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Electrically propelled road vehicles — Functional and safety requirements for power transfer between vehicle and external electric circuit —

Part 6: Safety and interoperability requirements for heavy-duty vehicles in magnetic field wireless power transfer

Véhicules routiers à propulsion électrique — Exigences fonctionnelles et exigences de sécurité pour le transfert de puissance entre le véhicule et le circuit électrique externe —

Partie 6: Exigences de sécurité et d'interopérabilité pour les véhicules utilitaires lourds dans le cadre du transfert d'énergie sans fil par champ magnétique

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, SC 37, *Electrically propelled vehicles*.

A list of all parts in the ISO 5474 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document specifies requirements for on-board components of a wireless power transfer systems in heavy-duty vehicles. It gives guidance in terms of safety and performance and additionally addresses interoperability to off-board components from different manufacturers to, for example, support the development of public wireless charging infrastructure. Even if the technology itself is well known, the implementation in a vehicle is new and demands to meet the very specific requirements of the automotive industry. This document is based on limited experience with series development and production. Current and future product developments will continuously prove (and disprove) the applicability of this document to further improve the contents, especially regarding the interoperability between systems from different manufacturers.

The systems specified in this document are intended to work with off-board systems that are compliant with the requirements of the relevant portions of the IEC 61980 series. Some of those relevant documents are currently in development.

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Electrically propelled road vehicles — Functional and safety requirements for power transfer between vehicle and external electric circuit —

Part 6:
Safety and interoperability requirements for heavy-duty vehicles in magnetic field wireless power transfer

1 Scope

This document defines the requirements and operation of the on-board vehicle equipment that enables magnetic field wireless power transfer (MF-WPT) for traction battery charging of electric vehicles. It specifies requirements for static (vehicle not in motion) and dynamic (vehicle in motion) applications. It is intended to be used for heavy duty vehicles. This does not exclude the application of systems in passenger cars or light commercial vehicles

This document addresses the following aspects for an EV device:

— safety requirements;

— transferred power and power transfer efficiency;

— ground clearance of the EV device;

— functionality with associated off-board systems under various conditions and independent of manufacturer (interoperability);

— test procedures.

EV devices that fulfil the requirements in this document are intended to operate with supply devices that fulfil the MF-WPT related requirements in the IEC 61980 series.

In this edition, multiple secondary devices (modular approach for higher power classes) are not covered.

NOTE The dynamic application is shown in Annex C.

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.

ISO 5474-1, *Electrically propelled road vehicles — Functional and safety requirements for power transfer between vehicle and external electric circuit — Part 1: General requirements for conductive power transfer*

ISO 6469-3:2021, *Electrically propelled road vehicles — Safety specifications — Part 3: Electrical safety*

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

IEC 60664 (all parts), *Insulation coordination for equipment within low-voltage systems*

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

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IEC 61980-2, *Electric vehicle wireless power transfer (WPT) Systems — Part 2: Specific requirements for MF-WPT system communication and activities*

ICNIRP 2010, *Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz – 100 kHz)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5474-1 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
alignment
relative position in x- and y-direction of the *secondary device* (3.16) to the *primary device* (3.10) for a given *secondary device ground clearance* (3.17)

3.2
alignment tolerance area
intended *wireless power transfer (WPT)* (3.23) operating area in x- and y-direction for a given *secondary device ground clearance* (3.17)

3.3
embedded mounting
mounting of a *primary device* (3.10) in such a manner that the top covering of the primary device is buried (embedded) under the pavement

3.4
centre alignment point
geometrical centre of the *alignment tolerance area* (3.2)

3.5
electrically propelled vehicle
EV
vehicle with one or more electric drive(s) for vehicle propulsion

3.6
EV device
on-board component assembly of *wireless power transfer (WPT) system* (3.24)

3.7
EV power circuit
EVPC
on-board component assembly, comprising the *secondary device* (3.16) and *EV power electronics* (3.8), as well as the electrical and mechanical connections

3.8
EV power electronics
on-board component that converts the power and frequency from the *secondary device* (3.16) to the DC power output of the *EV power circuit (EVPC)* (3.7)

3.9
magnetic field WPT system
MF-WPT system
system using wireless transfer of energy from a power source to an electrical load via a magnetic field

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