



**ElectroMagnetic Compatibility (EMC)
standard for combined and/or integrated radio
and non-radio equipment;
Part 2: Specific conditions for equipment
intended to be used in industrial locations;
Harmonised Standard covering the essential requirements
of article 3.1(b) of Directive 2014/53/EU**

Reference

DEN/ERM-EMC-356

Keywords

EMC, emission, harmonised standard, immunity

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2017.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Modal verbs terminology.....	4
Introduction	4
1 Scope	6
2 References	6
2.1 Normative references	6
2.1.1 Radio EMC standards	6
2.1.2 Non-radio EMC standards	7
2.1.3 Other EMC standards.....	9
2.2 Informative references.....	9
3 Definitions and abbreviations.....	9
3.1 Definitions.....	9
3.2 Abbreviations	11
4 EMC requirements	11
4.1 Introduction	11
4.2 Emissions requirements.....	11
4.2.1 Radiated Emissions.....	11
4.2.2 Conducted Emissions.....	12
4.2.2.1 Special provisions	12
4.2.2.2 AC Power port	12
4.2.2.3 PLC port.....	12
4.2.2.4 DC power port.....	12
4.2.2.5 Wired network port	12
4.2.2.6 Antenna Port	12
4.3 Immunity requirements	13
4.3.1 General.....	13
4.3.2 Configuration of the equipment during immunity tests	13
4.3.3 Performance criteria.....	13
4.3.4 Radiated Immunity	13
4.3.5 Electrostatic discharge	14
4.3.6 Fast transients, common mode.....	14
4.3.7 Radio frequency, common mode	14
4.3.8 Voltage dips and interruptions	14
4.3.9 Surges	14
4.3.10 Other immunity tests.....	14
Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU	15
Annex B (informative): Use of industrial equipment in residential locations.....	17
Annex C (informative): Exclusion bands.....	18
Annex D (informative): Change History	19
History	20

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document is based on the principles given in ETSI EG 203 367 "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment" [i.4].

For the equipment in the scope of the present document, it contains all requirements for showing compliance of the combined and/or integrated equipment with RED [i.1], article 3.1(b). For this purpose, normative references to the appropriate product standards are provided for the radio part(s) as well as for the non-radio part(s) of the combined and/or integrated equipment.

Furthermore it is determined which additional measurements, emission limits or performance criteria are necessary for the combination of a non-radio and a radio product (which is called " Δ " in ETSI EG 203 367 [i.4]).

Requirements for RED [i.1], article 3.2 (effective use of the spectrum) are not in the scope of the present document.

In contrast to ETSI EG 203 367 [i.4] the present document has been developed with the target to be listed under the RED [i.1].

1 Scope

The present document defines requirements in respect of ElectroMagnetic Compatibility (EMC) under article 3.1(b) of Directive 2014/53/EU [i.1] for combined and/or integrated equipment intended to be operated within industrial locations.

The present document is only applicable to combined and/or integrated equipment where the radio function is within the scope of one or more of the standards listed in clause 2.1.1 and where the non-radio function is within the scope of one or more of the standards listed in clause 2.1.2.

NOTE: Requirements applicable to the antenna port specifically related to the efficient use of radio spectrum are not included in the present document. These requirements are found in the applicable product standard(s) for the effective use of the radio spectrum under article 3.2 of Directive 2014/53/EU [i.1].

2 References

2.1 Normative references

2.1.1 Radio EMC standards

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 301 489-1 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU".
- [2] ETSI EN 301 489-3 (V2.1.1) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".
- [3] ETSI EN 301 489-6 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 6: Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".
- [4] ETSI EN 301 489-17 (V3.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".
- [5] ETSI EN 301 489-33 (V2.2.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 33: Specific conditions for Ultra-WideBand (UWB) devices; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".

- [6] ETSI EN 301 489-51 (V2.1.0) (03-2017): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 51: Specific conditions for Automotive, Ground based Vehicles and Surveillance Radar Devices using 24,05 GHz to 24,25 GHz, 24,05 GHz to 24,5 GHz, 76 GHz to 77 GHz and 77 GHz to 81 GHz; Harmonised Standard covering the essential requirements of article 3.1b of Directive 2014/53/EU".
- [7] ETSI EN 301 489-52 (V1.1.0) (11-2016): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1b of Directive 2014/53/EU".

2.1.2 Non-radio EMC standards

- [8] CENELEC EN 50270 (2006): "Electromagnetic compatibility. Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen".
- [9] CENELEC EN 50370-1 (2005): "Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 1: Emission".
- [10] CENELEC EN 50370-2 (2003): "Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunity".
- [11] CENELEC EN 55011 (2016): "Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement".
- [12] CENELEC EN 55015 (2013) and A1 (2015): "Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment".
- [13] CENELEC EN 60947-1 (2007), A1 (2011) and A2 (2014): "Low-voltage switchgear and controlgear - Part 1: General rules".
- [14] CENELEC EN 60947-2 (2006), A1 (2009) and A2 (2013): "Low-voltage switchgear and controlgear - Part 2: Circuit-breakers".
- [15] CENELEC EN 60947-3 (2009), A1 (2012) and A2 (2015): "Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units".
- [16] CENELEC EN 60947-4-1 (2010) and A1 (2012): "Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters".
- [17] CENELEC EN 60947-4-2 (2012): "Low-voltage switchgear and controlgear - Part 4-2: Contactors and motor-starters - AC semiconductor motor controllers and starters".
- [18] CENELEC EN 60947-4-3 (2014): "Low-voltage switchgear and controlgear - Part 4-3: Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads".
- [19] CENELEC EN 60947-5-1 (2004), AC (2004), AC (2005) and A1 (2009): "Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices".
- [20] CENELEC EN 60947-5-2 (2007) and A1 (2012): "Low-voltage switchgear and controlgear - Part 5-2: Control circuit devices and switching elements - Proximity switches".
- [21] CENELEC EN 60947-5-6 (2000): "Low-voltage switchgear and controlgear - Part 5-6: Control circuit devices and switching elements - DC interface for proximity sensors and switching amplifiers (NAMUR)".
- [22] CENELEC EN 60947-5-7 (2003): "Low-voltage switchgear and controlgear - Part 5-7: Control circuit devices and switching elements - Requirements for proximity devices with analogue output".
- [23] CENELEC EN 60947-5-9 (2007): "Low-voltage switchgear and controlgear - Part 5-9: Control circuit devices and switching elements - Flow rate switches".

- [24] CENELEC EN 60947-6-1 (2005) and A1 (2014): "Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment".
- [25] CENELEC EN 60947-6-2 (2003) and A1 (2007): "Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS)".
- [26] CENELEC EN 60947-8 (2003), A1 (2006) and A2 (2012): "Low-voltage switchgear and controlgear - Part 8: Control units for built-in thermal protection (PTC) for rotating electrical machines".
- [27] CENELEC EN 60974-10 (2014) and A1 (2015): "Arc welding equipment - Part 10: Electromagnetic compatibility (EMC) requirements".
- [28] CENELEC EN 61000-6-2 (2017): "Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments".
- [29] CENELEC EN 61000-6-4 (2007) and A1 (2011): "Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments".
- [30] CENELEC EN 61131-2 (2007): "Programmable controllers - Part 2: Equipment requirements and tests".
- [31] CENELEC EN 61204-3 (2000): "Low voltage power supplies, d.c. output - Part 3: Electromagnetic compatibility (EMC)".
- [32] CENELEC EN 61326-1 (2013): "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements".
- [33] CENELEC EN 61326-2-2 (2013): "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-2: Particular requirements - Test configurations, operational conditions and performance criteria for portable test, measuring and monitoring equipment used in low-voltage distribution systems".
- [34] CENELEC EN 61326-2-3 (2013): "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning".
- [35] CENELEC EN 61326-2-4 (2013): "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-4: Particular requirements - Test configurations, operational conditions and performance criteria for insulation monitoring devices according to IEC 61557-8 and for equipment for insulation fault location according to IEC 61557-9".
- [36] CENELEC EN 61326-2-5 (2013): "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-5: Particular requirements - Test configurations, operational conditions and performance criteria for devices with field bus interfaces according to IEC 61784-1".
- [37] CENELEC EN 61439-2 (2011): "Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies".
- [38] CENELEC EN 61439-3 (2012): "Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)".
- [39] CENELEC EN 61557-12 (2008): "Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. - Equipment for testing, measuring or monitoring of protective measures - Part 12: Performance measuring and monitoring devices (PMD)".
- [40] CENELEC EN 61800-3 (2004) and A1 (2012): "Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods".
- [41] CENELEC EN 62135-2 (2015): "Resistance welding equipment - Part 2: Electromagnetic compatibility (EMC) requirements".

2.1.3 Other EMC standards

- [42] CENELEC EN 55032 (2015) and AC (2016): "Electromagnetic compatibility of multimedia equipment - Emission requirements".
- [43] CENELEC EN 50561-1 (2013) and AC (2015): "Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 1: Apparatus for in-home use".
- [44] CENELEC EN 50561-3 (2016): "Power line communication apparatus used in low-voltage installations - Radio disturbance characteristics - Limits and methods of measurement - Part 3: Apparatus operating above 30 MHz".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/53/EU of the European Parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.2] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).
- [i.3] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.4] ETSI EG 203 367: "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".
- [i.5] ETSI EN 303 446-1 (2017): "ElectroMagnetic Compatibility (EMC) standard for combined and/or integrated radio and non-radio equipment; Part 1: Requirements for equipment intended to be used in residential, commercial and light industry locations; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".
- [i.6] CENELEC EN 61000-6-3 (2007), A1 (2011) and AC (2012): "Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 301 489-1 [1] and the following apply:

AC mains power port: port that connects to the low voltage AC mains power network for the sole purpose of supplying electrical energy to the EUT

applicable non-radio EMC standard: standard that would be applicable to the equipment under the EMCD [i.2] if it did not contain any radio functionality

applicable radio EMC standard: standard that is applicable under RED [i.1], article 3.1(b) to the embedded radio transmitter and/or receiver depending on the used radio functionality

combined equipment: equipment consisting of two or more products where at least one of which is radio communication or radio determination equipment and at least one of which is non-radio equipment

EXAMPLE: A radio enabled pressure sensor, where the radio functionality is embedded by incorporating a radio module, which may be assessed separated from the host.

function: operation carried out by an equipment

NOTE: Functions are related to basic technologies incorporated in the equipment such as radio reception, radio transmission, emitting light, conversion of physical dimensions to electrical signals.

industrial location: location characterized by a separate power network, supplied from a high- or medium-voltage transformer, dedicated for the supply of the installation

EXAMPLE: Metalworking, pulp and paper, chemical plants, car production, farm building, HV areas of airports.

NOTE 1: Industrial locations can generally be described by the existence of an installation with one or more of the following characteristics:

- items of equipment installed and connected together and working simultaneously;
- significant amount of electrical power is generated, transmitted and/or consumed;
- frequent switching of heavy inductive or capacitive loads;
- high currents and associated magnetic fields;
- presence of industrial, high power scientific and medical (ISM) equipment (for example, welding machines).

The electromagnetic environment at an industrial location is predominantly produced by the equipment and installation present at the location. There are types of industrial locations where some of the electromagnetic phenomena appear in a more severe degree than in other installations.

NOTE 2: Within these locations it is not expected to operate a broadcast receiver within a distance of 10 m from the device.

NOTE 3: See CENELEC EN 61000-6-2 [28].

integrated equipment: equipment which cannot be separated into radio and non-radio constituent products that can be assessed individually

EXAMPLE: A radio enabled programmable logic control, where the radio functionality is completely incorporated on the printed circuit board (PCB) of the programmable logic control in the host appliance, and cannot be assessed separately from the host.

PLC port: port for the purpose of data transfer and communications that may also carry electrical energy to or from the EUT

NOTE 1: PLC ports are also called PLT ports.

NOTE 2: A PLC port is not considered a wired network port in the sense of this definition.

radio module: piece of a radio equipment allowing the radio function of this equipment

service or configuration link: radio link that is only temporarily used by authorized personnel during installation, configuration and/or servicing and not intended to be operated unattended

wired network port: point of connection for voice, data and signalling transfers intended to interconnect widely dispersed systems by direct connection to a single-user or multi-user communication network (for example CATV, PSTN, ISDN, xDSL, LAN and similar networks)

NOTE: These ports may support screened or unshielded cables and may also carry AC or DC power where this is an integral part of the telecommunication specification.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1] and the following apply:

AC	Alternating Current
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
PLC	Power Line Communication

4 EMC requirements

4.1 Introduction

At least one configuration of typical intended use shall be tested according to the requirements in clauses 4.2 and 4.3 with both non-radio and radio functions operating at the same time. The configuration of the EUT should be established in order to:

- maximize the emissions of the EUT;
- ensure the EUT is most susceptible;
- be typical of the intended use.

For the non-radio function, this configuration can be achieved by satisfying the requirements of the applicable non-radio EMC standard listed in clause 2.1.2. The configuration of the radio function shall be in accordance with the applicable radio EMC standard listed in clause 2.1.1. The configuration(s) used shall be recorded in the test report together with the rationale for these choices.

Where the applicable non-radio EMC standard and the applicable radio EMC standard refer to different editions of a basic test standard, either edition of the basic test standard may be applied when assessing the combined and/or integrated equipment.

Where a manufacturer determines from the electrical characteristics and intended usage of the EUT that one or more measurements are unnecessary, the decision and justification not to perform these measurements shall be recorded in the test report.

Where there are alternative test methods and test configurations in the present document, those selected shall be detailed in the test report according to the applied standard, so that it is possible to use it for re-testing to ensure consistency of the results.

4.2 Emissions requirements

4.2.1 Radiated Emissions

For radiated emissions, the EUT with the radio function in receive mode shall be assessed to the applicable non-radio EMC standard(s) as listed in clause 2.1.2.

NOTE: The transmit mode of the radio function is part of the assessment under article 3.2 of the RED applicable to the radio technology used.

Alternatively, the EUT may be assessed with the radio function in transmit mode. In this case, the exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied. In this case, the EUT still needs to comply with the applicable non-radio EMC standard(s) as listed in clause 2.1.2.

If the upper frequency range of this assessment is below 6 GHz, then the test requirements (while keeping the EUT configuration from the non-radio EMC standard as listed in clause 2.1.2) of CENELEC EN 61000-6-4 [29] shall apply from this upper range frequency to a maximum of 6 GHz.

4.2.2 Conducted Emissions

4.2.2.1 Special provisions

Where the wired network port provides AC or DC power as part of a telecommunication specification, they shall be tested as wired network ports.

4.2.2.2 AC Power port

For conducted emissions on the AC power port(s), the EUT shall be assessed to the applicable non-radio EMC standard(s) as listed in clause 2.1.2.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

4.2.2.3 PLC port

Where the A.C power port of the equipment is also used for PLC communication up to 30 MHz, the EUT shall comply with the requirements of CENELEC EN 50561-1 [43], clause 6.

Where the A.C power port of the equipment is also used for PLC communication above 30 MHz, the EUT shall comply with the requirements of CENELEC EN 50561-3 [44], clause 6.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

4.2.2.4 DC power port

For conducted emissions on the DC power port(s), the EUT shall be assessed to the applicable non-radio EMC standard(s) as listed in clause 2.1.2.

Where the applicable non-radio EMC standard(s) listed in clause 2.1.2 do not contain test methods and limits no measurement is required.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

4.2.2.5 Wired network port

For conducted emissions on the wired network port(s), the EUT shall be assessed to the applicable non-radio EMC standard(s) as listed in clause 2.1.2.

Where the applicable non-radio EMC standard(s) listed in clause 2.1.2 do not contain test methods and limits, the EUT shall meet the requirements given in CENELEC EN 61000-6-4 [29], table 3.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

4.2.2.6 Antenna Port

Where the EUT has a port intended for the connection of an external antenna via coaxial cable, the Class A requirements of CENELEC EN 55032 [42] for antenna ports shall apply. In the case where non-compliance can be attributed to the transmission of the wanted signal from the EUT, these shall be disregarded.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

4.3 Immunity requirements

4.3.1 General

The radio function of the EUT shall be tested against the requirements of the applicable radio EMC standard (s) listed in clause 2.1.1 and the non-radio function of the EUT shall be tested against the applicable non-radio EMC standard(s) listed in clause 2.1.2. To reduce the amount of testing, it is recommended to select one or more configuration(s) that exercise these functions simultaneously during the application of each test.

Where the radio and the non-radio functions have been tested separately, an additional set of tests shall be performed within these functions operating simultaneously.

For this simultaneous testing, where immunity requirements are in conflict between those defined in the applicable radio EMC standard(s) listed in clause 2.1.1 and those defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2, the more stringent requirements shall apply, unless otherwise defined in clauses 4.3.4 to 4.3.10.

NOTE: As an example, the evaluation of the measurement and radio function of the EUT may be performed by transmitting measurement data over wireless LAN port. This allows the functions to be exercised in parallel during a single test, thus reducing test time.

4.3.2 Configuration of the equipment during immunity tests

The configuration(s) of the EUT as defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2 shall be used.

The radio function shall be set into the operating mode(s) as defined in the applicable radio EMC standard (s) listed in clause 2.1.1.

In order to minimize the number of tests, when possible and when this is representative of a normal use, different operating modes may be tested simultaneously (e.g. measurement with simultaneous transmission of data over wireless LAN).

Configuration(s) used during the tests shall be detailed in the test report.

4.3.3 Performance criteria

The performance of the radio communications function(s) shall comply with the performance criteria of the applicable radio EMC standard (s) listed in clause 2.1.1.

The other functions shall comply with the performance criteria defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2.

Performance criteria applied during the tests shall be detailed in the test report.

4.3.4 Radiated Immunity

The radio and non-radio functions of the EUT shall meet the immunity requirements of the applicable non-radio EMC standard(s) listed in clause 2.1.2. Where the frequency range in these standards does not fully cover 80 MHz to 6 GHz, or where only spot frequencies in this range are specified, the radio function shall meet the requirements of the applicable radio EMC standard(s) listed in clause 2.1.1 for the frequency range(s) not covered.

Where the radio link is defined by the manufacturer as a service or configuration link only and not intended for permanent use, the radio link may be disturbed temporarily at test levels higher than those defined in the applicable radio EMC standard (s) listed in clause 2.1.1. In this case, the "performance criteria for transient phenomena applied to transmitters and receivers" according ETSI EN 301 489-1 [1], clause 6.2 shall be applied to the radio function at those increased test levels.

Where the radio function is operational during the test, the exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

NOTE: If the radiated immunity test is also performed within the immunity/receiver exclusion band(s), some additional measures might be necessary to avoid damaging of the radio receiver.

4.3.5 Electrostatic discharge

The combined and/or integrated EUT shall be assessed to the requirements defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2.

4.3.6 Fast transients, common mode

The combined and/or integrated EUT shall be assessed to the requirements defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2.

4.3.7 Radio frequency, common mode

The EUT shall meet the radio frequency, common mode requirements of the applicable non-radio EMC standard(s) listed in clause 2.1.2 up to 80 MHz.

Where the radio link is defined by the manufacturer as a service or configuration link only and not intended for permanent use, the radio link may be disturbed temporarily at test levels higher than those defined in the applicable radio EMC standard (s) listed in clause 2.1.1. In this case, the "performance criteria for transient phenomena applied to transmitters and receivers" according clause 6.2 of ETSI EN 301 489-1 [1] shall be applied to the radio function at those increased test levels.

The exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

NOTE: If the radio frequency, common mode test is also performed within the immunity/receiver exclusion band(s) some additional measures might be necessary to avoid damaging of the radio receiver.

4.3.8 Voltage dips and interruptions

The combined and/or integrated EUT shall be assessed to the requirements defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2.

4.3.9 Surges

The combined and/or integrated EUT shall be assessed to the requirements defined in the applicable non-radio EMC standard(s) listed in clause 2.1.2.

4.3.10 Other immunity tests

If the applicable non-radio EMC standard(s) listed in clause 2.1.2 contain(s) further immunity test requirements than those defined in the previous clauses, than these requirements also apply to the combined and/or integrated EUT.

Where these immunity tests are of a continuous nature like the tests covered by clauses 4.3.4 or 4.3.7, than the exclusion band(s) defined in the applicable radio EMC standard (s) listed in clause 2.1.1 shall be applied.

NOTE: If other immunity tests are performed within the immunity/receiver exclusion band(s) some additional measures might be necessary to avoid damaging of the radio receiver.

Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

Harmonised Standard ETSI EN 303 446-2				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Radiated Emissions	4.2.1	U	
2	Conducted Emissions, AC mains power ports	4.2.2.2	C	Only where equipment has AC mains power input and/or output ports
3	Conducted Emissions, PLC ports	4.2.2.3	C	Only where equipment has PLC ports
4	Conducted Emissions, DC power ports	4.2.2.4	C	Only where equipment has DC power input and/or output ports with a cable length greater than 3 m
5	Conducted Emissions, Wired network ports	4.2.2.5	C	Only where equipment has wired network ports
6	Conducted Emissions, Antenna ports	4.2.2.6	C	Only where equipment has external antenna ports via coaxial cable
7	Radiated Immunity	4.3.4	U	
8	Immunity: Electrostatic discharge	4.3.5	U	
9	Immunity: Fast transients common mode	4.3.6	U	
10	Immunity: Radio frequency common mode	4.3.7	U	
11	Immunity: Voltage dips and interruptions	4.3.8	C	Only where the relevant referenced standard(s) listed in clause 2.1.2 define requirements and where equipment has AC and/or DC mains power input ports
12	Immunity: Surges	4.3.9	C	Only where the relevant referenced standard(s) listed in clause 2.1.2 define requirements and where equipment has relevant ports
13	Immunity: Other immunity tests	4.3.10	C	Only where the relevant referenced standard(s) listed in clause 2.1.2 define immunity tests additional to those defined in clauses 4.3.4 to 4.3.9 and where equipment has relevant ports.

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.

Description A textual reference to the requirement.

Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C	Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).
Condition	Explains the conditions when the requirement is or is not applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Use of industrial equipment in residential locations

If equipment can be used also in residential environments, then the instructions for use accompanying the product should contain the following text:

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Alternatively, the equipment should comply with the emission requirements of ETSI EN 303 446-1 [i.5] with CENELEC EN 61000-6-3 [i.6] used as non-radio EMC standard.

Annex C (informative): Exclusion bands

Where required by clauses in the present document exclusion bands are derived from the standard(s) referenced in table C.1 applicable to the radio technology deployed within the combined and/or integrated equipment under assessment. Where multiple radio technologies are deployed within the same equipment all of the relevant exclusion bands are applied.

It should be noted that the exclusion bands applied during immunity testing may differ from those applied during emission testing.

Table C.1: Exclusion band references

Radio technology	Exclusion bands defined in
Cellular (GSM [®] , 3G, 4G and 5G included)	ETSI EN 301 489-52 [7], clause 4.3
Bluetooth [®] (Bluetooth [®] LE included), ZigBee [®] , Wi-Fi [®]	ETSI EN 301 489-17 [4], clause 4.3
Non-Specific SRD	ETSI EN 301 489-3 [2], clause 4.3
WiGig [®]	No exclusion bands applied
DECT [®]	ETSI EN 301 489-6 [3], clause 4.3
NOTE 1: Other technologies have their exclusion band(s) according to the applicable radio EMC standard (s) listed in clause 2.1.1 of the present document or ETSI EN 301 489-1 [1], clause 4.3 if a specific radio technology part does not exist.	
NOTE 2: The Bluetooth [®] word mark is a registered trademark owned by Bluetooth SIG, Incorporation. This information is given for the convenience of the user of the present document and does not constitute an endorsement by ETSI. Equivalent technology may be used if it can be shown to lead to the same results.	
NOTE 3: The ZigBee [®] word mark is a registered trademark owned by the ZigBee Alliance. This information is given for the convenience of the user of the present document and does not constitute an endorsement by ETSI. Equivalent technology may be used if it can be shown to lead to the same results.	
NOTE 4: The Wi-Fi [®] and WiGig [®] word marks are registered trademarks owned by the Wi-Fi Alliance. This information is given for the convenience of the user of the present document and does not constitute an endorsement by ETSI. Equivalent technology may be used if it can be shown to lead to the same results.	

Annex D (informative): Change History

Version	Information about changes
1.1.1	First publication of the TS after approval by TC ERM at ERM#61 (21 – 24 February 2017, Sophia Antipolis) Rapporteur is Dirk Eyfrig

History

Document history			
V1.1.0	March 2017	EN Approval Procedure	AP 20170615: 2017-03-17 to 2017-06-15