

Electricity metering equipment — Dependability —

Part 41: Reliability prediction

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee PEL/13, Electricity meters, which has the responsibility to:

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

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Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62059-41:2006 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	4
1 Scope	5
2 Normative references	5
3 Terms, definitions and abbreviations	5
4 General information	9
5 Reliability analysis methods	10
6 Reliability prediction using the parts stress method	11
6.1 Overview	11
6.2 Component failure rate data.....	12
6.3 Stress models	12
6.4 Failure rate prediction using the parts stress method.....	13
6.5 Phases of the failure rate prediction process	13
6.6 Presentation of results	14
7 Other dependability considerations	14
8 Life time of life limited components	15
Annex A (normative) Reliability prediction – Procedural flow	16
Annex B (informative) Overview of other reliability analysis and prediction methods	17
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	23
Bibliography	21

INTRODUCTION

The main objective is to provide a tool for predicting the failure rate of electricity metering equipment using the parts stress method. It also provides an overview of reliability analysis and prediction methods.

The result of the prediction can be used in the design phase to support design decisions, in relation with type approval to support decisions concerning the certification period and in the operation phase to determine the necessary maintenance performance to obtain the required availability.

ELECTRICITY METERING EQUIPMENT – DEPENDABILITY –

Part 41: Reliability prediction

1 Scope

This part of IEC 62059-41 is applicable to all types of static metering equipment for energy measurement and load control.

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*
Amendment 1(1999)
Amendment 2 (2002)

IEC 61709:1996, *Electronic components – Reliability – Reference conditions for failure rates and stress models for conversion*

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

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

3 Terms, definitions and abbreviations

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

NOTE Only those terms relevant to the subject, which have not already been included in IEC 62059-11, are given here.

3.1

accelerated test

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 test shall not alter the basic fault modes and failure mechanisms, or their relative prevalence.

[IEV 191-14-07]

3.2**administrative delay (for corrective maintenance)**

accumulated time during which an action of corrective maintenance on a faulty item is not performed due to administrative reasons

[IEV 191-08-09]

3.3**ageing failure, wearout failure**

failure whose probability of occurrence increases with the passage of time, as a result of processes inherent in the item

[IEV 191-04-09]

3.4**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]

3.5**constant failure rate period**

that period, if any, in the life of a non-repaired item during which the failure rate is approximately constant

[IEV 191-01-09]

3.6**equipment under prediction****EUP**

static electricity metering equipment for which a reliability prediction is being made

3.7**failure cause**

circumstances during design, manufacture or use which have led to a failure

[IEV 191-04-17]

3.8**failure intensity acceleration factor**

in a time interval of given duration, whose beginning is specified by a fixed age of a repaired item, ratio of the number of failures obtained under two different sets of stress conditions

[IEV 191-14-12]

3.9**(instantaneous) failure rate**

$\lambda(t)$

limit, if it exists, of the quotient of the conditional probability that the instant of a failure of a non-repaired item falls within a given time interval $(t, t + \Delta t)$ and the duration of this time interval, Δt , when Δt tends to zero, given that the item has not failed up to the beginning of the time interval