IEC 60364-8-81

Edition 1.0 2026-02

INTERNATIONAL STANDARD

HORIZONTAL PUBLICATION

Low-voltage electrical installations -
Part 8-81: Functional aspects - Energy efficiency

ICS 13.020.01; 27.015; 91.140.50

ISBN 978-2-8327-1034-0

IEC 60364-8-81:2026-02(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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IEC 60364-8-81 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock. It is an International Standard.

This first edition cancels and replaces the second edition of IEC 60364-8-1 published in 2019. This edition constitutes a technical revision.

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

a) modified numbering that allows IEC 60364-7 subparts to amend this document;
b) alignment of the definitions with IEC 60050-826;
c) introduction of minimum energy moment method in Annex A;
d) improvements in Annex B;

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

Draft	Report on voting
64/2799/FDIS	64/2818/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.

It has the status of a group energy efficiency publication in accordance with IEC Guide 118.

A list of all parts in the IEC 60364 series, published under the general title *Low-voltage electrical installations*, can be found on the IEC website.

The reader's attention is drawn to the fact that Annex C lists all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this document.

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– withdrawn, or
– revised.

INTRODUCTION

The optimization of electrical energy usage can be facilitated by appropriate design and installation considerations. An electrical installation can provide the required level of service and safety for the lowest electrical consumption. This is considered by designers as a general requirement of their design procedures in order to establish the best use of electrical energy. In addition to the many parameters taken into account in the design of electrical installations, more importance is nowadays focused on reducing losses within the system and its use. It is important therefore that the design of the whole installation takes into account inputs from users, suppliers and utilities.

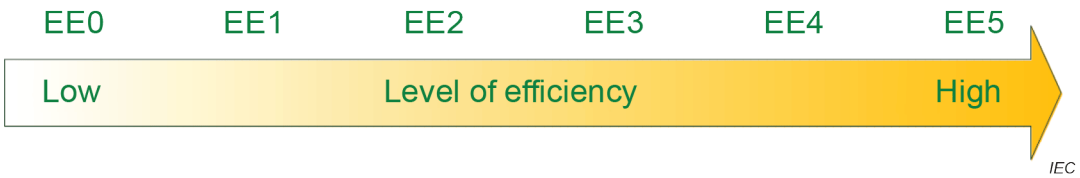
It is important that this document covers existing electrical installations in buildings, in addition to new installations. It is in the refurbishment of existing buildings that significant overall improvements in energy efficiency can be achieved.

The optimization of the use of electricity is based on energy efficiency management, which is based on the price of electricity, electrical consumption and real-time adaptation. Efficiency is checked by measurement during the whole life of the electrical installation. This helps identify opportunities for any improvements and corrections. Improvements and corrections can be implemented by redesign or equipment replacement. The aim is to provide a design for an efficient electrical installation which allows an energy management process to suit the user's needs, and in accordance with an acceptable investment. This document first introduces the different measures to provide an energy efficient installation based on kilowatt-hour (kWh) saving. It then provides guidance on giving priority to the measures depending on the return of investment, in other words the saving of electrical energy and reduction of electrical power costs divided by the amount of investment.

This document is intended to provide requirements and recommendations for the electrical part of the energy management system addressed by ISO 50001.

It introduces requirements, recommendations and methods for the design and the energy efficiency assessment of an electrical installation within the framework of an energy efficiency management approach in order to get the best permanent functionally equivalent service for the lowest electrical energy consumption and the most acceptable energy availability and economic balance.

The assessment method described in Annex B based on the electrical energy efficiency of the installation allows a classification of an energy efficiency installation according to the levels in Figure 1.



NOTE Account can be taken, if appropriate, of induced works (civil works, compartmentalization) and the necessity to expect, or not, the modifiability of the installation.

Figure 1 – Classification levels for energy efficiency installations

This document introduces requirements and recommendations to design the adequate installation in order to give the tenant or the user or, for example, the energy manager the ability to improve the management of the energy performance of the installation.

All requirements and recommendations of this document enhance the requirements contained in Parts 1 to 8 of the IEC 60364 series.

81 Energy efficiency

81.1 Scope

This part of IEC 60364 provides additional requirements, measures and recommendations for the design, erection, operation and verification of all types of low-voltage electrical installation including local production and storage of energy for optimizing the overall efficient use of electricity.

It introduces requirements, recommendations and methods for the design and the energy efficiency (EE) assessment of an electrical installation within the framework of an energy efficiency management approach in order to get the best permanent functionally equivalent service for the lowest electrical energy consumption and the optimal availability and acceptable cost-effectiveness.

These requirements, recommendations and methods apply, within the scope of the IEC 60364 series, for new installations and modification of existing installations.

This document is applicable to the electrical installation of a building or system and does not apply to products. The energy efficiency of products and their operational requirements are covered by the relevant product standards.

It is possible that another standard provides specific requirements for a particular system or installation application (e.g. manufacturing system covered by ISO 20140 series).

This document does not specifically provide requirements for building automation systems. The contribution of building automation systems to improve energy efficiency of the installation is considered.

This group energy efficiency publication is primarily intended to be used as an energy efficiency standard for the low-voltage electrical installations mentioned in the scope, but is also intended to be used by technical committees in the preparation of publications, in accordance with the principles laid down in IEC Guide 118.

81.2 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 60688, *Electrical measuring transducers for converting AC and DC electrical quantities to analogue or digital signals*

IEC 61557-12, *Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 12: Power metering and monitoring devices (PMD)*

IEC 61869-2, *Instrument transformers - Part 2: Additional requirements for current transformers*

IEC 62053-21, *Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)*

IEC 62053-22, *Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1 S, 0,2 S and 0,5 S)*

Bibliography

IEC 60034-30-1, *Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code)*

IEC 60050-826, *International Electrotechnical Vocabulary (IEV) - Part 826: Electrical installations* (available at http://www.electropedia.org)

IEC 60050-881:1983, *International Electrotechnical Vocabulary (IEV) - Part 881: Radiology and radiological physics* (available at http://www.electropedia.org)

IEC TS 60076-20, *Power transformers - Part 20: Energy efficiency*

IEC 60287-3-2, *Electric cables - Calculation of the current rating - Part 3-2: Sections on operating conditions - Economic optimization of power cable size*

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60364-5-52:2009, *Low-voltage electrical installations - Part 5-52: Selection and erection of electrical equipment - Wiring systems*

IEC 60364-5-55:2011, *Electrical installations of buildings - Part 5-55: Selection and erection of electrical equipment - Other equipment*

IEC 60364-6, *Low voltage electrical installations - Part 6: Verification*

IEC 60364-7-712, *Low voltage electrical installations - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems*

IEC 60947-6-1, *Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment*

IEC 61800-9-1, *Adjustable speed electrical power drive systems - Part 9-1: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - General requirements for setting energy efficiency standards for power driven equipment using the extended product approach (EPA) and semi analytic model (SAM)*

IEC 61800-9-2, *Adjustable speed electrical power drive systems (PDS) - Part 9-2: Ecodesign for motor systems - Energy efficiency determination and classification*

IEC 62586-1*, Power quality measurement in power supply systems - Part 1: Power quality instruments (PQI)*

IEC 62962*, Particular requirements for load-shedding equipment (LSE)*

IEC 62974-1, *Monitoring and measuring systems used for data collection, aggregation and analysis - Part 1: Device requirements*

IEC 62991*, Particular requirements for source switching equipment (SSE)*

IEC 63345, *Energy efficiency systems - Simple external consumer display*

IEC 63402 (all parts), *Energy efficiency - Customer energy management systems*

ISO 20140 (all parts), *Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment*

ISO 50001, *Energy management systems - Requirements with guidance for use*

ISO 50006, *Energy management systems - Evaluating energy performance using energy performance indicators and energy baselines*

ISO 52120-1, *Energy performance of buildings - Contribution of building automation, controls and building management - Part 1: General framework and procedures*

NEMA guide TP1, *Guide for Determining Energy Efficiency for Distribution Transformers*

IEEE C57.12.00-2000 *IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*

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