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Measuring relays and protection equipment – Part 27: Product safety requirements

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 27: Product safety requirements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
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7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This commented version (CMV) of the official standard IEC 60255-27:2023 edition 3.0 allows the user to identify the changes made to the previous IEC 60255-27:2013 edition 2.0. Furthermore, comments from IEC TC 95 experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 60255-27 has been prepared by IEC technical committee 95: Measuring relays and protection equipment. It is an International Standard.

This third edition cancels and replaces the second 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) conflicting statements removed;
b) scope clarified and statement added that all clauses of the standard are required not just type tests;
c) terminology, definitions and documentation requirements aligned with IEC 60255-1;
d) alignment with IEC 61010-1, e.g. HLV definitions;
e) ingress protection clarified;
f) dielectric and impulse tests added to mechanical and environmental test requirements;
g) insulation resistance requirements updated for alignment with other product safety standards;
h) sample testing removed;
i) short time limiting thermal overload added;
j) resistance to mechanical stress added;
k) low-power voltage and current transformer ports added;
l) Annex C tables updated to align with base standards;
m) Annex D voltage dependent resistors and radio transmitters added;
n) Annex G for risk assessment added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
95/516/FDIS	95/526/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all 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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

~~In order to demonstrate that the equipment is safe, it was previously necessary to refer to general safety standards such as IEC 61010-1 in addition to IEC 60664-1.~~

~~These general safety standards specify requirements for general product types or product families in order to reduce the risk of fire, electric shock or injury to the user. The product types do not include measuring relays and protection equipment. These standards also take into account single-fault conditions.~~

~~Reference to all these various standards created confusion due to conflicting requirements, for example, different clearances, creepage distances and test voltages etc., for the same rated voltages.~~

~~The aim of this standard is:~~

- ~~to remove confusion due to conflicting requirements between existing standards;~~
- ~~to achieve a uniform approach throughout the international industry for measuring relays and protection equipment.~~

~~This product safety standard for measuring relays and protection equipment takes the general product safety standards and IEC 60664-1 as the base, defining those issues specific to measuring relays and protection equipment.~~

This document specifies the safety requirements that are generally applicable to all equipment within its scope. These requirements may be supplemented by general product safety standards and IEC 60664-1.

MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 27: Product safety requirements

1 Scope

This part of IEC 60255 ~~describes~~ specifies the product safety requirements for measuring relays and protection equipment having a rated AC voltage up to 1 000 V ~~with a rated frequency up to 65 Hz~~, or a rated DC voltage up to 1 500 V. Above these limits, IEC 60664-1 is applicable for the determination of clearance, creepage distance and withstand test voltage.

This document ~~details~~ specifies essential safety requirements to minimize the risk of fire and hazards caused by electric shock or injury to the user and property. This document specifies only product safety requirements; functional performance of the equipment is not covered. 1

~~This standard does not cover the safety requirements of installations.~~ This document covers all the ways in which the equipment ~~may~~ can be mounted and used in ~~cubicles~~ cabinets, racks and panels~~, and also retesting~~. This document also applies to auxiliary devices such as shunts, series resistors, transformers, auxiliary control panels, display devices, etc., that are used in conjunction with measuring relays and protection equipment and are tested together.

It is possible that ancillary equipment such as network switches used in conjunction with measuring relays and protection equipment ~~may need~~ needs to comply with additional safety requirements.

~~This standard is intended to describe only product safety requirements; therefore, functional performance of the equipment is not covered.~~

~~Functional safety requirements, including EMC functional safety, are not covered by this standard. Functional safety risk analysis is not within the scope of this product safety standard.~~

This document does not specify the implementation of individual equipment, circuits and components.

~~The object of this standard is to have a comprehensive standard that covers all aspects of product safety and the related type and routine tests, for measuring relays and protection equipment.~~

This document applies to equipment designed to be safe at least under the following environmental conditions:

– indoor use;

– altitude up to 2 000 m, in accordance with IEC 60255-1;

~~– external operating temperature range, in accordance with IEC 60255-1;~~

– rated ambient temperature range, in accordance with IEC 60255-1;

– maximum external relative humidity ~~95 %, non-condensing~~, in accordance with IEC 60255-1;

~~– supply fluctuations in accordance with IEC 60255-1;~~

– operating range of auxiliary energizing voltage in accordance with IEC 60255-1;

– applicable ~~supply~~ overvoltage category;

~~– external pollution degree 1 and external pollution degree 2.~~

– applicable pollution degree of the intended environment (pollution degree 2 in most cases).

~~The equipment will normally be installed in a restricted access area within a power station, substation or industrial/retail environment. The environmental conditions specified for the equipment in IEC 60255-1 apply. This standard considers the normal environmental conditions of corrosion caused by humidity but does not cover corrosion by atmospheric pollution.~~

~~It is assumed that access to the equipment during installation, maintenance, normal service and decommissioning is restricted to users aware of working procedures necessary to ensure safety.~~

~~This product safety standard takes precedence over general standards for matters of safety.~~

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>~~

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60127-1, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

IEC 60255-1, *Measuring relays and protection equipment – Part 1: Common requirements*

~~IEC 60255-21-1, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section One: Vibration tests (sinusoidal)*~~

~~IEC 60255-21-2, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section Two: Shock and bump tests*~~

~~IEC 60255-21-3, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section 3: Seismic tests*~~

IEC 60255-26~~:2013~~, *Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements*

IEC 60352-1, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60352-2, *Solderless connections – Part 2: Crimped connections – General requirements, test methods and practical guidance*

IEC 60417, *Graphical symbols for use on equipment.* Available at: http://www.graphical-symbols.info/equipment

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code*)
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1:~~2007~~2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60664-3~~:2003~~, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*
~~Amendment 1:2010~~

IEC TS 60695-2-20, *Fire hazard testing – Part 2-20: Glowing/hot-wire based test methods – Hot-wire coil ~~ignitability~~ test method – Apparatus, test method and guidance*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 60990:~~1999~~2016, *Methods of measurement of touch current and protective conductor current*

IEC 61010-1:2010, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements*
IEC 61010-1:2010/AMD1:2016

IEC 61032, *Protection of persons and equipment by enclosures – Probes for verification*

IEC 61051-2:2021, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

~~IEC 61140, *Protection against electric shock – Common aspects for installation and equipment*~~

IEC 61180, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*

~~IEC 61180-1:1992, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*~~

~~IEC 61180-2, *High-voltage test techniques for low-voltage equipment – Part 2: test equipment*~~

IEC 61869-6, *Instrument transformers – Part 6: Additional general requirements for low-power instrument transformers*

IEC 61869-10, *Instrument transformers – Part 10: Additional requirements for low-power passive current transformers*

IEC 61869-11, *Instrument transformers – Part 11: Additional requirements for low-power passive voltage transformers*

IEC 62151, *Safety of equipment electrically connected to a telecommunication network*

~~ISO 7000, *Graphical symbols for use on equipment – Index and synopsis.* Available at: http://www.graphical-symbols.info/equipment~~

IEC 60255-27

Edition 3.0 2023-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Measuring relays and protection equipment – Part 27: Product safety requirements

Relais de mesure et dispositifs de protection – Partie 27: Exigences de sécurité des produits

IEC 60255-27:2023-02(en-fr)

CONTENTS

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MEASURING RELAYS AND PROTECTION EQUIPMENT –

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MEASURING RELAYS AND PROTECTION EQUIPMENT –

Part 27: Product safety requirements

1 Scope

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– indoor use;
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– rated ambient temperature range, in accordance with IEC 60255-1;
– maximum external relative humidity, in accordance with IEC 60255-1;
– operating range of auxiliary energizing voltage in accordance with IEC 60255-1;
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IEC 60255-26, *Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements*

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IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code*)
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC TS 60695-2-20, *Fire hazard testing – Part 2-20: Glowing/hot-wire based test methods – Hot-wire coil test method – Apparatus, test method and guidance*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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RELAIS DE MESURE ET DISPOSITIFS DE PROTECTION –

Partie 27: Exigences de sécurité des produits

AVANT-PROPOS

1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets.

L'IEC 60255-27 a été établie par le comité d'études 95 de l'IEC: Relais de mesure et dispositifs de protection. Il s'agit d'une Norme internationale.

Cette troisième édition annule et remplace la deuxième édition parue en 2013. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) suppression des énoncés contradictoires;
b) clarification du domaine d'application et ajout de l'énoncé qui précise que tous les articles de la norme constituent des exigences, et pas seulement les essais de type;

c) alignement de la terminologie, des définitions et des exigences de documentation sur l'IEC 60255-1;

d) alignement sur l'IEC 61010-1, par exemple pour les définitions relatives à la TAD;

e) clarification de l'indice de protection;

f) ajout des essais diélectriques et des essais de choc aux exigences d'essais mécaniques et d'environnement;

g) mise à jour des exigences relatives à la résistance d'isolement pour s'aligner sur d'autres normes de sécurité des produits;

h) suppression des essais sur prélèvement;

i) ajout de la surcharge thermique limite de courte durée;

j) ajout de la résistance aux contraintes mécaniques;

k) ajout des accès de transformateurs de tension et de courant de faible puissance;

l) mise à jour des tableaux de l'Annexe C pour correspondre aux normes de référence;

m) ajout des résistances sensibles à la tension et des émetteurs radioélectriques à l'Annexe D;

n) ajout de l'Annexe G pour l'évaluation des risques.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
95/516/FDIS	95/526/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 60255, publiées sous le titre général *Relais de mesure et dispositifs de protection*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

Le présent document spécifie les exigences de sécurité qui s'appliquent généralement à tous les matériels qui relèvent de son domaine d'application. Ces exigences peuvent être complétées par des normes générales de sécurité des produits et par l'IEC 60664-1.

RELAIS DE MESURE ET DISPOSITIFS DE PROTECTION –

Partie 27: Exigences de sécurité des produits

1 Domaine d'application

La présente partie de l'IEC 60255 spécifie les exigences de sécurité des produits pour les relais de mesure et les dispositifs de protection avec une tension assignée en courant alternatif inférieure ou égale à 1 000 V ou avec une tension assignée en courant continu inférieure ou égale à 1 500 V. Au-dessus de ces limites, l'IEC 60664-1 s'applique pour déterminer les distances d'isolement, les lignes de fuite et les tensions d'essai de tenue.

Le présent document spécifie les exigences de sécurité fondamentales pour réduire le plus possible les risques d'incendie et de dangers causés par un choc électrique ou les risques de blessure de l'utilisateur et de dégradation matérielle. Le présent document spécifie uniquement les exigences de sécurité des produits; les performances fonctionnelles du matériel ne sont pas couvertes.

En revanche, le présent document couvre tous les modes qui peuvent être utilisés pour le montage et l'utilisation du dispositif dans des baies, des racks ou des panneaux. Le présent document s'applique aussi aux dispositifs auxiliaires comme les shunts, résistances série, transformateurs, panneaux de commande auxiliaires, dispositifs d'affichage, etc., qui sont utilisés conjointement avec les relais de mesure et les dispositifs de protection et sont soumis à l'essai ensemble.

Il est possible qu'il soit nécessaire que les matériels auxiliaires tels que les commutateurs réseau utilisés conjointement avec les relais de mesure et les dispositifs de protection satisfassent à des exigences de sécurité supplémentaires.

Le présent document ne s'applique pas à la mise en œuvre individuelle de matériels, de circuits, et de composants.

Le présent document s'applique aux matériels conçus pour être sûrs au moins dans les conditions d'environnement suivantes:

– installation à l'intérieur;
– altitude jusqu'à 2 000 m conformément à l'IEC 60255-1;
– plage assignée de températures ambiantes conformément à l'IEC 60255-1;
– humidité relative extérieure maximale conformément à l'IEC 60255-1;
– plage de fonctionnement de la tension d'alimentation auxiliaire conformément à l'IEC 60255-1;
– catégorie de surtension applicable;
– degré de pollution applicable de l'environnement prévu (degré de pollution 2 dans la plupart des cas).

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60085, *Isolation électrique – Évaluation et désignation thermiques*

IEC 60127-1, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links* (disponible en anglais seulement)

IEC 60255-1, *Relais de mesure et dispositifs de protection – Partie 1: Exigences communes*

IEC 60255-26, *Relais de mesure et dispositifs de protection – Partie 26: Exigences de compatibilité électromagnétique*

IEC 60352-1, *Connexions sans soudure – Partie 1: Connexions enroulées – Règles générales, méthodes d'essai et guide pratique*

IEC 60352-2, *Connexions sans soudure – Partie 2: Connexions serties – Exigences générales, méthodes d'essai et guide pratique*

IEC 60417, *Symboles graphiques utilisables sur le matériel.* Disponible à l'adresse: http://www.graphical-symbols.info/equipment

IEC 60529:1989, *Degrés de protection procurés par les enveloppes (code IP*)
IEC 60529:1989/AMD1:1999
IEC 60529:1989/AMD2:2013

IEC 60664-1:2020, *Coordination de l'isolement des matériels dans les réseaux d'énergie électrique à basse tension – Partie 1: Principes, exigences et essais*

IEC 60664-3, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 3: Utilisation de revêtement, d'empotage ou de moulage pour la protection contre la pollution*

IEC TS 60695-2-20, *Fire hazard testing – Part 2-20: Glowing/hot-wire based test methods – Hot-wire coil test method – Apparatus, test method and guidance* (disponible en anglais seulement)

IEC 60695-11-10, *Essais relatifs aux risques du feu – Partie 11-10: Flammes d'essai – Méthodes d'essai horizontale et verticale à la flamme de 50 W*

IEC 60825-1, *Sécurité des appareils à laser – Partie 1: Classification des matériels et exigences*

IEC 60990:2016, *Méthodes de mesure du courant de contact et du courant dans le conducteur de protection*

IEC 61010-1:2010, *Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire – Partie 1: Exigences générales*
IEC 61010-1:2010/AMD1:2016

IEC 61032, *Protection des personnes et des matériels par les enveloppes – Calibres d'essai pour la vérification*

IEC 61051-2:2021, *Varistances utilisées dans les équipements électroniques – Partie 2: Spécification intermédiaire pour varistances pour limitations de surtensions transitoires*

IEC 61180, *Techniques des essais à haute tension pour matériel à basse tension – Définitions, exigences relatives aux essais, matériel d'essai*

IEC 61869-6, *Transformateurs de mesure – Partie 6: Exigences générales supplémentaires concernant les transformateurs de mesure de faible puissance*

IEC 61869-10, *Transformateurs de mesure – Partie 10: Exigences supplémentaires concernant les transformateurs de courant passifs de faible puissance*

IEC 61869-11, *Transformateurs de mesure – Partie 11: Exigences supplémentaires pour les transformateurs de tension passifs de faible puissance*

IEC 62151, *Sécurité des matériels reliés électriquement à un réseau de télécommunications*