

INTERNATIONAL STANDARD

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Electrical equipment for measurement, control and laboratory use – EMC requirements –

Part 2-5: Particular requirements – Test configurations, operational conditions and performance criteria for field devices with field bus interfaces according to IEC 61784-1

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Matériel électrique de mesure, de commande et de laboratoire – Exigences relatives à la CEM –

Partie 2-5: Exigences particulières – Configurations d'essai, conditions de fonctionnement et critères d'aptitude à la fonction pour les équipements de terrain avec des interfaces utilisant des bus de terrain conformes à la CEI 61784-1



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL EQUIPMENT FOR MEASUREMENT,
CONTROL AND LABORATORY USE –
EMC REQUIREMENTS –****Part 2-5: Particular requirements –
Test configurations, operational conditions and performance criteria
for field devices with field bus interfaces according to IEC 61784-1**

FOREWORD

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International Standard IEC 61326-2-5 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- Update with respect to IEC 61326-1:2012.

The text of this standard is based on the following documents:

FDIS	Report on voting
65A/643/FDIS	65A/654/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part of IEC 61326 series is to be used in conjunction with IEC 61326-1:2012 and follows the same numbering of clauses, subclauses, tables and figures.

When a particular subclause of IEC 61326-1 is not mentioned in this part, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in IEC 61326-1 is to be adapted accordingly.

NOTE The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in IEC 61326-1;
- unless notes are in a new subclause or involve notes in IEC 61326-1, they are numbered starting from 101 including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

A list of all parts of IEC 61326 series, under the general title *Electrical equipment for measurement, control and laboratory use – EMC requirements* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE – EMC REQUIREMENTS –

Part 2-5: Particular requirements – Test configurations, operational conditions and performance criteria for field devices with field bus interfaces according to IEC 61784-1

1 Scope

In addition to the requirements of International Standard IEC 61326-1, this part of IEC 61326 treats the particular features for EMC testing of field devices with field bus interfaces. This part of IEC 61326 covers only the field bus interface of the equipment.

NOTE The other functions of the equipment remain covered by other parts of IEC 61326 series.

This part refers only to field devices intended for use in process control and process measuring.

In this standard field devices with interfaces according to IEC 61784-1, CP 3/2 and CP 1/1 as defined in IEC 61784 are covered. Other field busses may be included in future editions of this standard.

The IEC 61784-1 specifies a set of protocol specific communication profiles based on IEC 61158.

The manufacturer specifies the environment for which the product is intended to be used and/or selects the appropriate test level specifications of IEC 61326-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Clause 2 of IEC 61326-1 applies except as follows:

Addition:

IEC 61158-2:2010, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61158-3-3:2007, *Industrial communication networks – Fieldbus specifications – Part 3-3: Data-link layer service definition – Type 3 elements*

IEC 61158-5-5:2007, *Industrial communication networks – Fieldbus specifications – Part 5-5: Application layer service definition – Type 5 elements*

IEC 61158-6-10:2010, *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 61784-1:2010, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

3 Terms and definitions

Clause 3 of IEC 61326-1 applies.

4 General

Clause 4 of IEC 61326-1 applies.

5 EMC test plan

5.1 General

Subclause 5.1 of IEC 61326-1 applies.

5.2 Configuration of EUT during testing

Subclause 5.2 of IEC 61326-1 applies, except as follows:

Addition:

Additional requirements: see Annexes AA and BB.

5.3 Operation conditions of EUT during testing

Subclause 5.3 of IEC 61326-1 applies, except as follows:
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Addition:

Additional requirements: see Annexes AA and BB.

5.4 Specification of functional performance

Subclause 5.4 of IEC 61326-1 applies.

5.5 Test description

Subclause 5.5 of IEC 61326-1 applies.

6 Immunity requirements

6.1 Conditions during the tests

Subclause 6.1 of IEC 61326-1 applies.

6.2 Immunity test requirements

Subclause 6.2 of IEC 61326-1 applies.

6.3 Random aspects

Subclause 6.3 of IEC 61326-1 applies.

6.4 Performance criteria

Subclause 6.4 of IEC 61326-1 applies, except as follows:

Addition:

Additional requirements: see Annexes AA and BB.

7 Emission requirements

Clause 7 of IEC 61326-1 applies.

8 Test results and test report

Clause 8 of IEC 61326-1 applies, except as follows:

Addition:

The type of shield connection at the EUT shall be stated in the test report.

9 Instructions for use

Clause 9 of IEC 61326-1 applies.

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Annex AA (normative)

Particular requirements – Test configurations, operational conditions and performance criteria for field devices with field bus interfaces according to IEC 61784-1 CP 1/1

AA.1 General

In connection with the main part of this standard, this Annex AA describes specific test configurations, operational conditions and performance criteria regarding the field bus interface using the communication profile CP 1/1 according to IEC 61784-1.

To prevent confusion with requirements of other annexes, the equipment under test (EUT) is called “EUT with CP 1/1 interface” throughout this annex.

AA.2 EMC test plan

AA.2.1 Configuration of EUT with CP 1/1 interface during testing

Subclause 5.2 of IEC 61326-1 applies, except as follows

Addition:

(standards.iteh.ai)

AA.2.1.1 Test configuration for EUT with CP 1/1 interface

In order to assign any malfunction of the communication during the EMC-test to the EUT with CP 1/1 interface, the configuration of field devices with interfaces according to IEC 61784-1, CP 1/1 shall be limited to the operation of one host system and one EUT with CP 1/1 interface during EMC type tests.

Ports other than I/O ports covered by this part of the standard are tested according to IEC 61326-1.

The connection plan is shown in Figure AA.1.

The field device is connected via a device coupler with the power conditioner and the host system.

A standardised field bus terminator is attached at the third port of the device coupler.

The EUT with CP 1/1 interface, power conditioner, host system, device coupler(s) and terminator are connected by means of a standard type A field bus cable (foil shield, foil shield/mesh). Armoured cables or cables in conduit are not allowed for EMC testing.

Except for the connection at the EUT with CP 1/1 interface itself (see AA.2.1.3), the shield shall be connected at any individual component by a low-impedance grounding strip (connection between shield and the case with a large surface).

The individual cable lengths L1, L2, L3, L5 and L6 originate from a practice-adjusted set up, preferred as given in Figure AA.1.

The cable length L4 should be $8 \text{ m} \pm 1 \text{ m}$, in case that the respective basic standards do not specify other lengths. The cable installation shall be in accordance with the appropriate basic standard.

The connection of the shield at the shield grounding point may be produced by partially removing the insulation of the cable shield and fixing the cable shield with a metal clamp or by means of conductive leading-in-conductors such as a metallic cable gland at the ground plane or at the shielding metal wall respectively.

The location and execution of the shield grounding point depend on the given test facility, e.g. by use of an anechoic chamber or a shielded cabin it is the metal wall penetration; and with tests on tables with ground plane the shield grounding point is on the ground plane.

AA.2.1.2 Connection cable for EUT with CP 1/1 interface

A standard bus cable type A shall be used as communication cable (see IEC 61158–2:2010, 12.8.2). The cable lengths L1 to L4, are given in Figure AA.1 and additional requirement for L4 is described in AA.2.1.1. The lengths of L5 and L6 are not specified and depend on the installed equipment.

AA.2.1.3 Connections at the EUT with CP 1/1 interface

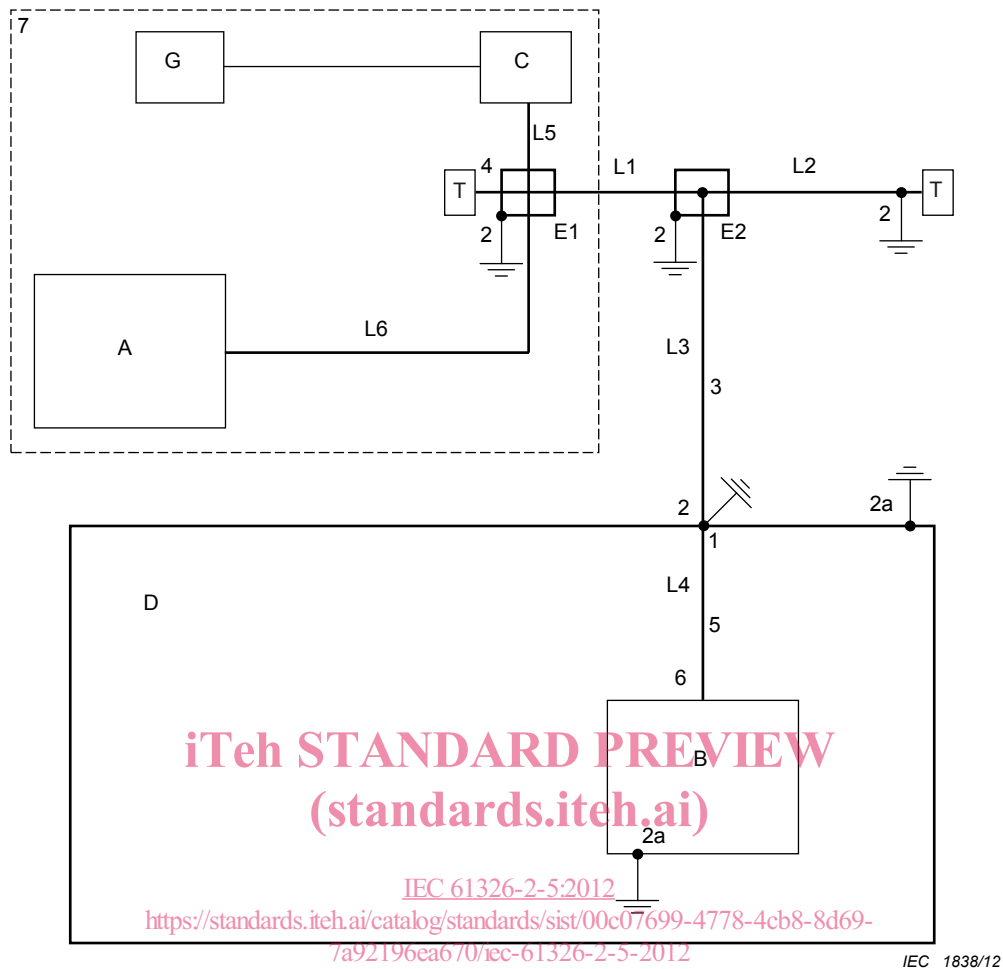
The grounding of the EUT with CP 1/1 interface shall be in accordance with the manufacturer's specification.

The shield of the cable shall be connected in the most sensitive method (for example with the shield not connected at the EUT with CP 1/1 interface) if not otherwise specified by the manufacturer.

NOTE If the manufacturer specifies the shield shall be connected at the EUT with CP 1/1 interface, the EUT with CP 1/1 interface shall be tested in accordance with the manufacturer's specification.

AA.2.1.4 Field bus network

The field bus network shall include the terminator of the bus, device coupler(s), the host system and the EUT with CP 1/1 interface. For bus-powered devices the field bus network includes additionally the power conditioner and the power supply. The evaluation and conditioning of the data in the host system are not the object of this part of the standard. The device coupler(s) and the bus terminator are passive components only.



- | | |
|---|--|
| <p>A: Host system</p> <p>B: Field device (EUT with CP 1/1 interface)</p> <p>C: Power conditioner (5 mH+50 Ω)</p> <p>D: EMC test place</p> <p>E1, E2: device coupler(s)</p> <p>T: Bus terminator</p> <p>G: Power supply</p> <p>L1: 8 m cable type A</p> <p>L2: 2 m cable type A</p> <p>L4: 8 m cable type A (see AA.2.1.2)</p> | <p>1: Shield grounding point (SGP) of L4</p> <p>2: Shield / housing connected with low impedance</p> <p>2a: Enclosure connected with low impedance</p> <p>3: Cable from device coupler(s) to SGP</p> <p>4: Terminator, either direct at device coupler or after a short cable (< 1 m)</p> <p>5: Cable from SGP to field device</p> <p>6: Connection of shield at field device see AA.2.1.3</p> <p>7: A, C, G, E1 and T may be included in a single housing / system / device</p> <p>L3: 2 m cable type A</p> <p>L5, L6: cable type A (see AA.2.1.2)</p> |
|---|--|

Figure AA.1 – Test set up for EUT with CP 1/1 interface

AA.2.2 Operation conditions of EUT with CP 1/1 interface during testing

Subclause 5.3 of IEC 61326-1 applies, except as follows:

Addition: