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Radio Standards Specification

# Wireless Power Transfer Devices

## Preface

This Radio Standards Specification RSS-216, Issue 2, *Wireless Power Transfer Devices*, replaces RSS-216 Issue 1, *Wireless Power Transfer Devices (Wireless Chargers)*, published in September 2014. RSS-216 sets out the minimum requirements for wireless power transfer devices.

A transition period of six months is provided, within which compliance with either RSS-216 Issue 1 or with RSS-216 Issue 2 is accepted. The transition period will end on the last day of June 2016, after which date only compliance with RSS-216 Issue 2 will be accepted.

### List of Changes:

- 1) The title of the standard has been changed from RSS-216 *Wireless Power Transfer Devices (Wireless Chargers)* to RSS-216 *Wireless Power Transfer Devices*;
- 2) The content of this standard has been significantly modified. A list of key changes is provided below:
  - The scope of RSS-216 was updated to cover all types of wireless power transfer devices (although, for some types, an inquiry has to be submitted before applying RSS-216).
  - Issue 2 differentiates between three types of devices based on their classification as radio apparatus (of Category I or II) or interference-causing equipment, specifically Industrial, Scientific and Medical (ISM) equipment (see Note).
  - Added test methods and arrangements of the equipment under test, specific to wireless power transfer devices.

NOTE: The Department feels that the benefits and convenience of having all wireless power transfer devices under one standard (instead of one ICES, one RSS-200 series and one RSS-300 series) outweigh this exception from the normal standard numbering system.

Inquiries may be submitted online using the “[General Inquiry](#)” form at <http://www.ic.gc.ca/eic/site/ceb-bhst.nsf/frm-eng/EABV-9X4GEH>, or by regular mail to the following address:

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

If using the online “*General Inquiry*” form, please select the “*Regulatory Standards Branch*” radio button and specify “RSS-216” in your message.

Comments and suggestions for improving this standard can be submitted online using the “[Standard Change Request](#)” form at <http://www.ic.gc.ca/eic/site/ceb-bhst.nsf/frm-eng/EABV-9VCLQJ>.

All Spectrum Management and Telecommunications publications are available on the following [website](http://www.ic.gc.ca/spectrum): <http://www.ic.gc.ca/spectrum>.

Issued under the authority of  
the Minister of Innovation, Science and Economic Development

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Daniel Duguay  
Director General  
Engineering, Planning and Standards Branch

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## 1 Scope

This Radio Standards Specification (RSS) sets out the minimum requirements for wireless power transfer (WPT) devices, including sources (WPT transmitters) and clients (WPT receivers). See Section 4 for the definitions of these terms.

### 1.1 General

The following categories of WPT devices may require additional instructions on test setup, specific test procedure and/or technical requirements:

- High power WPT devices (e.g. for charging electric vehicles);
- WPT devices capable of wireless power transfer over distances greater than 10 cm;
- Medical devices with wireless power transfer capability; or
- WPT source devices operating at wireless power transfer frequencies higher than 400 MHz.

As such, prior to verifying compliance with RSS-216, an inquiry must be submitted to the Directorate of Regulatory Standards (DRS) of Innovation, Science and Economic Development Canada (ISED) for these four categories of WPT devices, using the “*General Inquiry*” online form or the mailing address specified in the [Preface](#). The inquiry shall include sufficient information pertaining to the technology and operation of the device in order for the Department to determine the applicable technical and administrative requirements for the specific device.

Wireless power transfer devices are either interference-causing equipment or licence-exempt radio apparatus that operate on a no-interference, no-protection basis.

### 1.2 Classification of WPT Devices

A WPT device, in addition to the wireless power transfer subassembly, may also include specific wireless modules and/or other functional circuitry, e.g. information technology equipment (ITE) for processing and manipulating digital data. This RSS only specifies applicable requirements for the WPT subassembly and for any wireless modules that the WPT device may incorporate. The requirements applicable to these two components of a WPT device depend on the device type, which can be interference-causing equipment or Category I or Category II radio apparatus, as determined by their characteristics and described in this section.

If the WPT device includes any other functions or circuitry, it may also be subject to other ISED standards, in addition to RSS-216. For example, if the WPT device includes additional digital or ITE subassemblies, it will also be subject to Interference-Causing Equipment Standard ICES-003, [Information Technology Equipment \(Including Digital Apparatus\) — Limits and Methods of Measurement](#).

#### 1.2.1 WPT Source Subassembly

There are three possible types of WPT source subassemblies, as described in this sub-section.

### 1.2.1.1 Type 1 (Interference-causing Equipment)

Type 1 includes WPT source subassemblies that are incapable of transmitting any form of intelligent communication wirelessly (including communication related to power transfer management). Type 1 WPT source subassemblies are classified as interference-causing equipment, specifically Industrial, Scientific and Medical (ISM) equipment.

### 1.2.1.2 Type 2 (Category II Radio Apparatus)

Type 2 includes all WPT source subassemblies that use some form of modulation on the wireless power transfer frequency for transmitting information (including WPT source subassemblies using load modulation techniques – see definition in Section 4.7) and that comply with the following two conditions:

- (i) Fundamental emissions are below 490 kHz; and
- (ii) All emissions radiated by the device are at least 40 dB below the general field strength limits for licence-exempt radio apparatus set out in RSS-Gen — [General Requirements for Compliance of Radio Apparatus](#).

Type 2 WPT source subassemblies are classified as Category II radio apparatus, as per [RSS-Gen](#).

### 1.2.1.3 Type 3 (Category I Radio Apparatus)

Type 3 includes all WPT source subassemblies that cannot be classified as either Type 1 or Type 2, i.e. WPT source subassemblies that use some form of modulation on the power transfer frequency for transmitting intelligent communication and which do not meet one or both of the conditions listed in Section 1.2.1.2.

Type 3 WPT source subassemblies are classified as Category I radio apparatus, as per [RSS-Gen](#), and require certification.

## 1.2.2 WPT Client Subassembly

The WPT subassembly of a WPT client device is only able to receive electromagnetic energy and is unable to transmit it (see definition in Section 4.2). As such, this subassembly is classified as interference-causing equipment, specifically ISM equipment.

## 1.2.3 Wireless Transmitters

A wireless transmitter module or subassembly intentionally transmits radiated electromagnetic energy on a frequency other than the wireless power transfer frequency of the WPT device (i.e. on a secondary frequency, as defined in Section 4.9). This type of module or subassembly is designated as a Category II radio apparatus if it satisfies both conditions (i) and (ii) from Section 1.2.1.2; otherwise, it is a Category I radio apparatus and it requires certification.

Both WPT sources and WPT clients may include wireless modules.

## 2 Summary of Applicable Requirements

This section provides an overview of all the technical and administrative requirements applicable to a specific WPT device as a function of its design, features and capabilities. The requirements applicable to the WPT subassembly of a source device depend on its classification as Type 1, Type 2 or Type 3 subassembly (see Section 1.2.1), while the requirements applicable to wireless modules depend on their classification as Category I or Category II radio apparatus (see Section 1.2.3).

**Table 1 – Applicable Requirements**

WPT device or system that includes		Applicable technical requirements, other than RF exposure	RF exposure	Certification	Labelling
Component	Type				
WPT subassembly of the client	ISM	ICES-001 (Section 6.2)	NA (Notes 2, 3) (Section 6.4.1)	Not required	RSS-216 (Notes 5, 6) (Section 8.1)
WPT subassembly of the source	Type 1 (ISM)	ICES-001 (Section 6.2)	Safety Code 6 (Notes 2, 3) (Section 6.4.2)	Not required	RSS-216 (Notes 5, 6) (Section 8.1)
	Type 2 (Cat. II)	ICES-001 (Note 1) (Section 6.2)	RSS-102 (Notes 3, 4) (Section 6.4.3)	Not required	RSS-216 (Notes 5, 6) (Section 8.1)
	Type 3 (Cat. I)	ICES-001 (Note 1) (Section 6.2)	RSS-102 (Notes 3, 4) (Section 6.4.4)	RSP-100 (Section 5)	RSP-100 (Note 5) (Section 8.2)
Wireless module (in the client or in the source)	Category II	RSS-Gen and RSS-310 (Section 6.3)	RSS-102 (Notes 3, 4) (Section 6.4.3)	Not required	RSS-216 (Notes 5, 6) (Section 8.1)
	Category I	RSS-Gen and other RSS(s) (Section 6.3)	RSS-102 (Notes 3, 4) (Section 6.4.4)	RSP-100 (Section 5)	RSP-100 (Note 5) (Section 8.2)
<p><b>Note 1:</b> Test facility must be registered with the Department and fundamental frequencies cannot be within the restricted bands specified in <a href="#">RSS-Gen</a>.</p> <p><b>Note 2:</b> WPT source devices with Type 1 WPT subassemblies but which also include Category I wireless modules must comply with the Radio frequency (RF) exposure requirements set out in <a href="#">RSS-102</a>. The same applies to WPT client devices.</p> <p><b>Note 3:</b> RF exposure must be verified at the device or system level, with all transmitters operating at maximum power.</p> <p><b>Note 4:</b> Category II radio apparatus is exempt from the routine evaluation procedure in <a href="#">RSS-102</a>. However, they are not exempt from compliance with <a href="#">Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 kHz to 300 GHz (2015)</a>, referred to hereinafter as Safety Code 6. The same applies to some Category I radio apparatus (see Section 6.4.4).</p> <p><b>Note 5:</b> RSS-216 labelling is performed at the device or system level. <a href="#">RSP-100</a> labelling (for Category I radio apparatus) can be performed at the device / system level or at the module level (in the case of third-party Category I wireless modules).</p> <p><b>Note 6:</b> WPT devices or systems that include these subassemblies plus at least one Category I wireless module can either be certified at the host level, in which case the <a href="#">RSP-100</a> labelling requirements apply, or can be labelled as per Section 8.1 in addition to the specific labelling requirements applicable to modular Category I radio apparatus set out in <a href="#">RSP-100</a>.</p>					

Although they are presented separately in the above table, the technical requirements for each subassembly of the WPT device are system-level tests, i.e. they must be verified on a sample of the corresponding WPT device model that is equipped with the given subassembly such that the tested sample is representative of the production units. However, various conditions apply to different tests, as follows:

- When performing compliance verifications against the technical requirements, other than RF exposure, as applicable to the WPT subassembly (see Section 6.2), emissions due to intentional transmitters from wireless modules that may be included in the device under test shall not be

considered. This can be accomplished either by disabling the wireless module, if possible and if it does not impact the emissions from the rest of the device under test in any way, or by ignoring these emissions when comparing with the limits defined in Section 6.2.

- Similarly, when verifying compliance of wireless modules against the requirements in Section 6.3, emissions generated by the WPT subassembly can be ignored.
- RF exposure shall be verified with the WPT device transmitting at maximum power on all its transmitters, including on the wireless power transfer frequency.

### 3 Normative References

The following documents are referenced in this standard and are indispensable for its application. The latest edition applies for each normative reference.

ICES-001, [\*Industrial, Scientific and Medical \(ISM\) Radio Frequency Generators\*](#)

RSS-Gen, [\*General Requirements for Compliance of Radio Apparatus\*](#)

RSS-102, [\*Radio Frequency \(RF\) Exposure Compliance of Radiocommunication Apparatus \(All Frequency Bands\)\*](#)

RSS-310, [\*Licence-exempt Radio Apparatus \(All Frequency Bands\): Category II Equipment\*](#)

RSP-100, [\*Certification of Radio Apparatus\*](#)

### 4 Definitions

#### 4.1 Wireless Power Transfer (WPT)

Wireless power transfer is the transfer of energy between a source and one or more client devices through radio waves, with no electrical contact between the source and client devices, for the purpose of powering and/or charging client devices wirelessly.

#### 4.2 WPT Client

A WPT client is a device capable of receiving power wirelessly from a WPT source. A WPT client is not designed to transmit power wirelessly, but to receive it only. However, it may include intentional radiators other than for power transfer, e.g. for power management signalling to the WPT source.

#### 4.3 WPT Source

A WPT source is a device directly connected (i.e. through a wired connection) to a power source, e.g. AC mains, a battery or some other source of internal or external electrical power, and which is capable of wireless power transfer to one or more WPT client devices.

#### **4.4 WPT Device**

A WPT device may be a WPT source, a WPT client or a system that includes a combination of one WPT source and one or more WPT clients.

A WPT device may also include other subassemblies for additional functionality beyond wireless power transfer. These may include, for example, wireless radio modules for IEEE 802.11 communication or circuitry for processing digital information.

#### **4.5 WPT Source Subassembly**

The term “WPT source subassembly” refers to that part (component) of a WPT source device that generates, conditions and operates the wireless power transfer function of the device. It includes any signalling and modulation circuitry if the device is capable of transmitting information by modulating the intentional radiating signal on the wireless power transfer frequency (i.e. in case of Type 2 or Type 3 devices – see sections [1.2.1.2](#) and [1.2.1.3](#) respectively).

#### **4.6 Power Transfer Management**

Power transfer management refers to the capability of some WPT devices to exchange information related to the power transfer operation between the source and the client for detecting invalid devices or objects, communicating status information, sending commands from the source to the client, sending acknowledgements from the client to the source, etc.

#### **4.7 Load Modulation**

Load modulation is a limited communication technique between WPT sources and WPT clients that is performed by modulating the wireless power transfer signal that is transmitted at the WPT frequency and is strictly limited to power transfer management and control.

#### **4.8 Separation Distance**

Separation distance is defined as the distance over which wireless power is transferred from a WPT source to a WPT client. It is measured from the surface of the WPT source that is used for wireless power transfer (its “WPT zone”, usually on the top of the WPT source) to the surface of the WPT client that is designed to be placed on or oriented towards the WPT source (usually the bottom of the WPT client). The separation distance is measured between the corresponding edges of the WPT zones of the WPT source and client devices, at the surface of their enclosures.

#### **4.9 Secondary Frequency**

Secondary frequency is any frequency or channel on which a WPT device intentionally transmits radiated electromagnetic energy for purposes other than wireless power transfer.

#### **4.10 Wireless Module**

A wireless module is a part (subassembly) of a WPT device that intentionally transmits radiated electromagnetic energy on one or more secondary frequencies.

## 5 Certification Requirements

WPT devices without Category I radio apparatus sub-components do not require certification. These WPT devices include the following categories:

- WPT source devices with Type 1 or Type 2 WPT source subassemblies (see Sections [1.2.1.1](#) and [1.2.1.2](#)) and either with Category II wireless modules (see Section [1.2.3](#)) or with no wireless modules;
- WPT client devices (see Section [1.2.2](#)) either with Category II wireless modules (see Section [1.2.3](#)) or with no wireless modules;
- WPT systems composed of WPT source and client devices as outlined above.

The manufacturer, importer and/or distributor shall ensure, however, that all such WPT systems and devices comply with all applicable standards and procedures.

WPT devices that include Type 3 WPT source subassemblies (see Section [1.2.1.3](#)) and/or Category I wireless modules (see Section [1.2.3](#)) require a technical acceptance certificate (TAC), as per [RSS-Gen](#). The application for certification shall follow the procedures set out in [RSP-100](#). If the WPT device only contains a third party Category I radio module, the modular certification procedure specified in [RSP-100](#) applies and the entire product (host with radio module installed) shall comply with the RF exposure requirements in [RSS-102](#).

## 6 Technical Requirements

### 6.1 Methods of Measurement – General Requirements

This section includes general requirements to be observed when verifying compliance with this standard. These general requirements are applicable to all types of WPT devices, in addition to the specific requirements defined elsewhere in Section [6](#) for each subassembly of the WPT device.

#### 6.1.1 Equipment under Test (EUT)

##### 6.1.1.1 WPT Source

WPT source devices that are marketed independently shall be tested with one or more units of typical client devices, as applicable, selected such that the WPT source device is fully exercised at maximum power from all its transmitters, including at the power transfer frequency, as per Section [6.1.2](#). In this case, the EUT consists of the WPT source device. The WPT client devices are auxiliary equipment.

The WPT client devices used as auxiliary equipment during testing shall be compliant with this standard.

Alternatively, passive or active dummy loads can be used instead of typical WPT client devices. However, in this case, all conditions listed below shall be satisfied:

- dummy loads can only be used to verify compliance of the WPT subassembly of the WPT source device with the limits defined in Section [6.2](#);

- dummy loads can only be used for Type 1 WPT subassemblies, i.e. incapable of any form of communication on the wireless power transfer frequency (see Section 1.2.1.1);
- dummy loads shall be designed such that the WPT source transmits constant power at maximum level on its wireless power transfer frequency throughout the entire test;
- each dummy load shall be designed to include power rectification and regulation circuitry representative of the anticipated client device design.

### 6.1.1.2 WPT Client

WPT client devices marketed independently shall be tested with a typical source device that is selected such that the WPT client device is fully exercised, as per Section 6.1.3, i.e. receiving maximum power from the WPT source and, if applicable, transmitting at maximum power from all its secondary frequency transmitters. In this case, the EUT consists of the WPT client device. The WPT source device is auxiliary equipment.

The WPT source device used as auxiliary equipment during testing shall be compliant with this standard.

### 6.1.1.3 WPT System

WPT systems consisting of one WPT source and one or more WPT clients, marketed together as a system, and where neither the source nor the clients can operate with other types of WPT devices, shall be tested together. In this case, the EUT consists of the WPT source and the WPT clients together (see Section 6.1.4).

WPT source and client devices marketed as a system, but where the source and/or client devices are designed with the capability of operating with other WPT device models, can be tested either as a WPT system, as per Section 6.1.4, or as independent devices, as per Sections 6.1.1.1 and 6.1.1.2, respectively.

## 6.1.2 EUT Setup for WPT Source Devices

This section applies to WPT source devices that are marketed independently (see Section 6.1.1.1).

### 6.1.2.1 Setup for Verifying the Power Transfer Function

When verifying compliance of emissions generated from the EUT's WPT subassembly with the technical requirements in this standard, the EUT shall be tested with one or more typical WPT client devices of models for which it is designed; dummy loads are permitted instead of typical WPT clients if all the conditions listed in Section 6.1.1.1 are met.

The WPT client devices or dummy loads shall be selected and both the EUT and the WPT client devices shall be operated such that the EUT transmits at the maximum output power for which it is designed on its wireless power transfer frequency or frequencies. This may be accomplished using dummy loads (as per Section 6.1.1.1) or by means of disconnecting the WPT subassemblies of client devices from their loads and connecting them instead to resistive loads, as per Section 6.1.3.1. Other methods can be used, as long as the EUT transmits constantly at maximum power throughout the test; for example, through

special configuration of the EUT (e.g. by means of specific software or hardware configuration, if provided by the manufacturer) and/or by periodically interrupting the test and discharging the auxiliary WPT client devices before resuming the test. The method used to ensure that the EUT transmits at its maximum power shall not modify the EUT from its typical application configuration, other than to ensure continuous maximum power transfer. The method used shall be documented in the test report.

Depending on the design of the EUT, one of the following EUT setup configurations shall be used throughout the tests, as applicable:

(i) **Single fixed power transfer zone, single client**

If the EUT has only one fixed power transfer zone and is capable of only powering or charging one client at a time, it shall be tested with a typical WPT client device for which it is designed or a dummy load, if permitted (as per Section 6.1.1.1). The model of the auxiliary WPT client device (or the dummy load) shall be selected such that the requirements for maximum power loading of the EUT specified above are satisfied.

(ii) **Multiple fixed power transfer zones, single client**

If the EUT has multiple fixed power transfer zones, but it is only capable of powering or charging one client at a time, it shall be tested with a typical WPT client device for which it is designed or a dummy load, if permitted (as per Section 6.1.1.1), and the test shall be repeated with the WPT client device (or dummy load) placed in sequence in each power transfer zone of the EUT. The model of the auxiliary WPT client device (or the dummy load) shall be selected such that the requirements for maximum power loading of the EUT specified above are satisfied.

(iii) **Multiple non-fixed power transfer zones, single client**

If the EUT has a large power transfer zone or multiple non-fixed power transfer zones, but is capable of powering or charging only one client at a time (e.g. WPT source devices with free positioning of the client device), it shall be tested with a typical WPT client device for which it is designed or a dummy load, if permitted (as per Section 6.1.1.1), and the test shall be repeated with the WPT client device (or dummy load) placed in sequence at the following locations:

- If the EUT's overall power transfer zone and the WPT client models accepted by the EUT are such that four or more client devices would fit within the EUT's power transfer zone at the same time, the test shall be repeated for five locations of the client device (or dummy load): in the centre and at four locations near the boundary of the overall power transfer zone. If the EUT's overall power transfer zone is of rectangular or square shape, the four boundary locations shall be at its four corners. Otherwise, the four boundary locations shall be approximately equally spaced around the perimeter of the EUT's overall power transfer zone.
- If the EUT's overall power transfer zone and the WPT client models accepted by the EUT are such that only three or fewer client devices would fit within the EUT's power transfer zone at the same time, a reduced number of test locations is acceptable. However, the test locations and their number shall be selected such that the entire EUT's overall power transfer zone would be covered if WPT client devices were placed on all test locations at the same time.

The model of the auxiliary WPT client device (or the dummy load) shall be selected such that the requirements for maximum power loading of the EUT specified above are satisfied.

(iv) **Multiple power transfer zones, multiple clients**

If the EUT has a large power transfer zone or multiple fixed or non-fixed power transfer zones and is capable of powering or charging multiple clients simultaneously, it shall be tested with multiple WPT client devices of types / models for which it is designed or with dummy loads, if permitted (as per Section 6.1.1.1). If the number of client devices (or dummy loads) selected for satisfying the EUT maximum output power requirement does not completely cover the overall power transfer surface area of the EUT, the test shall be repeated with different placement configurations of the client devices (or dummy loads) such that each of the locations described in (ii) or (iii) above, as applicable (based on the EUT design, i.e. fixed or non-fixed power transfer zones, respectively), is included in at least one test configuration.

If more than one test is required, the EUT must comply with this standard in all tested configurations.

### **6.1.2.2 Setup for Verifying the Secondary Frequencies**

When verifying compliance of emissions generated from secondary frequencies (see definition in Section 4.9) with the technical requirements in this standard, the EUT shall be tested with one or more typical WPT client devices of models for which it is designed.

The WPT client devices shall be selected and both the EUT and the WPT client devices shall be configured such that the EUT transmits at maximum power on all its secondary frequencies. This may be accomplished, for example, through special configuration of the EUT and/or of the auxiliary WPT client devices by means of specific software or hardware configuration, if provided by the manufacturer.

If the EUT cannot transmit simultaneously at maximum power on all secondary frequencies in normal operation, the test shall be repeated for a number of typical combinations of secondary frequencies that can transmit at the same time such that all secondary frequencies are verified for compliance with this standard. The method used to ensure the EUT transmits at its maximum power shall not modify the EUT from its typical application configuration, other than to ensure continuous transmission at maximum power. The method used shall be documented in the test report.

If more than one test is required, the EUT must comply with this standard in all tested configurations.

### **6.1.3 EUT Setup for WPT Client Devices**

This section applies to WPT client devices that are marketed independently (see Section 6.1.1.2).

#### **6.1.3.1 Setup for Verifying the Power Transfer Function**

The EUT shall be tested together with a typical WPT source device for which the EUT is designed. The WPT subassembly of the EUT shall be disconnected from its load (i.e. battery and/or power supply input of the load subassembly) and connected instead to a non-inductive resistive load. The resistive load shall be selected such that the WPT client device receives constant maximum power from the WPT source throughout the duration of the test. Other methods are acceptable as long as the requirement for constant maximum received power throughout the test is observed. The method used shall be documented in the test report.

### 6.1.3.2 Setup for Verifying the Secondary Frequencies

The EUT shall be tested together with a typical WPT source device for which the EUT is designed. The selected WPT source shall be capable of exercising all secondary frequency transmitters (see definition in Section 4.9) of the EUT, at their maximum transmission power.

When verifying compliance with this standard, the WPT client device shall be operated such that it transmits at maximum power on all secondary frequencies. This may be accomplished, for example, through special configuration of the EUT and/or auxiliary WPT source device (e.g. by means of specific software or hardware configuration, if provided by the manufacturer).

If the EUT cannot transmit simultaneously at maximum power on all secondary frequencies in normal operation, the test shall be repeated for a number of typical combinations of secondary frequencies that can transmit at the same time such that all secondary frequencies are verified for compliance with this standard. The method used to ensure that the EUT transmits at its maximum power shall not modify the EUT from its typical application configuration, other than to ensure continuous transmission at maximum power. The method used shall be documented in the test report.

If more than one test is required, the EUT must comply with this standard in all tested configurations.

### 6.1.4 EUT Setup for WPT Systems (source and client(s) together)

This section applies to WPT systems consisting of a source and client devices that are marketed together as a system and where neither the source nor the clients are intended to operate with other models of WPT devices (see Section 6.1.1.3). WPT source and client devices marketed as a system, but where the source and/or client devices are designed such that they are capable of operating with other WPT device models, can be tested either as a WPT system, in accordance with the requirements in this section, or as independent devices, as per the requirements in Sections 6.1.2 and 6.1.3, respectively.

#### 6.1.4.1 Setup for Verifying the Power Transfer Function

When verifying compliance of emissions generated from the EUT's WPT source and client subassemblies with the technical requirements in this standard, the EUT shall be tested with one or more WPT client devices, as applicable, based on the EUT design (the use of dummy loads instead of WPT client devices for testing WPT systems is not permitted).

The WPT client devices shall be selected and both the WPT source and WPT client devices shall be operated such that the EUT's WPT source transmits at the maximum output power for which it is designed on its wireless power transfer frequency or frequencies. This may be accomplished by disconnecting the WPT subassemblies of the client devices from their loads and connecting them instead to resistive loads, as per Section 6.1.3.1. Other methods can be used, as long as the EUT's source transmits constantly at maximum power throughout the entire test; for example, through special configuration of the EUT (e.g. by means of specific software or hardware configuration, if provided by the manufacturer) and/or by periodically stopping the test and fully discharging the client devices before resuming the test. The method used to ensure that the EUT's source device transmits at its maximum power shall not modify the EUT from its typical application configuration, other than to ensure continuous maximum power transfer. The method used shall be documented in the test report.

Depending on the design of the EUT, the setup configuration used throughout the tests shall comply with the requirements described in Section 6.1.2.1 (i), (ii), (iii) or (iv), as applicable.

All models of WPT client devices included in the EUT must be verified, either through testing or technical analysis. Preliminary investigations may be performed to determine the combination of WPT client devices that generates worst-case emissions (i.e. models and number of each model) and perform the final compliance measurement on that configuration only: see Section 6.1.7. For WPT client models of the EUT that are not subject to testing, the test report shall include the technical justification and analysis to demonstrate how their compliance can be assessed based on the test results obtained with the tested models.

If more than one test is required, the EUT must comply with this standard in all tested configurations.

#### **6.1.4.2 Setup for Verifying the Secondary Frequencies**

When verifying compliance of emissions generated from secondary frequencies (see definition in Section 4.9) with the technical requirements in this standard, the EUT shall be configured with its WPT source and at least one WPT client device such that both its WPT source and its WPT clients transmit at maximum power on all their secondary frequencies. This may be accomplished, for example, through special configuration of the EUT (e.g. by means of specific software or hardware configuration, if provided by the manufacturer).

The WPT clients used for testing shall be selected as follows:

- If the EUT only includes receive-only WPT client devices (with no secondary frequency transmitters), any of these can be selected for testing as long as the EUT can be configured such that its WPT source transmits at maximum power on all its secondary frequencies;
- If the EUT only includes WPT clients with secondary frequencies, at least one of each model of WPT client device shall be included in the test;
- If the EUT includes a number of WPT clients of different models, some (not all) of which have secondary frequency transmitters, at least one of each model of the latter shall be included in the test.

If the EUT cannot transmit simultaneously at maximum power on all secondary frequencies in normal operation, the test shall be repeated for a number of typical combinations of secondary frequencies that can transmit at the same time such that all secondary frequencies in both the WPT source and in each model of WPT client are verified for compliance with this standard. The method used to ensure that the EUT transmits at its maximum power shall not modify the EUT from its typical application configuration, other than to ensure continuous transmission at maximum power. The method used shall be documented in the test report.

If more than one test is required, the EUT must comply with this standard in all tested configurations.

#### **6.1.5 Separation Distance**

This section applies to all EUTs that are capable of wireless power transfer over a non-zero separation distance (see definition in Section 4.8) between the source and the client devices.

For these EUTs, preliminary exploratory measurements shall be performed by varying the orientation of the WPT client(s) and its (their) separation distance(s) from the wireless power transfer zone of the WPT source, within the limits permitted by the WPT system under test (i.e. such that the source and each client can still operate as intended, with wireless power transfer between them), for finding the configuration that generates the highest levels of emissions. The final compliance measurements shall then be performed on the worst-case EUT configuration. This procedure shall be used for all EUT emissions.

Alternatively, the EUT shall be tested in at least the following two configurations:

- With zero separation between the source and client devices;
- With maximum separation between the source and client devices.

### **6.1.6 Orientation**

The WPT devices subject to this standard shall be tested in their typical setup configuration, as per the manufacturer's instructions in the user manual. If the device can be operated in various orientations (e.g. tabletop and wall-mount), it shall be tested in each orientation in which it is intended to be used.

For wall-mounted operation, the device shall be placed on the test table (80 cm high, for radiated emissions; 80 or 40 cm high for conducted emissions, if a vertical reference ground plane is used or not used, respectively) and it shall be set up vertically, in a similar way as in its intended application. Any support used to hold the device in vertical position on the test table shall be composed of insulating materials that are transparent to and not reflective of the electromagnetic energy at all frequencies within the tested frequency range.

### **6.1.7 Multiple Tests**

Wherever this standard requires a test case to be repeated for a number of specific EUT configurations, initial pre-scan investigations are acceptable in order to determine the configuration which generates worst-case emissions. In this case, the final measurement need only be performed on the worst-case configuration. However, all pre-scan results and a description of the preliminary investigation, including photographs of the various test configurations, together with the final measurements, shall be documented in the test report. This process is not applicable to secondary frequencies. Each type of secondary frequency must be tested against the applicable requirements in the corresponding RSS.

### **6.1.8 Battery-operated WPT Source**

The conducted emissions requirements do not apply to WPT source devices that are exclusively powered from a battery and that do not have the capability to (re)charge their battery by means of an external AC mains power adapter.

WPT source devices that are exclusively powered from a battery, but which are capable of recharging their battery while connected to the AC mains through an external power adapter and where their WPT function is disabled while in battery charging mode, shall be tested in two configurations:

- The WPT source shall be placed in battery charging mode and tested for conducted emissions at its AC mains power adapter terminals;

- The WPT source shall be placed in WPT mode and tested for radiated emissions.

WPT source devices powered from a battery, but which are also capable of operating while powered from AC mains, shall be tested as an AC mains powered device, in two configurations:

- The WPT source shall be placed in battery charging mode and tested for conducted emissions at its AC mains power input terminals (or at the AC mains power terminals of its adapter, in case of external AC mains power adapter);
- The WPT source shall be placed in WPT mode and tested for conducted emissions at its AC mains power input terminals and for radiated emissions. The WPT source shall be connected to AC mains (through its power adapter, in case of an external adapter) for both the conducted and radiated emissions test cases.

WPT source devices powered exclusively from the AC mains power network (either directly or indirectly, through an external power adapter) shall be tested together with their AC mains power adapter (in case of an external adapter), if included with the WPT source device. Otherwise, the WPT source device shall be tested with a typical power adapter, as per the manufacturer's recommendation.

## 6.2 Technical Requirements for the WPT Subassembly

This section applies to all WPT source devices, regardless of their WPT subassembly type, as well as to WPT client devices, including source and client devices that are part of a WPT system. In addition to the technical requirements set out in this section, see also Section 6.4, for the applicable RF exposure requirements.

### 6.2.1 Instrumentation, Test Facilities and Measurement Methods

The instrumentation, test facilities and measurement methods used to demonstrate compliance of WPT devices with the limits defined in this section shall be in accordance with the requirements set out in [ICES-001](#). The additional EUT test setup and measurement method requirements set out in Section 6.1 shall also apply.

For Type 2 or Type 3 WPT source subassemblies (see Sections [1.2.1.2](#) and [1.2.1.3](#)), the following additional requirements apply:

- The instrumentation, test facilities and measurement methods used to verify compliance of Type 2 WPT source subassemblies with the two conditions listed in Section [1.2.1.2](#) shall be in accordance with the requirements set out in [RSS-Gen](#);
- The test facilities used to verify compliance of Type 2 and Type 3 WPT source subassemblies with the limits defined in this section shall be registered with the Department, as per the registration requirements for test site facilities set out in [RSS-Gen](#). For these devices, the test facility shall be validated as per the requirements in ANSI C63.4-2014 (as per [RSS-Gen](#)) instead of CISPR 16-1-4 (as per the CISPR 11 standard referenced in [ICES-001](#)).

## 6.2.2 Limits

### 6.2.2.1 Conducted Emissions

WPT subassemblies of WPT source devices shall comply with the mains terminals disturbance voltage limits for induction cooking (group 2) equipment, as set out in the CISPR 11 standard referenced in [ICES-001](#).

### 6.2.2.2 Radiated Emissions

The magnetic field radiated emissions within 9 kHz – 30 MHz from the WPT subassembly of WPT source and client devices and WPT systems shall comply with the limits for induction cooking (group 2) equipment, as set out in the CISPR 11 standard referenced in [ICES-001](#). The preferred test method for WPT devices that may be used in residential environments and that have a maximum dimension of less than or equal to 1.6 m is the test method using the van Veen loop antenna system, as per the CISPR 11 standard referenced in [ICES-001](#). However, it is acceptable to use the alternate 60 cm loop test method and corresponding limit for these small residential WPT devices (the same as for commercial / industrial and large residential devices).

The electric field radiated emissions within 30 – 1000 MHz from the WPT subassembly of WPT source and client devices and WPT systems shall comply with the Class B limits for group 2 equipment, as set out in the CISPR 11 standard referenced in [ICES-001](#).

## 6.2.3 Restricted Bands

Fundamental frequencies and modulation components of Type 2 and Type 3 WPT source subassemblies shall not fall within the restricted bands specified in [RSS-Gen](#).

## 6.2.4 Certification

Type 3 WPT source assemblies require certification, as per [RSS-Gen](#) (see Section 5). Type 1 and Type 2 WPT source assemblies, as well as WPT client subassemblies, do not require certification.

## 6.3 Technical Requirements for Wireless Modules

This section applies to all WPT devices (source, client and system) that include wireless modules (see Section 1.2.3). In addition to the technical requirements set out in this section, see also Section 6.4, for the applicable RF exposure requirements.

### 6.3.1 Instrumentation, Test Facilities and Measurement Methods

The instrumentation, test facilities and measurement methods used to demonstrate compliance of the wireless modules included in WPT devices with the limits defined in this section shall be in accordance with the requirements set out in [RSS-Gen](#) and the other RSSs applicable to the wireless technology used in the device. The additional EUT test setup and measurement method requirements set out in Section 6.1 shall also apply.

### 6.3.2 Limits

Category II wireless modules that are included in WPT devices shall comply with [RSS-Gen](#) and with Section 3.7 of [RSS-310](#).

Category I wireless modules that are included in WPT devices shall comply with [RSS-Gen](#) and with the other RSSs applicable to the specific wireless technologies used in the device. Category I wireless modules require certification, as per [RSS-Gen](#) (see Section 5).

## 6.4 Radio Frequency (RF) Exposure Compliance

### 6.4.1 RF Exposure from Receive-only WPT Client Devices

There are no RF exposure requirements applicable to the WPT subassembly of WPT client devices under RSS-216. However, WPT client devices that include wireless modules are subject to [Safety Code 6](#) or [RSS-102](#): see Section 6.4.3 or Section 6.4.4, as applicable.

### 6.4.2 RF Exposure from WPT Devices that are ISM equipment

This section applies to WPT source devices with a Type 1 WPT subassembly (see Section 1.2.1.1) and no wireless modules (see Section 1.2.3). Such WPT devices are interference-causing equipment and, as such, although they intentionally transmit radiated electromagnetic energy, they fall out of the scope of [RSS-102](#).

WPT source devices with a Type 1 WPT subassembly and which include Category II wireless modules are also subject to the RF exposure requirements set out in this section. However, WPT devices (source, client or system) that include Category I wireless modules, regardless of their WPT subassembly type, shall comply with the requirements in [RSS-102](#), as per Section 6.4.4.

WPT devices subject to this section shall comply with the requirements set out in Health Canada's [Safety Code 6](#) for RF exposure. When assessing compliance with [Safety Code 6](#), all transmitters, including those not used for power transfer, must be simultaneously active and at maximum power.

Compliance can be verified through testing, simulation, analysis or a combination thereof and the results shall be documented in the test report, which is subject to the same requirements as stated in Section 7 (e.g. retention period and requirement to make the report available to the Department upon request).

### 6.4.3 RF Exposure from WPT Devices that are Category II Radio Apparatus

This section applies to the following categories of WPT devices:

- WPT source devices with a Type 2 WPT subassembly (see Section 1.2.1.2) and which include either no wireless modules or Category II wireless modules (see Section 1.2.3);
- WPT client devices that include Category II wireless modules (see Section 1.2.3);
- WPT systems consisting of a source device as above and including either client devices as above or receive-only client devices, or a combination thereof.

Such WPT devices are exempt from an RF exposure and/or specific absorption rate (SAR) routine evaluation as set out in [RSS-102](#). However, this exemption from routine evaluation **is not** an exemption from compliance with the limits specified in Health Canada's [Safety Code 6](#), as set out in [RSS-102](#).

#### 6.4.4 RF Exposure from WPT Devices that are Category I Radio Apparatus

This section applies to WPT devices (source, client and system) that have at least one subassembly classified as Category I radio apparatus, i.e. WPT devices that include a Type 3 WPT source subassembly (see Section 1.2.1.3) and/or Category I wireless modules (see Section 1.2.3).

WPT devices subject to this section, except for those meeting all the conditions in the following paragraph, shall comply with the applicable requirements of [RSS-102](#).

Inductive WPT devices with no secondary intentional radiating frequencies that meet all of the following conditions are exempted from RF exposure and/or SAR routine evaluation as set out in [RSS-102](#). However, this exemption from routine evaluation **is not** an exemption from compliance with the limits specified in Health Canada's [Safety Code 6](#), as set out in [RSS-102](#). The conditions for exemption from routine evaluation are as follows:

- (i) Wireless power transfer frequency is below 1 MHz;
- (ii) Output power from each primary coil (i.e. transmitter coil in the WPT source device) is less than or equal to 5 W;
- (iii) The WPT device is only capable of wireless power transfer between one source and one client at a time. This includes WPT systems with multiple primary coils (i.e. in the WPT source) as long as they only allow wireless power transfer to take place through a single pair of coils at any given time (one in the source and the other in the client). It also includes WPT systems where the source may use two or more overlapping smaller coils to form a fixed charging/powering zone, as long as they only allow wireless power transfer to take place between this zone and a single client device;
- (iv) The WPT client device is placed in direct contact with or docked onto the WPT source;
- (v) The maximum coupling surface area of the WPT source is less than or equal to 400 cm<sup>2</sup>; and
- (vi) The total leakage fields from all simultaneous transmitting coils are proven to be less than 30% of the applicable Health Canada's [Safety Code 6](#) limits for uncontrolled environments, as set out in [RSS-102](#), at 10 cm from the WPT system in all directions. The total leakage fields shall be calculated or measured based on actual and typical WPT clients of types selected such that they provide worst-case conditions. For WPT source devices with multiple fixed wireless power transfer zones that are only capable of powering/charging one client at a time, this requirement shall be met separately for each zone.

RF exposure shall be evaluated with the client devices charged/powered by the source device at maximum output power. Additionally, all transmitters, including those not used for wireless power transfer, must be active simultaneously and at maximum power.

For WPT devices designed for desktop applications (e.g. wireless charging pads), RF exposure shall be evaluated at 10 cm away from all sides and from the top of the WPT device / system. The 10 cm shall be as measured from the probe centre to the WPT device / system edge.

A combination of analysis, electric and magnetic field strength measurements, SAR assessments, radiated and conducted power measurements, in conjunction with computational modeling, may be required to demonstrate compliance with the RF exposure limits, depending on the operating frequency of the wireless power transfer device.

## 7 Test Report

The manufacturer or importer of WPT devices subject to this RSS shall ensure that compliance with all applicable technical requirements has been demonstrated and the results documented in the test report. The test report shall comply with the provisions set out in [ICES-001](#) (for WPT subassembly of WPT source and client devices), [RSS-Gen](#) (for WPT devices that include Category I or II radio apparatus) and this standard (for all WPT devices). The test report shall be retained by the manufacturer or importer for as long as the model is manufactured, imported, offered for sale, sold, distributed and/or leased in Canada, and it shall be made available to the Department upon request.

NOTE: The test report for Category I radio apparatus (which requires certification) must be submitted to the Department (directly or through a recognized certification body) with the certification application, as per [RSP-100](#).

## 8 Labelling Requirements

### 8.1 Labelling Requirements for WPT Devices that are not Category I Radio Apparatus

The labelling requirements in this section apply to all WPT devices that do not include any Category I radio apparatus, i.e.

- WPT source devices with a Type 1 or Type 2 WPT subassembly (see Sections [1.2.1.1](#) and [1.2.1.2](#), respectively) and which include either no wireless modules or Category II wireless modules (see Section [1.2.3](#));
- WPT client devices that include either no wireless modules or Category II wireless modules (see Section [1.2.3](#));
- WPT systems consisting of a source device and one or more client devices as above.

WPT host devices (source, client or system) that only include third party Category I wireless modules (see Section [1.2.3](#)) shall be labelled as per the requirements in this section or as per Section [8.2](#):

- If the WPT device (including the host and all modules) is certified as a Category I radio apparatus, then Section [8.2](#) applies;
- If the host WPT device is not certified, then it shall be labelled as per this section **and** as per the labelling requirements set out in [RSP-100](#) for modular certification. In this case, all Category I wireless modules that are included in the WPT device must have been individually certified by their manufacturer as per the modular certification procedures in [RSP-100](#).

Each unit of a WPT device model of the types specified above shall bear a label which represents the manufacturer's or importer's Self-Declaration of Compliance to Innovation, Science and Economic Development Canada RSS-216. This label shall be permanently affixed to the apparatus or displayed

electronically, as per [Notice 2014 - DRS1003](#), and its text must be clearly legible. If the dimensions of the device are too small or if it is not practical to place the label on the apparatus and electronic labelling has not been implemented, the label shall be placed in a prominent location in the user manual supplied with the apparatus, upon agreement with Innovation, Science and Economic Development Canada. The user manual may be in an electronic format, in which case it must be readily available (e.g. on the manufacturer's website) for as long as the model is manufactured, imported, offered for sale, sold, distributed and/or leased in Canada.

The Innovation, Science and Economic Development Canada compliance label shall include the word "Canada" (or "CAN") and the standard name in both English and French. An example is given below:

**CAN RSS-216 / CNR-216**

## **8.2 Labelling Requirements for WPT Devices that are Category I Radio Apparatus**

WPT devices that are classified as Category I radio apparatus, i.e. WPT source devices or WPT systems including a Type 3 WPT source assembly (as per Section [1.2.1.3](#)) and WPT devices (source, client or system) including Category I wireless modules (as per Section [1.2.3](#)), shall be labelled as per the requirements set out in [RSP-100](#).