

MADALPINGELISED ELEKTRIPAIGALDISED. OSA 8-1:
TALITLUSLIKUD ASPEKTID. ENERGIATÕHUSUS

Low-voltage electrical installations - Part 8-1:
Functional aspects - Energy efficiency (IEC
60364-8-1:2019)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-HD 60364-8-1:2019 sisaldab Euroopa standardi HD 60364-8-1:2019, HD 60364-8-1:2019/AC:2019-06 ingliskeelset teksti.	This Estonian standard EVS-HD 60364-8-1:2019 consists of the English text of the European standard HD 60364-8-1:2019, HD 60364-8-1:2019/AC:2019-06.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.06.2019.	Date of Availability of the European standard is 14.06.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.020.01, 27.015, 91.140.50

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ICS 13.020.01; 27.015; 91.140.50

English Version

**Low-voltage electrical installations - Part 8-1: Functional aspects
- Energy efficiency
(IEC 60364-8-1:2019/COR1:2019)**

Installations électriques à basse tension - Partie 8-1:
Fonctionnalité - Efficacité énergétique
(IEC 60364-8-1:2019/COR1:2019)

Errichten von Niederspannungsanlagen - Teil 8-1:
Funktionale Aspekte - Energieeffizienz
(IEC 60364-8-1:2019/COR1:2019)

This corrigendum becomes effective on 14 June 2019 for incorporation in the English language version of the HD.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Endorsement notice

The text of the corrigendum IEC 60364-8-1:2019/COR1:2019 was approved by CENELEC as HD 60364-8-1:2019/AC:2019-06 without any modification.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60364-8-1
 Edition 2.0 2019-02
LOW-VOLTAGE ELECTRICAL INSTALLATIONS –**Part 8-1: Functional aspects – Energy efficiency****CORRIGENDUM 1****2 Normative references**

Replace the reference to IEC 61557-12:2007 with the following new reference:

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)*

4.1.3 Design principles

Replace the first dashed list item with the following new item:

– load energy profile (active and reactive energy);

8.3.1.2 Requirements on accuracy and measuring range**Table 1**

In the first row, second column, replace "IEC 62052-22" with "IEC 62053-22". In the second and third rows, third column, replace "PMD-1", "PMD-2" and "PMD-3" with "PMD-I", "PMD-II" and "PMD-III" respectively, as shown:

Measurement application	Applicable IEC product standards	Device name according to standards	Usual device name	Complementary explanations
Billing (Contractual)	or IEC 62053-21 or IEC 62053-22	Electricity metering equipment	Revenue meter, electricity meter, utility meter	Energy metering for billing applications (e.g. utility invoicing a landlord or a mall owner, sub-billing to tenants)
Energy usage analysis	IEC 61557-12 ^a	Power metering and monitoring device (PMD-I or PMD-II or PMD-III)	Power meter, energy meter	Energy cost and usage analysis (for cost allocation or sub-billing within a company or for energy efficiency purposes)
Power monitoring	IEC 61557-12 ^b	Power metering and monitoring device (PMD-II or PMD-III)	Power meter, energy meter	Demand side power quality analysis and energy cost and usage analysis

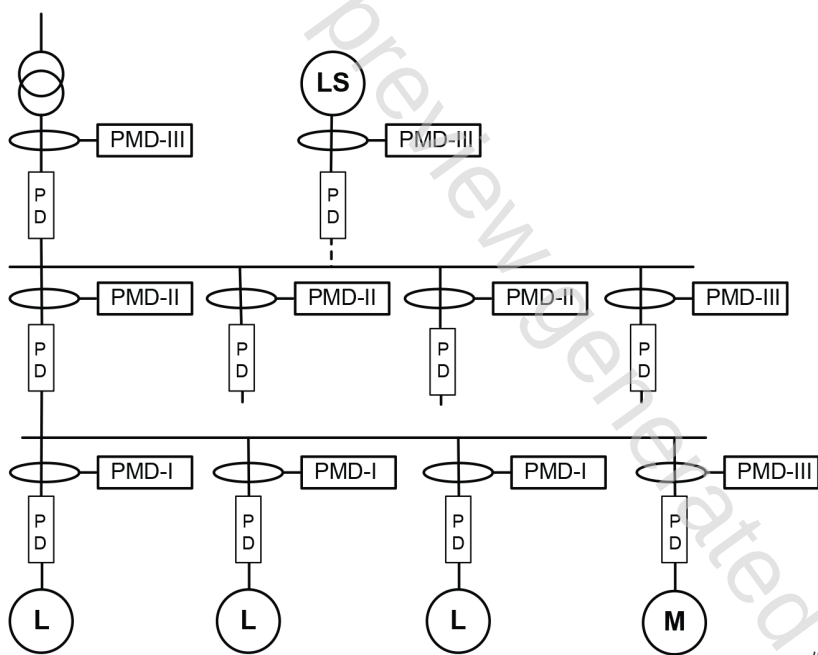
Energy estimation		Indicator or sensor	Energy estimator	Devices for giving information needed to correctly operate the energy management system, for example running time of equipment, number of operation, basic measurement
^a Devices used for power quality monitoring, when they provide active energy measurement function, can be used for energy usage analysis. ^b Devices used for power quality monitoring in accordance with IEC 62586-1 can be used for power monitoring especially where comparable measurements are needed. NOTE Other information such as occupancy, number of operations, manufacturing figures, is provided by different instruments and are covered by other standards.				

8.3.1.3 Measurement

Replace, in the 3 dashed list items, in the third paragraph, "PMD-1", "PMD-2" and "PMD-3" with "PMD-I", "PMD-II" and "PMD-III" respectively.

Figure 3

Replace Figure 3, including the Key, with the following new Figure 3 and Key:



Key

Symbol	Function
PMD	power metering and monitoring device
PMD-I	PMD including at least: E_a
PMD-II	PMD including at least: P , Q , S , E_a , E_r , f , I , U and/or V , PF ,
PMD-III	PMD including at least: P , Q , S , E_a , E_r , E_{ap} , f , I , I_N , U and/or V , PF , THD_U and/or THD_V and/or $THD-R_U$ and/or $THD-R_V$, THD_I and/or $THD-R_I$
P	total active power
E_a	total active energy
Q	total reactive power
S	total apparent power

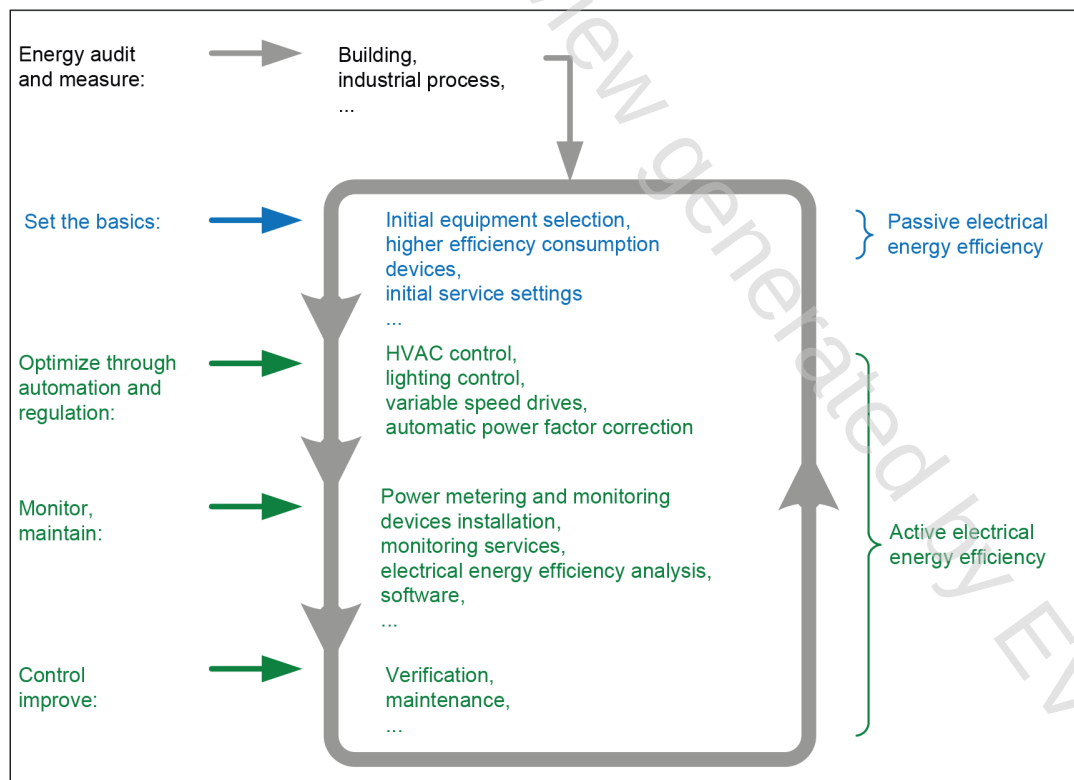
	E_r	total reactive energy
	E_{ap}	total apparent energy
	f	frequency
	I	line current
	I_N	neutral current
	U	line to line voltage
	V	line to neutral voltage
	PF	power factor
	THD_U	total harmonic distortion voltage related to fundamental
	$THD-R_U$	total harmonic distortion voltage related to RMS value
	THD_I	total harmonic current related to fundamental
	$THD-R_I$	total harmonic current related to RMS value
PD		protective device with isolation function
M		motor
L		load
LS		local power supply (e.g. PV, wind turbine, generator) (if present)

Figure 3 – Example of measurement equipment selection in an installation

9.1 Methodology

Figure 4

Replace Figure 4 with the following new Figure 4:



IEC

Figure 4 – Iterative process for electrical energy efficiency management

B.3.2.2.1 Parameter II01: determination of energy consumption

Table B.3

In the first column, last row, replace "> 90 %" with "≥ 90 %" as shown:

Table B.3 – Determination of energy consumption: coverage

K_1	Points for industrial building	Points for commercial building	Points for infrastructure
< 50 %	0	0	0
≥ 50 % and < 65 %	1	1	1
≥ 65 % and < 75 %	2	2	2
≥ 75 % and < 83 %	4	4	4
≥ 83 % and < 90 %	6	5	6
≥ 90 %	7	6	7

B.3.2.2.2 Parameter II02: consumption and location of the main substation

Table B.4

In the first column, last row, replace "> 90 %" with "≥ 90 %" as shown:

Table B.4 – Main substation: consumption

% of consumption vs total consumption	Points for industrial building	Points for commercial building	Points for infrastructure
< 50 %	0	0	0
≥ 50 % and < 70 %	2	1	2
≥ 70 % and < 83 %	4	2	4
≥ 83 % and < 90 %	5	3	5
≥ 90 %	6	4	6

B.3.2.2.3 Parameter II03: voltage drop

Table B.6

In the first column, last row, replace "< 1 %" with "≤ 1 %" as shown:

Table B.6 – Voltage drop

K_{VD}	Points for industrial building	Points for commercial building	Points for infrastructure
> 5 %	0	0	0
≤ 5 % and > 3 %	1	1	1
≤ 3 % and > 2 %	2	2	2
≤ 2 % and > 1,5 %	4	4	4
≤ 1,5 % and > 1 %	5	5	5
≤ 1 %	6	6	6

B.3.2.2.5 Parameter II05: efficiency of fixed installed current using equipment

Table B.8

In the first column, first row, replace "< 1,2" with "≥ 1,2" as shown:

Table B.8 – Efficiency of fixed installed current using equipment

R_{EC}	Points for industrial building	Points for commercial building	Points for infrastructure
$\geq 1,2$	0	0	0
$\geq 1,05$ and $< 1,2$	2	2	2
$< 1,05$	4	4	4

B.3.2.4.3 Parameter MA03: data management**Table B.22**

In the first column, second row, replace "> 1 year" with " ≥ 1 year". In the first column, last row, replace "> 5 years" with " ≥ 5 years" as shown:

Table B.22 – Data management

Data stored	Points for industrial building	Points for commercial building	Points for infrastructure
< 1 year of history	0	0	0
≥ 1 year and < 5 years	4	4	4
≥ 5 years	10	8	8

B.3.2.4.4 Parameter MA04: performance of the transformer(s)**Table B.23**

In the first column, first row, replace "> 0,2" with " $\geq 0,2$ " as shown:

Table B.23 – Working point of transformer

R_{ET}	Points for industrial building	Points for commercial building	Points for infrastructure
$\geq 0,2$	0	0	0
$< 0,2$	1	1	1

B.3.3.7 Parameter EM05: measurement by usage**Table B.37**

In the first column, last row, replace "> 4" with " ≥ 4 " as shown:

Table B.37 – Measurement by usage

Number of usage measured	Points
0	0
≥ 1 and < 2	4
≥ 2 and < 3	10
≥ 3 and < 4	16
≥ 4	20

English Version

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Fonctionnalité - Efficacité énergétique
(IEC 60364-8-1:2019)

Errichten von Niederspannungsanlagen - Teil 8-1:
Funktionale Aspekte - Energieeffizienz
(IEC 60364-8-1:2019)

This Harmonization Document was approved by CENELEC on 2019-03-13. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for implementation of this Harmonization Document at national level.

Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 64/2353/FDIS, future edition 2 of IEC 60364-8-1, prepared by IEC/TC 64 "Electrical installations and protection against electric shock" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as HD 60364-8-1:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-12-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-06-14

This document supersedes HD 60364-8-1:2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60364-8-1:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034-30-1	NOTE	Harmonized as EN 60034-30-1
IEC 60364 (series)	NOTE	Harmonized as HD 60364 (series)
IEC 60364-5-52:2009	NOTE	Harmonized as HD 60364-5-52:2011 (modified)
IEC 60364-5-55:2011	NOTE	Harmonized as HD 60364-5-55:2012 (modified)
IEC 60364-5-55:2011/A1:2012	NOTE	Harmonized as HD 60364-5-55:2013 (not modified)
IEC 60364-6	NOTE	Harmonized as HD 60364-6
IEC 60947-6-1:2005	NOTE	Harmonized as EN 60947-6-1:2005 (not modified)
IEC 60947-6-1:2005/A1:2013	NOTE	Harmonized as EN 60947-6-1:2005/A1:2014 (not modified)
IEC 61800-9-1	NOTE	Harmonized as EN 61800-9-1
IEC 61800-9-2	NOTE	Harmonized as EN 61800-9-2
IEC 62052-11	NOTE	Harmonized as EN 62052-11
IEC 62586-1	NOTE	Harmonized as EN 62586-1
IEC 62962 ¹	NOTE	Harmonized as EN 62962 ²
IEC 62974-1	NOTE	Harmonized as EN 62974-1
ISO 50001	NOTE	Harmonized as EN ISO 50001

¹ To be published. Stage at the time of publication: IEC PRVC 62962:2018.

² To be published. Stage at the time of publication: prEN 62962:2017.

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61557-12	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 12: Performance measuring and monitoring devices (PMD)	EN 61557-12	2008
IEC 61869-2	-	Instrument transformers - Part 2: Additional requirements for current transformers	EN 61869-2	-
IEC 62053-21	-	Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)	EN 62053-21	-
IEC 62053-22	-	Electricity metering equipment (a.c.) - Particular Requirements - Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)	EN 62053-22	-
IEC GUIDE 118	-	Inclusion of energy efficiency aspects in - electrotechnical publications		-
IEC GUIDE 119	-	Preparation of energy efficiency - publications and the use of basic energy efficiency publications and group energy efficiency publications		-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 8-1: Functional aspects – Energy efficiency

FOREWORD

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International Standard IEC 60364-8-1 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

- a) revision of Annex B;
- b) revision of 4.2: Energy efficiency assessment for electrical installations;
- c) update of 8.3: Input from loads, sensors and forecasts;
- d) introduction of new definitions.

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

FDIS	Report on voting
64/2353/FDIS	64/2360/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

It has the status of a group energy efficiency publication in accordance with IEC Guide 118 and IEC Guide 119.

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.

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 committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://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.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication 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

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. The design of the whole installation has therefore to take into account inputs from users, suppliers and utilities.

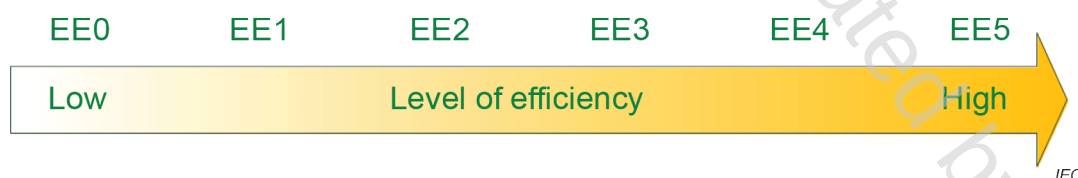
It is important that this document covers existing electrical installations in buildings, in addition to new installations. It is in the refurbishment of existing buildings that significant overall improvements in energy efficiency can be achieved.

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 may 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 ensure an energy efficient installation based on kWh saving. It then provides guidance on giving priority to the measures depending on the return of investment; i.e. the saving of electrical energy and reducing 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 energy efficiency installation according to the following levels:



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.

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

All requirements and recommendations of this part of IEC 60364 enhance the requirements contained in Parts 1 to 7 of the IEC 60364 series.

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 8-1: Functional aspects – Energy efficiency

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 most acceptable energy availability and economic balance.

These requirements, recommendations and methods apply, within the scope of IEC 60364 (all parts), 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.

Where another standard provides specific requirements for a particular system or installation application (e.g. manufacturing system covered by ISO 20140 (all parts)), those requirements may supersede this document.

This document does not specifically address building automation systems.

This group energy efficiency publication is primarily intended to be used as an energy efficiency standard for the low voltage electrical installations mentioned in Clause 1, but is also intended to be used by technical committees in the preparation of standards, in accordance with the principles laid down in IEC Guide 119 and IEC Guide 118.

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 61557-12:2007, *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 12: Performance measuring and monitoring devices (PMD)*

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

IEC 62053-21, *Electricity metering equipment (a.c.) – Particular requirements – Part 21: Static meters for active energy (classes 1 and 2)*