

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Electric vehicle wireless power transfer (WPT) systems –  
Part 3: Specific requirements for magnetic field wireless power transfer systems**

**Systèmes de transfert de puissance sans fil (WPT) pour véhicules électriques –  
Partie 3: Exigences spécifiques pour les systèmes de transfert de puissance  
sans fil par champ magnétique**





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Draft	Report on voting
69/857/FDIS	69/866/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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## INTRODUCTION

The IEC 61980 series is published in separate parts according to the following structure:

- IEC 61980-1 covers general requirements for electric road vehicle (EV) wireless power transfer (WPT) systems including general background and definitions (e.g. efficiency, electrical safety, EMC, EMF);
- IEC 61980-2<sup>1</sup> specifically applies to magnetic field wireless power transfer (MF-WPT) for electric road vehicles (EV) and covers specific requirements for system activities and communication between the electric road vehicle side and the off-board side, including general background and definitions;
- IEC 61980-3 covers specific power transfer requirements for the off-board side of magnetic field wireless power transfer systems for electric road vehicles (e.g. efficiency, electrical safety, EMC, EMF).

Requirements for the on-board side of MF-WPT for electric road vehicles are covered in ISO 19363.

IEC 61980-3 follows the structure of IEC 61980-1:2020.

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<sup>1</sup> Under preparation. Stage at the time of publication: IEC/AFDIS 61980-2:2022.

# ELECTRIC VEHICLE WIRELESS POWER TRANSFER (WPT) SYSTEMS –

## Part 3: Specific requirements for magnetic field wireless power transfer systems

### 1 Scope

This part of IEC 61980 applies to the off-board supply equipment for wireless power transfer via magnetic field (MF-WPT) to electric road vehicles for purposes of supplying electric energy to the RESS (rechargeable energy storage system) and/or other on-board electrical systems. The MF-WPT system operates at standard supply voltage ratings per IEC 60038 up to 1 000 V AC and up to 1 500 V DC from the supply network. The power transfer takes place while the electric vehicle (EV) is stationary.

Off-board supply equipment fulfilling the requirements in this document are intended to operate with EV devices fulfilling the requirements described in ISO 19363.

The aspects covered in this document include

- the characteristics and operating conditions,
- the required level of electrical safety,
- requirements for basic communication for safety and process matters if required by a MF-WPT system,
- requirements for positioning to assure efficient and safe MF-WPT power transfer, and
- specific EMC requirements for MF-WPT systems.

The following aspects are under consideration for future documents:

- requirements for MF-WPT systems for two- and three-wheel vehicles,
- requirements for MF-WPT systems supplying power to EVs in motion,
- requirements for bidirectional power transfer,
- requirements for flush mounted primary device,
- requirements for MF-WPT systems for heavy duty vehicle, and
- requirements for MF-WPT systems with inputs greater than 11,1 kVA.

This document does not apply to

- safety aspects related to maintenance, and
- trolley buses, rail vehicles and vehicles designed primarily for use off-road.

NOTE The terms used in this document are specifically for MF-WPT.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 61439-7:2018, *Low-voltage switchgear and controlgear assemblies – Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations*

IEC 61980-1:2020, *Electric vehicle wireless power transfer (WPT) systems – Part 1: General requirements*

IEC 61980-2:—, *Electric vehicle wireless power transfer (WPT) systems – Part 2: Specific requirements for MF-WPT system communication and activities<sup>2</sup>*

ISO 19363:2020, *Electrically propelled road vehicles – Magnetic field wireless power transfer – Safety and interoperability requirements*

ISO 20653, *Road vehicles – Degrees of protection (IP code) – Protection of electrical equipment against foreign objects, water and access*

ICNIRP, *ICNIRP guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz – 100 kHz)*, Health Physics 99(6):818-836; 2010

Recommendation ITU-R SM.2110-1:2019, *Guidance on frequency ranges for operation of non-beam wireless power transmission for electric vehicles*

### 3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

Clause 3 of IEC 61980-1:2020 is applicable.

*Additional terms and definitions:*

#### 3.101

##### **accessible part**

part of equipment that can be touched without the use of a tool, excluding parts when under the vehicle

#### 3.102

##### **alignment**

relative position in X- and Y- direction of the secondary device to the primary device for a given secondary device ground clearance

#### 3.103

##### **alignment tolerance area**

intended WPT operating area in X- and Y- direction for a given secondary device ground clearance

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<sup>2</sup> Under preparation. Stage at the time of publication: IEC/AFDIS 61980-2:2022.

**3.104****centre alignment point**

spatial X, Y centre of the alignment tolerance area

Note 1 to entry: The centre alignment point is not a fixed point for any single coil. It only has relevance for a primary and secondary device combination and is specific for that combination.

**3.105****charge session**

period when the SECC is in the WPT\_S\_PTA or WPT\_S\_PT state as defined in IEC 61980-2

**3.106****compatibility class A supply device**

supply device that interoperates with compatibility class A EV devices

Note 1 to entry: See ISO 19363:2020, Clause 6.

Note 2 to entry: A compatibility class A supply device is interoperable with all normative reference EVPCs – see Annex A.

**3.107****compatibility class B supply device**

supply device that operates with at least one compatibility class B EV device and might interoperate with one or more compatibility class A EV devices

Note 1 to entry: See ISO 19363:2020, Clause 6.

Note 2 to entry: Interoperability with any of the normative reference EVPCs is optional.

**3.108****connecting cable**

cable which connects a physical unit containing portions of the SPC to another physical unit containing portions of the SPC

Note 1 to entry: Cables within a physical unit are not connecting cables.

**3.109****DUT**

device under test

**3.110****electric vehicle communication controller****EVCC**

embedded system within the vehicle that implements the communication between the vehicle and the SECC in order to support specific functions

Note 1 to entry: Such specific functions could be controlling input and output channels, encryption or data transfer between the vehicle and the SECC.

[SOURCE: ISO 15118-1:2019, 3.1.31]

**3.111****EV power circuit****EVPC**

on-board component assembly comprising the secondary device and EV power electronics as well as the mechanical connections

SEE: Figure 1.

**3.112****EV power electronics**

on-board component that converts the power and frequency from the secondary device to the DC output of the EVPC

EXAMPLE Impedance matching network (IMN), filter, rectifier, impedance converter

**3.113****flush mounted**

mounting of a primary device in such a manner that the top covering of the primary device is flush with the pavement

**3.114****foreign object**

object that is not an attached part of the vehicle or the WPT system

**3.115****fundamental mutual inductance**

mutual inductance of two specific coils at a specific physical position relative to each other

**3.116****gauge device**

test device to characterize magnetic fields associated with a coil

**3.117****geometric centre**

spatial X, Y centre of the primary coil or the secondary coil

**3.118****MF-WPT power class**

power class of a supply device of MF-WPT systems defined from the perspective of the maximum power drawn from the supply network in order to drive the supply device

**3.119****magnetic field WPT****MF-WPT**

transfer of electrical energy from a power source to an electrical load via a magnetic field without galvanic connection

**3.120****magnetic resonance**

magnetic field wireless power transfer (MF-WPT) that utilizes one or more high quality factor coils and one or more impedance matching networks or compensation networks operating at or near resonance

**3.121****operating frequency**

frequency used to transmit energy between the supply device and the EV device within the system frequency range

**3.122****power transfer efficiency**

ratio of the output power of the EVPC divided by the input power of the SPC

**3.123****primary coil**

component of the primary device comprising one or more electrical windings and magnetic materials that generate a magnetic field for MF-WPT