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Electricity metering equipment - Dependability - Part 31-1: Accelerated reliability testing - Elevated temperature and humidity

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Standard on kinnitatud Eesti Standardikeskuse 19.01.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 19.01.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
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ICS 29.240, 91.140.50

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EUROPEAN STANDARD

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Electricity metering equipment - Dependability - Part 31-1: Accelerated reliability testing - Elevated temperature and humidity

(IEC 62059-31-1:2008)

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Elektrizitätszähler - Zuverlässigkeit - Teil 31-1: Zeitraffende Zuverlässigkeitsprüfung - Temperatur und Luftfeuchte erhöht (IEC 62059-31-1:2008)

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CENELEC

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

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Foreword

The text of document 13/1437A/FDIS, future edition 1 of IEC 62059-31-1, prepared by IEC TC 13, Electrical energy measurement, tariff- and load control, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62059-31-1 on 2008-11-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-08-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-11-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62059-31-1:2008 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 61124	NOTE	Harmonized as EN 61124:2006 (not modified).
IEC 61163-1	NOTE	Harmonized as EN 61163-1:2006 (not modified).
IEC 61164	NOTE	Harmonized as EN 61164:2004 (not modified).
IEC 61709	NOTE	Harmonized as EN 61709:1998 (not modified).

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced 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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60050-191	1990	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-
IEC 60300-3-5	2001	Dependability management - Part 3-5: Application guide - Reliability test conditions and statistical test principles	-	-
IEC 61649	2008	Weibull analysis	EN 61649	2008
IEC 61703	2001	Mathematical expressions for reliability, availability, maintainability and maintenance support terms	EN 61703	2002
IEC/TR 62059-11	2002	Electricity metering equipment - Dependability - Part 11: General concepts	-	-
IEC/TR 62059-21	2002	Electricity metering equipment - Dependability - Part 21: Collection of meter dependability data from the field	-	-
IEC 62059-41	2006	Electricity metering equipment - Dependability - Part 41: Reliability prediction	EN 62059-41	2006
IEC 62308	2006	Equipment reliability - Reliability assessment methods	EN 62308	2006

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INTRODUCTION

Electricity metering equipment are products designed for high reliability and long life under normal operating conditions, operating continuously without supervision. To manage metering assets effectively, it is important to have tools for predicting and estimating life characteristics of various types.

IEC 62059-41 provides methods for predicting the failure rate – assumed to be constant – of metering equipment based on the parts stress method.

IEC 62059-31-1 provides a method for estimating life characteristics using temperature and humidity accelerated testing.

It is practically impossible to obtain data about life characteristics by testing under normal operating conditions. Therefore, accelerated reliability test methods have to be used.

During accelerated reliability testing, samples taken from a defined population are operated beyond their normal operating conditions, applying stresses to shorten the time to failure, but without introducing new failure mechanisms.

The estimation is performed by recording and analysing failures during such accelerated testing, establishing the failure distribution under the test conditions and, using life stress models, extrapolating failure distribution under accelerated conditions of use to normal conditions of use.

The method provides quantitative results with their confidence limits and may be used to compare life characteristics of products coming from different suppliers or different batches from the same supplier.

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ELECTRICITY METERING EQUIPMENT – DEPENDABILITY –

Part 31-1: Accelerated reliability testing – Elevated temperature and humidity

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1 Scope

This part of IEC 62059 provides one of several possible methods for estimating product life characteristics by accelerated reliability testing.

Acceleration can be achieved in a number of different ways. In this particular standard, elevated, constant temperature and humidity is applied to achieve acceleration. The method also takes into account the effect of voltage and current variation.

Of course, failures not (or not sufficiently) accelerated by temperature and humidity will not be detected by the application of the test method specified in this standard.

Other factors, like temperature variation, vibration, dust, voltage dips and short interruptions, static discharges, fast transient burst, surges, etc. – although they may affect the life characteristics of the meter – are not taken into account in this standard; they may be addressed in future parts of the IEC 62059 series.

This standard is applicable to all types of metering equipment for energy measurement, tariff- and load control in the scope of IEC TC 13. The method given in this standard may be used for estimating (with given confidence limits) product life characteristics of such equipment prior to and during serial production. This method may also be used to compare different designs.

2 Normative references

The following referenced 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 60050-191:1990, *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

IEC 60300-3-5 Ed. 1.0:2001, *Dependability management – Part 3-5: Application guide – Reliability test conditions and statistical test principles*

IEC 61649 Ed 2.0: 2008, *Goodness-of-fit tests, confidence intervals and lower confidence limits for Weibull distributed data*

IEC 61703 Ed. 1.0: 2001*, Mathematical expressions for reliability, availability, maintainability and maintenance support terms*

IEC/TR 62059-11 Ed 1.0:2002, *Electricity metering equipment – Dependability – Part 11: General concepts*

IEC/TR 62059-21 Ed. 1.0:2002, *Electricity metering equipment – Dependability – Part 21: Collection of meter dependability data from the field*

IEC 62059-41 Ed. 1.0: 2006*, Electricity metering equipment – Dependability – Part 41: Reliability prediction*

IEC 62308 Ed. 1.0:2006, *Equipment reliability – Reliability assessment methods*

3 Terms and definitions

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

NOTE 1 Here only those terms relevant to the subject are included, which have not been already included in IEC 62059-11.

3.1
accelerated life test
a test in which the applied stress level is chosen to exceed that stated in the reference conditions in order to shorten the time duration required to observe the stress response of the item, or to magnify the response in a given time duration

NOTE To be valid, an accelerated life test shall not alter the basic fault modes and failure mechanisms, or their relative prevalence.

[IEV 191-14-07, modified]

3.2
ageing failure, wear-out failure
a failure whose probability of occurrence increases with the passage of time, as a result of processes inherent in the item

[IEV 191-04-09]

3.3
burn-in (for repairable hardware)
a process of increasing the reliability performance of hardware employing functional operation of every item in a prescribed environment with successive corrective maintenance at every failure during the early failure period

[IEV 191-17-02]

3.4
burn-in (for a non-repairable item)
a type of screening test employing the functional operation of an item

[IEV 191-17-03]

3.5
censoring
termination of the test after either a certain number of failures or a certain time at which there are still items functioning

[IEC 60300-3-5, 3.1.2]

3.6
constant failure intensity period
that period, if any, in the life of a repaired item during which the failure intensity is approximately constant

[IEV 191-10-08]

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