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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Switchgear and controlgear and their assemblies for low voltage – Integration of radiocommunication device above 380 MHz into an equipment

Appareillages et ensembles d'appareillages à basse tension – Intégration d'un dispositif de radiocommunication de plus de 380 MHz à un équipement



IEC 63404:2024-02(en-fr)



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SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES FOR LOW VOLTAGE – INTEGRATION OF RADIOCOMMUNICATION DEVICE ABOVE 380 MHZ INTO AN EQUIPMENT

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The text of this International Standard is based on the following documents:

Draft	Report on voting
121/151/FDIS	121/158/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. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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INTRODUCTION

In the context of the fast evolution of radiocommunication technologies and the long lifetime of low voltage equipment, this document proposes the evaluation and verification of the initial integration and update of radiocommunication devices within host equipment, including the hardware or the software.

The aim of this document is to define the tasks of testing the host equipment when integrating and updating the radiocommunication device into low voltage equipment (e.g. circuit-breaker, sensor, electric actuator, etc.). In general, this document gives requirements for components hosting a radiocommunication device in order to facilitate their integration into an assembly.

This document is intended to be referenced by product standards as common radiocommunication requirements (see Annex C).

The test program has been elaborated based on the result of actual IEC 61000-4-39 testing by equipment manufacturers and test laboratories. This test allows the characterisation of radiofrequency band(s) and amplitude(s) which is called a capability profile. This capability profile can be used to demonstrate the capability of an equipment to host various radiocommunication devices when their characteristics are within the limits given by the capability profile.

The integration of a pre-evaluated radiocommunication device according to its radiotechnology standard into a host equipment can affect its radio transmitter performances. This document includes the verification of the radiocommunication functions after integration following the main guidance from ETSI EG 203 367, FCC KDB 996369 D04, MIIT No.129:2021 and GRFC N 07-20-03-001:2007.

SWITCHGEAR AND CONTROLGEAR AND THEIR ASSEMBLIES FOR LOW VOLTAGE – INTEGRATION OF RADIOCOMMUNICATION DEVICE ABOVE 380 MHZ INTO AN EQUIPMENT

1 Scope

This document defines radiocommunication related requirements for equipment intended to integrate a radiocommunication device. It includes the initial integration and update of a the radiocommunication device, having a carrier frequency greater than 380 MHz, into new or updated host equipment with:

– The classification of integration categories;
– The EMC immunity verification using a capability profile approach;
– The verification of the unwanted emission level of the radio transceiver.

This document also provides typical radiocommunication device integration use cases (see Annex A).

The object of this document is to define the required evaluation when incorporating a radiocommunication device into a new or updated host equipment.

This document is intended to be referred by the product standard of the host equipment for providing additional characteristics, performance, and evaluation regarding the integration and update of a radiocommunication device (see Annex C). It can also be used by the manufacturer of the host equipment when no applicable product standard exists.

In addition, this document provides guidance on considerations to be addressed in product standards including safety and security matter.

This document does not cover:

– The test of the radiocommunication device according to its radiotechnology standard or specification (e.g. IEEE 802.11, IEEE 802.15.4);
– Allocation of radio frequencies;
– The impact on the application of the equipment;
– The safety related requirements of the host equipment (see the applicable product standard)
– Hazards related to remote control operations (see the applicable product standard);
– Over the air software updates (under consideration for the next revision).

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 60417, *Graphical symbols for use on equipment*, available at http://www.graphical-symbols.info/equipment

IEC 61000-4-39:2017, *Electromagnetic compatibility (EMC) – Part 4-39: Testing and measurement techniques – Radiated fields in close proximity – Immunity test*

IEC 62479, *Assessment of the compliance of low-power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)*

IEC 62657-2, *Industrial networks – Coexistence of wireless systems – Part 2: Coexistence management*

ISO 7000, *Graphical symbols for use on equipment*, available at http://www.graphical-symbols.info/equipment

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1
radiocommunication device
radio transceiver intended to be integrated into an equipment for communication purposes

Note 1 to entry: The form of the device can be a complete single unit (module) or a set of associated elements (antenna, transmitter, power supply, etc.).

Note 2 to entry: The original evaluation of the transmitter and receiver functions can be associated with specific integration instructions and operating conditions.

3.2
radio transceiver
transmitter-receiver
combination in a single unit of a radio transmitter and a radio receiver employing common circuit components and usually the same antenna for both transmitting and receiving

Note 1 to entry: A transceiver is often used as a portable or mobile station. In French, the terms “talkie-walkie” and “walkie-talkie” are strongly deprecated in the sense of portable transmitter-receiver.

[SOURCE: IEC 60050-713:1998, 713-08-02 modified by adding radio in the term]

3.3
radio link
telecommunication facility of specified characteristics between two points provided by means of radio waves

[SOURCE: ITU-R V.573-5:2015, A21]

3.4
antenna gain
ratio, generally expressed in decibels, of the radiation intensity produced by an antenna in a given direction to the radiation intensity that would be obtained if the power accepted by the antenna were radiated equally in all directions

Note 1 to entry: If no direction is specified, the direction of maximum radiation intensity from the given antenna is implied.

Note 2 to entry: The gain is frequently expressed in decibels with respect to an isotropic antenna which is expressed in dBi.

[SOURCE: IEC TR 62630: 2010, 3.1.6, modified with a new Note 2 to entry replacing the original one]

3.5
antenna port
port that is connected to an antenna, either direct or by a cable. The antenna may be external or internal to the equipment or the radiocommunication device

Note 1 to entry: Antenna ports connected to antennas internal to the equipment or the radiocommunication device are covered by signal ports.

[SOURCE: IEC 61000-6-6:2003, 4.1, modified with equipment or the radiocommunication device]

3.6
equivalent radiated power
ERP
product of the power supplied to the antenna and the maximum antenna gain relative to a half-wave dipole

[SOURCE: ITU-T K.70:2020]

3.7
equivalent isotropically radiated power
EIRP
product of the power accepted by the antenna and the maximum antenna gain relative to an isotropic antenna

[SOURCE: ITU-T K.100:2019]

3.8
host equipment
<radiocommunication> switchgear, controlgear or other equipment or assembly, intended to host a radiocommunication device

3.9
switchgear
general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended in principle for use in connection with generation, transmission, distribution and conversion of electric energy

[SOURCE: IEC 60050-441:1984, 441-11-02, modified by deleting the first article]

3.10
controlgear
general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended in principle for the control of electric energy consuming equipment

[SOURCE: IEC 60050-441:1984, 441-11-03, modified by deleting the first article]

3.11
low-voltage switchgear and controlgear assembly
assembly
combination of one or more low-voltage switching devices together with associated control, measuring, signalling, protective, regulating equipment, with all the internal electrical and mechanical interconnections and structural parts, as defined by the original manufacturer, which can be assembled in accordance with the original manufacturer's instructions

[SOURCE: IEC 61439-1:2020, 3.1.1, modified – removal of notes to entry]

3.12
intelligent assembly
assembly which includes facilities for intelligent operation and maintenance for the full life cycle by using advanced sensor technology, digital technology, network technology, communication technology and artificial intelligence technology

[SOURCE: IEC TS 63290:—, 3.1, modified – removal of Note 1 to entry]

3.13
original manufacturer
organization that has carried out the original design and the associated verification of an assembly in accordance with the relevant assembly standard

[SOURCE: IEC 61439-1:2011, 3.10.1]

3.14
capability profile
<nearfield radiofrequency> spectral envelope of electromagnetic radiated nearfield which an equipment is able to withstand without degradation of its non-radio functions

4 Implementation categories

For the purpose of managing the update of the radiocommunication device of an equipment, the following implementation categories are defined. These depend on whether the equipment has electronic circuits and where the embedded software, called also firmware, if any, supporting the non-radio functions of the equipment, is hosted.

The electronic circuit, including the embedded software, if any, supporting the non-radio functions of the host equipment, can be either of:

a) Integrated fully or partially into the radiocommunication device or
b) Hosted only on the equipment, separately from the radiocommunication device or electronic circuits without embedded software.

NOTE For the purpose of this document, the term "electronic circuit" excludes circuits in which all components are passive (including diodes, resistors, varistors, capacitors, surge suppressors, inductors).