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Interested committees:

Title: Draft BS EN 60255-26 Measuring relays and protection equipment. Part 26: Electromagnetic compatibility requirements.

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER: IEC 60255-26 ED4	
DATE OF CIRCULATION: 2017-12-01	CLOSING DATE FOR COMMENTS: 2018-02-23
SUPERSEDES DOCUMENTS: 95/377/RR	

IEC TC 95 : MEASURING RELAYS AND PROTECTION EQUIPMENT			
SECRETARIAT: France		SECRETARY: Mr Thierry BARDOU	
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 14, TC 17, TC 38, TC 77, TC 115, TC 122		PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.	
FUNCTIONS CONCERNED:			
☒ EMC	☐ ENVIRONMENT	☐ QUALITY ASSURANCE	☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

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TITLE:
Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 26: Electromagnetic compatibility requirements

FOREWORD

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- International Standard IEC 60255-26 has been prepared by IEC technical committee 95: Measuring relays and protection equipment.
- This fourth edition cancels and replaces the third edition published in 2013. This edition constitutes a technical revision.
- This edition includes the following significant technical changes with respect to the previous edition:
- a) expand the frequency range on radiated radio-frequency immunity test up to 6 GHz,
 - b) additional higher requirements on electrostatic discharge tests,
 - c) additional higher immunity requirements on power frequency magnetic field tests,
 - d) addition of an annex regarding background information about spot frequency test,
 - e) introduction of a wired network port,

f) update to latest product standards and basic EMC standards

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

FDIS	Report on voting
95/xxx/FDIS	95/xxx/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.

A list of all the parts in the IEC 60255 series, published under the general title *Measuring relays and protection equipment*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

The National Committees are requested to note that for this publication the stability date is 20xx.

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 26: Electromagnetic compatibility requirements

1 Scope

1.1 General

This part of the IEC 60255 series is applicable to measuring relays and protection equipment, taking into account combinations of devices to form schemes for power system protection including the control, monitoring, communication and process interface equipment used with those systems.

This standard specifies the requirements for electromagnetic compatibility for measuring relays and protection equipment.

Tests specified in this standard are not required for equipment not incorporating electronic circuits, for example electromechanical relays.

The requirements specified in this standard are applicable to measuring relays and protection equipment in a new condition and all tests specified are type tests only.

1.2 Emission

The object of this standard is to specify limits and test methods, for measuring relays and protection equipment in relation to electromagnetic emissions which may cause interference in other equipment.

These emission limits represent electromagnetic compatibility requirements and have been selected to ensure that the disturbances generated by measuring relays and protection equipment, operated normally in substations and power plants, do not exceed a specified level which could prevent other equipment from operating as intended.

Test requirements are specified for the enclosure, auxiliary power supply ports, communication ports, and wired network ports.

1.3 Immunity

The object of this standard is to specify the immunity test requirements for measuring relays and protection equipment in relation to continuous and transient, conducted and radiated disturbances, including electrostatic discharges.

These test requirements represent the electromagnetic compatibility immunity requirements and have been selected so as to ensure an adequate level of immunity for measuring relays and protection equipment, operated normally in substations and power plants.

NOTE 1 Safety considerations are not covered in this standard.

NOTE 2 In special cases, situations will arise where the levels of disturbance could exceed the levels specified in this standard, for example where a hand-held transmitter or a mobile telephone is used in close proximity to measuring relays and protection equipment. In these instances, special precautions and procedures could have to be employed.

2 Normative references

The following documents are indispensable for the application 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 60255-1:2009, *Measuring relays and protection equipment - Part 1: Common requirements*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*
Amendment 1:2007
Amendment 2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test*

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields*
Corrigendum 1:2015

IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test*

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests*
Amendment 1:2017

IEC 61000-4-16:2015, *Electromagnetic compatibility (EMC) - Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz*

IEC 61000-4-17:1999, *Electromagnetic compatibility (EMC) - Part 4-17: Testing and measurement techniques - Ripple on d.c. input power port immunity test*
Amendment 1:2001
Amendment 2:2008

IEC 61000-4-18:2006, *Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - Damped oscillatory wave immunity test*
Amendment 1:2010

IEC 61000-4-29:2000, *Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
Amendment 1:2016

159 CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission*
 160 *requirements*
 161 Corrigendum 1:2016

162 3 Terms and definitions

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

164 3.1

165 EUT

166 Equipment Under Test

167 equipment submitted to a test, including any accessories, unless otherwise specified

168 3.2

169 small equipment

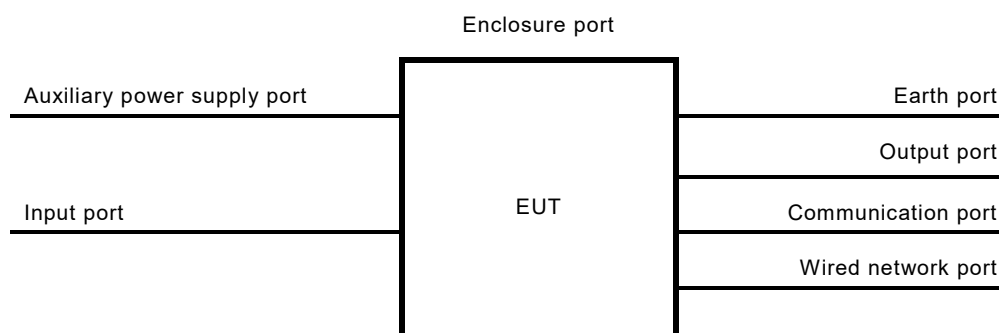
170 equipment, either positioned on a table top or standing on the floor which, including its cables
 171 fits in a cylindrical test volume of 1,2 m in diameter and 1,5 m above the ground plane.

172 3.3

173 port

174 particular interface of the specified EUT with the external electromagnetic environment

175 See Figure 1



IEC 896/08

176
 177
 178 **Figure 1 – Ports for measuring relays and protection equipment**

179 3.4

180 auxiliary power supply port

181 a.c. or d.c. auxiliary energizing input of the EUT

182 3.5

183 communication port

184 interface with a communication and/or control system permanently connected to the EUT

185 Note: Examples of these include connections to Modbus, IEC 60870-5-103, DNP 3.0, etc.

186 3.6

187 wired network port

188 port for the connection of voice, data and signaling transfers intended to interconnect widely-dispersed
 189 systems by direct connection to a single-user or multi-user communication network

190 Note 1 to entry: Examples of these include CATV, PSTN, ISDN, xDSL, LAN and similar networks.

191 Note 2 to entry: These ports may support screened or unscreened cables and may also carry AC or DC power where this is an
 192 integral part of the telecommunication specification.

193 [SOURCE: CISPR 32]

3.7**enclosure port**

physical boundary of the EUT through which electromagnetic fields may radiate or impinge

3.8**Earth port**

point where a cable intended for connection to earth for functional or safety purposes can be connected

Note 1 to entry: Multiple earth ports should be tested separately.

3.9**input port**

port through which the EUT is energized or controlled in order to perform its function(s)

EXAMPLE Current and voltage transformer, binary input, etc.

3.10**output port**

port through which the EUT produces predetermined changes

EXAMPLE Contacts, optocouplers, analogue output, etc.

3.11**coupling/decoupling network****CDN**

electrical circuit for the purpose of transferring energy from one circuit to another/
electrical circuit for the purpose of preventing test voltages applied to the EUT from affecting
other devices, equipment, or systems which are not under test

3.12**common mode****CM**

mode between each active conductor and a specified reference, usually earth or ground
reference plane

3.13**differential mode****DM**

mode between any two of a specified set of active conductors

4 Electromagnetic environmental levels**4.1 General**

The environmental levels shall be selected in accordance with the most realistic installation
and environmental conditions in which the EUT is expected to operate.

Based on common installation practices, the recommended selection of test levels is the
following:

4.2 Zone A, severe electromagnetic environment

The installation is characterized by the following attributes:

- no suppression of electrical fast transients/bursts in the power supply and control and
power circuits which are switched by relays and contactors;
- no separation of the industrial circuits from other circuits associated with environments of
higher severity levels;
- no separation between power supply, control, signal and communication cables;

- use of common multi-core cables for control and signal lines.

The outdoor area of industrial process equipment, where no specific installation practice has been adopted, of power stations, open-air HV substation switchyards and gas insulated switchgear may be representative of this environment.

4.3 Zone B, typical electromagnetic environment

The installation is characterized by the following attributes:

- no suppression of electrical fast transients/bursts in the power supply and control circuits which are switched by relays (no contactors);
- poor separation of the industrial circuits from other circuits associated with environments of higher severity levels;
- dedicated cables for power supply, control, signal and communication lines;
- poor separation between power supply, control, signal and communication cables;
- availability of earthing system represented by conductive pipes, ground conductors in the cable trays (connected to the protective earth system) and by a ground mesh.

The area of industrial process equipment, the power plants and the relay room of open-air HV substations may be representative of this environment.

5 Emission

5.1 Radiated emission

Table 1 – Radiated emission tests – Enclosure port

Item	Environmental phenomena	Frequency range	Limits	Basic standard	Test procedure
1.1	Radiated emission (below 1 GHz) ^{ab}	30 MHz to 230 MHz	40 dB(μV/m) quasi peak at 10 m 50 dB(μV/m) quasi peak at 3 m	CISPR 11	See 7.1.2
		230 MHz to 1 000 MHz	47 dB(μV/m) quasi peak at 10 m 57 dB(μV/m) quasi peak at 3 m		
1.2	Radiated emission (above 1 GHz)	1 GHz to 3 GHz	56 dB(μV/m) average 76 dB(μV/m) peak at 3 m	CISPR 32	See 7.1.2
		3 GHz to 6 GHz	60 dB(μV/m) average 80 dB(μV/m) peak at 3 m		

^a Measuring relays and protection equipment are apparatus which satisfy the class A limits. Limits can be measured at a nominal distance of 3 m, 10 m or 30 m. A measuring distance less than 10 m is allowed only for equipment which complies with the definition given in 3.2. In case of measurements at a separation distance of 30 m an inverse proportionality factor of 20 dB per decade shall be used to normalize the measured data to the specified distance for determining compliance.

^b The limits specified for the 3 m separation distance apply only to small equipment meeting the size criterion defined in 3.2.

Conditional testing procedure

- The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.
- If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.
- If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.
- If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.
- If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

5.2 Conducted emission

Table 2 – Conducted emission tests – A.C. and d.c. auxiliary power supply port

Item	Environmental phenomena	Frequency range	Limits ^a	Basic standard	Test procedure
2.1	Conducted emission on a.c.	0,15 MHz to 0,50 MHz	79 dB(μV) quasi peak 66 dB(μV) average	CISPR 11	See 7.1.3
		0,50 MHz to 30 MHz	73 dB(μV) quasi peak 60 dB(μV) average		
2.2	Conducted emission on d.c.	0,15 MHz to 5 MHz	97 - 89 dB(μV) quasi peak 84 - 76 dB(μV) average		
		5 MHz to 30 MHz	89 dB(μV) quasi peak 76 dB(μV) average		

^a These limits apply to class A group 1 equipment with a rated power ≤ 20 kVA

Table 3 – Conducted emission tests – Wired network port

Item	Environmental phenomena	Frequency range	Limits ^a	Basic standard	Test procedure
3.1	Conducted emission	0,15 MHz to 0,50 MHz	97 – 87 dB(μV) quasi peak 84 – 74 dB(μV) average	CISPR 32	See 7.1.3
		0,5 MHz to 30 MHz	87 dB(μV) quasi peak 74 dB(μV) average		

^a These limits apply to class A equipment measured with an AAN (Asymmetric Artificial Network) as coupling device

6 Immunity

6.1 Immunity enclosure

Table 4 – Immunity tests – Enclosure port

Item	Environmental phenomena	Test specification	Units	Basic standard	Test procedure	Acceptance criteria (see 8.2)
4.1	Radiated radio-frequency, electromagnetic field					
	Frequency sweep					
	Test frequency range	80 to 6 000	MHz			
	Test field strength (prior to modulation)	10 (up to 2 700 MHz)	V/m (r.m.s.)			
		1 (2 700 MHz to 6 000 MHz)	V/m (r.m.s.)			
	Amplitude modulated	80	% AM (1 kHz)			
	Frequency step size	≤ 1	% (of preceding frequency value)			
	Spot frequencies			IEC 61000-4-3	7.2.4	A
	Test spot frequencies	80 ± 0,5 %	MHz			
		160 ± 0,5 %	MHz			
		380 ± 0,5 %	MHz			
		450 ± 0,5 %	MHz			
		900 ± 5	MHz			
		1 850 ± 5	MHz			
		2 150 ± 5	MHz			
		Test field strength (prior to modulation)	10	V/m (r.m.s.)		
4.2	Electrostatic discharge					
	Zone A					
	Contact	2 4 6 8	kV (charge voltage)	IEC 61000-4-2	See 7.2.3	B
	Air	2 4 8 15	kV (charge voltage)			
	Zone B					
	Contact	2 4 6	kV (charge voltage)			
	Air	2 4 8	kV (charge voltage)			

Item	Environmental phenomena	Test specification	Units	Basic standard	Test procedure	Acceptance criteria (see 8.2)
4.3	Power frequency magnetic field			IEC 61000-4-8	See 7.2.10	
	Zone A					
	Continuous	100	A/m			A
	1s to 3 s	1 000	A/m			B
	Zone B					
	Continuous	30	A/m			A
	1s to 3 s	300	A/m			B

6.2 Immunity auxiliary power supply port

Table 5 – Immunity tests – Auxiliary power supply port

Item	Environmental phenomena	Test specification	Units	Basic standard	Test procedure	Acceptance criteria (see 8.2)
5.1	Conducted disturbance induced by radio-frequency fields					
	Frequency sweep					
	Test frequency range	0,15 to 80	MHz			
	Test level (prior to modulation)	10	V (r.m.s.)			
	Source impedance	150	Ω			
	Amplitude modulated	80	% AM (1 kHz)			
	Frequency step size	≤ 1	% (of preceding frequency value)	IEC 61000-4-6	See 7.2.8	A
	Spot frequencies					
	Test spot frequencies	27 $\pm$ 0,5 % 68 $\pm$ 0,5 %	MHz MHz			
	Test level (prior to modulation)	10	V (r.m.s.)			
5.2	Electrical fast transient/burst					
	Rise time t_r / Duration time t_d	5 / 50	ns			
	Test level			IEC 61000-4-4	See 7.2.5	B
	Zone A	4	kV peak voltage			
	Zone B	2	kV peak voltage			
	Repetition frequency	5 or 100 ^e	kHz			
5.3	Slow damped oscillatory wave					
	Voltage oscillation frequency	1	MHz			
	Test level					
	Differential mode	1	kV peak voltage	IEC 61000-4-18	See 7.2.6	B
	Common mode	2,5	kV peak voltage			
	Voltage rise time	75	ns			
	Repetition frequency	400	Hz			
	Output impedance	200	Ω			