



DPC: 19/30398880 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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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 Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.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.**
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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:

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2019-06-28

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95/415/RVC, 95/415/RVC

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

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Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

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

NOTE FROM TC/SC OFFICERS:

Under SMB/6653/QP and SMB/6653A/RV. SMB has approved the TC95 request for derogation from ISO/IEC Directives Part 1- circulation of a revised CD after approved CDV.

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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) expands the frequency range on radiated radio-frequency immunity test up to 6 GHz;
 - b) includes additional higher requirements on electrostatic discharge tests;
 - c) includes additional higher immunity requirements on power frequency magnetic field tests;
 - d) adds an annex with background information about the spot frequency test;
 - e) adds details and an annex with further guidance on the relay settings

- f) introduces a wired network port;
g) updates to the latest product standards and basic EMC standards.

The text of this International 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.

A bilingual version of this publication may be issued at a later date.

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

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

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

1.2 Emission

The objective of this document is to specify limits and test methods, for measuring relays and protection equipment in relation to electromagnetic emissions which might 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, signal/control ports, and wired network ports.

1.3 Immunity

The objective of this document 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 Product safety considerations are not covered in this document.

NOTE 2 In special cases, situations will arise where the levels of disturbance could exceed the levels specified in this document, 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/AMD1:2007/AMD2:2010, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

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/AMD1:2017, *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*

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/AMD1:2017, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

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/AMD1:2001/AMD2:2008, *Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on d.c. input power port immunity test*

IEC 61000-4-18:2006/AMD1:2010, *Electromagnetic compatibility (EMC) – Part 4-18: Testing and measurement techniques – Damped oscillatory wave immunity test*

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/AMD1:2016, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

3 Terms and definitions

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

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

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

3.1

auxiliary power supply port

AC or DC auxiliary energizing input of the EUT

3.2

common mode

CM

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

3.3

coupling network

electrical circuit for the purpose of transferring energy from one circuit to another

3.4

decoupling network

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

3.5

differential mode

DM

mode between any two of a specified set of active conductors

3.6

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.

3.7

enclosure port

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

3.8

EUT

equipment under test

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

3.9

input port

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

EXAMPLES Current transformer (CT) input, voltage transformer (VT) input, binary input, battery monitor input etc.

3.10**output port**

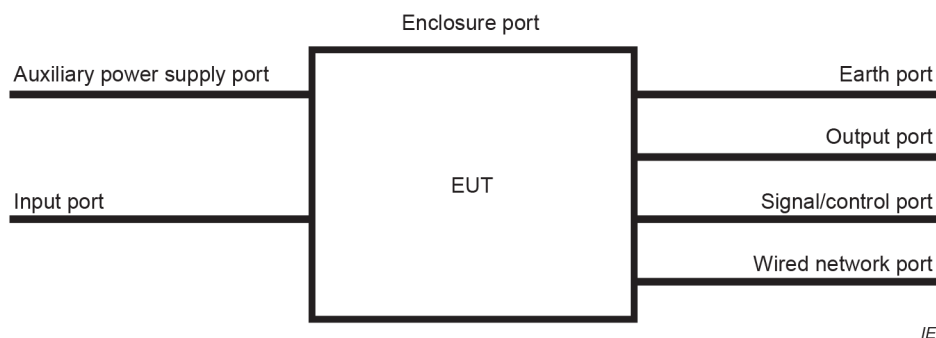
port through which the EUT produces predetermined changes

EXAMPLE Contacts, optocouplers, analogue output, etc.

3.11**port**

particular interface of the specified EUT with the external electromagnetic environment

See Figure 1.



IEC

Figure 1 – Ports for measuring relays and protection equipment

3.12**signal/control port**

port intended for the interconnection of components of an EUT, or between an EUT and local AE and used in accordance with relevant functional specifications (for example, for the maximum length of cable connected to it)

Note 1 to entry: Examples include RS-232, Universal Serial Bus (USB), High-Definition Multimedia Interface (HDMI), IEEE Standard 1394 ("Fire Wire").

3.13**small equipment**

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

3.14**wired network port**

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

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

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

NOTE 3 A port generally intended for interconnection of components of a system under test (e.g. RS232, RS-485, field buses in the scope of IEC 61158, IEEE Standard 1284 (parallel printer), Universal Serial Bus (USB), IEEE Standard 1394 ("Fire Wire"), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a wired network port.

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 given using 4.2 and 4.3.

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, 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	Reference standard	Test procedure
1.1	Radiated emission (below 1 GHz) ^a	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 at 3 m 76 dB(μV/m) peak at 3 m	CISPR 32	See 7.1.2
		3 GHz to 6 GHz	60 dB(μV/m) average at 3 m 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 3.13. 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.					

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.

NOTE Where the highest internal frequency is unknown, the measurement shall be made up to 6 GHz.

5.2 Conducted emission

Table 2 – Conducted emission tests – AC and DC auxiliary power supply port

Item	Environmental phenomena	Frequency range	Limits ^a	Reference standard	Test procedure
2.1	Conducted emission	0,15 MHz to 0,50 MHz	79 dB(μV) quasi-peak 66 dB(μV) average	CISPR 32	See 7.1.3
		0,50 MHz to 30 MHz	73 dB(μV) quasi-peak 60 dB(μV) average		

^a These limits apply to class A equipment measured with an AMN (Artificial Mains Network) as coupling device.

Table 3 – Conducted emission tests – Wired network port

Item	Environmental phenomena	Frequency range	Limits	Reference standard	Test procedure
3.1	Conducted emission ^a	0,15 MHz to 0,50 MHz	97 dB(μV) to 87 dB(μV) quasi-peak	CISPR 32	See 7.1.3
			84 dB(μV) to 74 dB(μV) average		
		0,5 MHz to 30 MHz	87 dB(μV) quasi-peak		
			74 dB(μV) average		
3.2	Conducted emission ^b	0,15 MHz to 0,50 MHz	97 dB(μV) to 87 dB(μV) quasi-peak 53 dB(μA) to 43 dB(μA)	CISPR 32	See 7.1.3
			84 dB(μV) – 74 dB(μV) average 40 dB(μA) – 30 dB(μA)		
		0,5 MHz to 30 MHz	87 dB(μV) quasi-peak 43 dB(μA)		
			74 dB(μV) average 30 dB(μA)		

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

^b These limits apply to class A equipment of CISPR 32 measured with a capacitive voltage probe (CVP) and current probe as coupling device.

6 Immunity

6.1 Immunity enclosure

Table 4 – Immunity tests – Enclosure port

Item	Environmental phenomena	Test specification	Units	Basic EMC publication	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 (RMS)			
		3 (2 700 MHz to 6 000 MHz)	V/m (RMS)			
	Amplitude modulated	80	% AM (1 kHz)			
	Frequency step size	≤ 1	% (of preceding frequency value)			
	Spot frequencies^a			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			
4.2	Electrostatic discharge	Test field strength (prior to modulation)	10	V/m (RMS)		
		Amplitude modulated	80	% AM (1 kHz)		
		Duty cycle	100	%		
		Zone A				
		Contact	2 4 6 8	kV (charge voltage)	IEC 61000-4-2	B
		Air	2 4 8 15	kV (charge voltage)	See 7.2.3	
		Zone B				
		Contact	2 4 6	kV (charge voltage)		
		Air	2 4 8	kV (charge voltage)		

Item	Environmental phenomena	Test specification	Units	Basic EMC publication	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
	1 s to 3 s	1 000	A/m			B
	Zone B					
	Continuous	30	A/m			A
	1 s to 3 s	300	A/m			B
^a Details about the choice of spot frequencies is available in Annex D.						

6.2 Immunity auxiliary power supply port

Table 5 – Immunity tests – Auxiliary power supply port

Item	Environmental phenomena	Test specification	Units	Basic EMC publication	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 (RMS)			
	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 (RMS)			
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			