

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

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

Partie 2-4: Exigences particulières – Configurations d'essai, conditions de
fonctionnement et critères de performance pour les contrôleurs d'isolement conformes
à la CEI 61557-8 et pour les dispositifs de localisation de défaut d'isolement conformes
à la CEI 61557-9



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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**

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International Standard IEC 61326-2-4 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.

This edition includes the following significant technical change with respect to the previous edition:

- update of the document with respect to IEC 61326-1:2012.

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

FDIS	Report on voting
65A/630/FDIS	65A/639/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 the 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 the 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 2-4: 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

1 Scope

In addition to IEC 61236-1, this part of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria than IEC 61326-1 for equipment for

- insulation monitoring according to IEC 61557-8;
- insulation fault location according to IEC 61557-9.

This applies to insulation monitoring devices and insulation fault location systems permanently or semi-permanently connected to the distribution system.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 61326-1:2012 applies, except as follows:

Addition:

IEC 61326-1:2012, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

IEC 61557-8:2007, *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 8: Insulation monitoring devices for IT systems*

IEC 61557-9:2009, *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 9: Equipment for insulation fault location in IT systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61326-1 apply, except as follows.

Addition:

**3.101
insulation resistance**

R_F

resistance in the system being monitored, including the resistance of all the connected appliances to earth

[SOURCE: IEC 61557-8:2007, 3.2]

**3.102
specified response value**

R_{an}

value of the insulation resistance, permanently set or adjustable, on the device and monitored if the insulation resistance falls below this limit

[SOURCE: IEC 61557-8:2007, 3.3]

**3.103
response sensitivity**

value of the evaluating current or insulation resistance at which the evaluator responds under specified conditions

[SOURCE: IEC 61557-9:2009, 3.4]

**3.104
nominal voltage of the distribution system**

U_n

voltage by which a distribution system or equipment is designated and to which certain operating characteristics are referred

[SOURCE: IEC 61557-1:2007, 3.1]

[IEC 61326-2-4:2012](#)

<https://standards.iteh.ai/catalog/standards/sist/5d65fadf-f70a-413a-ab67-79bd8a3f2665/iec-61326-2-4-2012>

**3.105
supply voltage**

U_S

voltage at a point where the measuring equipment does or can accept electric energy as a supply

[SOURCE: IEC 61557-1:2007, 3.8, modified]

**3.106
system leakage capacitance**

C_e

maximum permissible value of the total capacitance to earth of the system to be monitored, including any connected appliances, up to which value the insulation monitoring device can work as specified

[SOURCE: IEC 61557-8:2007, 3.6]

4 General

Clause 4 of IEC 61326-1:2012 applies.

5 EMC test plan

5.1 General

Subclause 5.1 of IEC 61326-1:2012 applies.

5.2 Configuration of EUT during testing

5.2.1 General

Subclause 5.2.1 of IEC 61326-1:2012 applies, except as follows.

Addition:

During the tests, the EUT is supplied as specified by the manufacturer.

For EUT having several ratings, the EUT shall be connected

- to the lowest nominal supply voltage U_S ;
- to the highest nominal voltage of the distribution system U_n , but not more than 400 V.

If the EUT has only a combined terminal for the supply voltage and the voltage of the distribution system, it shall be connected to the highest nominal voltage, but not more than 400V.

If the EUT has interfaces for remote functions, they shall be connected during the tests as specified by the manufacturer for normal installation.

Insulation monitoring devices and equipment for insulation fault location shall be tested separately.

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5.2.2 Composition of EUT (standards.iteh.ai)

Subclause 5.2.2 of IEC 61326-1:2012 applies.

[IEC 61326-2-4:2012](#)

5.2.3 Assembly of EUT <https://standards.iteh.ai/catalog/standards/sist/5d65fadf-f70a-413a-ab67-79bd8a3f2665/iec-61326-2-4-2012>

Subclause 5.2.3 of IEC 61326-1:2012 applies.

5.2.4 I/O ports

Subclause 5.2.4 of IEC 61326-1:2012 applies.

5.2.5 Auxiliary equipment

Subclause 5.2.5 of IEC 61326-1:2012 applies.

5.2.6 Cabling and earthing (grounding)

Subclause 5.2.6 of IEC 61326-1:2012 applies.

5.3 Operation conditions of EUT during testing

Subclause 5.3 of IEC 61326-1:2012 applies, except as follows.

Addition:

5.3.101 Operational conditions

The EUT shall be set as specified by the manufacturer for normal operation.

If the EUT has adjustable specified response values, tests shall be performed as follows:

- for insulation monitoring devices, one value shall be selected by the manufacturer among the following possibilities:
 - at the value equal or closest to the internal d.c. resistance value;
 - at the value equal or closest to the internal a.c. impedance value;
- for insulation fault location equipment at the value in the middle of the response sensitivity range;

The insulation resistance shall be simulated by a single phase insulation resistance.

If the EUT has a selectable time delay, the time delay shall be set to the minimum value.

The system leakage capacitance shall be set to the maximum value as defined by the manufacturer but not more than 1 μF . The system leakage capacitance is to be installed symmetrically to all phases of U_n . For example:

- $2 \times 0,5 \mu\text{F}$ for single-phase a.c. and d.c. systems,
- $3 \times 0,33 \mu\text{F}$ for 3-phase a.c. systems.

5.4 Specification of functional performance

Subclause 5.4 of IEC 61326-1:2012 applies.

5.5 Test description

Subclause 5.5 of IEC 61326-1:2012 applies.

6 Immunity requirements

[IEC 61326-2-4:2012](#)

6.1 Conditions during the tests

<https://standards.iteh.ai/catalog/standards/sist/5d65fadf-f70a-413a-ab67-79bd8a3f2665/iec-61326-2-4-2012>

Subclause 6.1 of IEC 61326-1:2012 applies, except as follows.

Addition:

The configuration and modes of operation during the tests shall be precisely noted in the test report.

Tests shall be applied to the relevant ports in accordance with Table 101.

The tests shall be conducted in accordance with the basic standards. The tests shall be carried out one at a time. If additional methods are required, the method and rationale shall be documented.

6.1.101 Electrostatic discharge immunity tests

The test shall only be applied to parts of the EUT which are accessible to the user in normal operations, for example, push-buttons, displays; this test does not apply to connection terminals.

Electrostatic discharges of positive and negative polarity shall be applied 10 times to each of the selected test points.

The points of application shall be stated in the report.

6.1.102 Electromagnetic field tests

The dwell time for each frequency shall be 1,5 times the longest response time of the EUT specified by the manufacturer, plus the time delay, see 5.3. The actual dwell time shall be stated in the test report

6.1.103 Burst tests

Ports for remote control functions shall be tested separately. Cables for functions not tested shall be disconnected.

The bursts shall be applied for a minimum time of 1 min, however, the time of application shall be greater than the response time of the EUT specified by the manufacturer.

6.1.104 Surge immunity tests

In deviation from the general test conditions of 5.2.1 this test is applied at the maximum supply voltage U_S .

Pulses both with positive and negative polarity shall be injected with a phase angle being 90° and 270° .

A series of five pulses is applied for each polarity and each phase angle with a time between the pulses of 1 min or less.

6.1.105 Conducted RF tests

The dwell time for each frequency shall be 1,5 times the longest response time of the EUT specified by the manufacturer, plus the time delay (see 5.3). The actual dwell time shall be stated in the test report.

6.1.106 Power frequency magnetic field tests

The test is performed only on EUT with integrated magnetic sensitive components.

6.2 Immunity test requirements

Subclause 6.2 of IEC 61326-1:2012 does not apply.

Replacement:

The immunity requirements are given in Table 101.

NOTE The required tests correspond to the required tests applicable for equipment of industrial electromagnetic environments.

Table 101 – Immunity tests

Port	Phenomenon	Basic standard	Test value	Performance criteria (as defined in 6.4)
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact discharge, 8 kV air discharge	A2 A2
Enclosure	Electromagnetic field	IEC 61000-4-3	80 MHz to 1 000 MHz, 10 V/m 1,4 GHz to 2 GHz, 3 V/m 2,0 GHz to 2,7 GHz, 1 V/m 80 % AM modulation	A1 A1 A1
AC and DC power supply, AC and DC connections to distribution system (including connection to earth) and I/O signal / control connected directly to distribution network	Fast transients (burst)	IEC 61000-4-4	2 kV (5/50 ns, 5 kHz)	A2
I/O signal / control (including functional earth lines and remote connections)			1 kV (5/50 ns, 5 kHz)	A2
AC power supply, AC connections to distribution system (including connection to earth) and I/O signal / control connected directly to distribution network	Surge	IEC 61000-4-5 https://standards.iteh.ai/catalog/standards/sist/5d65fad6-f70a-413a-ab67-79bd8a3f2665/iec-61326-2-4-2012	2 kV line to earth 1 kV line to line	B A2
I/O signal / control (including functional earth lines and remote connections)			1 kV line to earth	B
All ports except enclosure port	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz, 10 V Common mode 80 % AM modulation	A1
Enclosure	Power frequency magnetic field	IEC 61000-4-8	30 A/m Only for EUT with integrated magnetic sensitive components	A1
AC power	Voltage dip	IEC 61000-4-11	0% during 1 cycle, 40 % during 10/12 ^a cycles 70 % during 25/30 ^a cycles	A2 C C
	Short interruptions	IEC 61000-4-11	0 % during 250/300 ^a cycles	C

^a For example “25/30 cycles” means “25 cycles for 50 Hz test” or “30 cycles for 60 Hz test”.

6.3 Random aspects

Subclause 6.3 of IEC 61326-1:2012 applies.

6.4 Performance criteria

Subclause 6.4 of IEC 61326-1:2012 does not apply.