# IEC 60115-1

Edition 5.0 2020-03

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Fixed resistors for use in electronic equipment – Part 1: Generic specification

## Résistances fixes utilisées dans les équipements électroniques – Partie 1: Spécification générique



IEC 60115-1:2020-03(en-fr)



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# FIXED RESISTORS FOR USE IN ELECTRONIC EQUIPMENT –

## Part 1: Generic specification

## FOREWORD

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International Standard IEC 60115-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This fifth edition cancels and replaces the fourth edition published in 2008. This edition constitutes a technical revision.

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

a) this 5th edition employs a new document structure, where the tests of prior Clause 4 are given in Clauses 6 to 12 now, with an informative Annex X providing cross-references for references to the prior revision of this standard;
b) the terms and definitions have been revised and amended, supplemented by a new section on resistor technologies and a new section on product classification levels;
c) a new Subclause 4.7 on recommendations for permissible substitutions has been added;

d) the provisions for packaging, storage and transportation in Subclauses 4.8, 4.9 and 4.10 have been completely revised;

e) a new Subclause 5.3 on default tolerances for the most common test parameters has been added;

f) the generic method of measuring resistance, now Sublause 5.6, has been separated from the test for compliance with a prescribed resistance value in 6.1, as a revision of the prior 4.5;

g) the test for the temperature coefficient of resistance of Subclause 6.2 is a revision of the prior test 4.8, variation of resistance with temperature, where the special concessions for resistors below 10 Ω have been waived;

h) the test methods for endurance testing of Subclauses 7.1 to 7.3 (prior 4.25.1 to 4.25.3) have been completely revised;

i) the single-pulse high-voltage overload test of Subclause 8.2 (prior 4.27) has been completely revised, and now offers adjustable severities for the 1,2/50 and for the 10/700 pulse shape for the benefit of detail specifications with improved significance;

j) the periodic-pulse high-voltage overload test of Subclause 8.3 (prior 4.28) has been revised and a corrected table of severities provided;

k) the period-pulse overload test of Subclause 8.4 (prior 4.39) has been deprecated and streamlined to only offer the severity historically applied in subordinate specifications;

l) the Subclauses 9.1 on visual inspection, 9.2 on the gauging of dimensions, and 9.3 on the assessment of detail dimensions (all parts of prior 4.4) have been completely revised;

m) the tests for robustness of terminations (prior 4.16) have been revised and separated into tests for the robustness of solderable terminations, Subclause 9.5, and tests for the robustness of threaded stud or screw terminations, Subclause 9.6;

n) the bump test of Subclause 9.9 (prior 4.20) and the shock test of Subclause 9.10 (prior 4.21) have been revised to reflect the merged relevant test standard IEC 60068-2-29;

o) the dry heat and cold test of the climatic sequence of Subclause 10.3 (prior 4.23) have been revised to reflect the changes of the relevant test standards IEC 60068-2-2 and IEC 60068-2-1;

p) the accelerated damp heat, steady state test of Subclause 10.5 (prior 4.37) has been amended with an option for a reduced number of bias voltages;

q) the corrosion test of Subclause 10.6 has been completely revised in order to employ the better suitable test method of IEC 60068-2-52 instead of the prior used IEC 60068-2-11;

r) the whisker growth test of Subclause 10.7 has been revised to reflect the changes of the new revision of the test methods of IEC 60068-2-82;

s) the test methods for solderability of Subclause 11.1 (prior 4.17) and for resistance to soldering heat of Subclause 11.2 (prior 4.18) have been completely revised to incorporate the necessary option for the variety of lead-bearing and lead-free solder alloys and respective process conditions;

t) the solvent resistance test of Subclause 11.3 combines the prior tests 4.29, component solvent resistance, and 4.30, solvent resistance of marking, in one test;

u) the accidental overload test of Subclause 12.3 (prior 4.26) has been completely revised;

v) the Annex Q on quality assessment procedures has been completely revised;

w) a new Annex R on failure rate evaluation, determination and qualification has been added.

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

| FDIS | Report on voting |
|---|---|
| 40/2717/FDIS | 40/2733/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.

A list of all parts of the IEC 60115 series, under the general title *Fixed resistors for use in electronic 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 "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.

# INTRODUCTION

The specification system for fixed resistors for use in electronic equipment is structured in a hierarchical system as shown in Figure 1, consisting of the following specification types.

**Generic specification**

The generic specification covers all subjects mainly common to the family of fixed resistors for use in electronic equipment, such as terminology, methods of measurement and tests. Where the individual subjects require the prescription conditions or parameters specific to the particular sub-family or type of fixed resistor, such prescriptions are required to be given by one of the subordinate specifications.

For the scope of fixed resistors, the numeric reference to the generic specification is IEC 60115-1.

**Sectional specification**

Sectional specifications cover all subjects additional to those given in the generic specification, which are specific to a defined sub-group of fixed resistors. These subjects normally are preferred values for dimensions and characteristics, additional test methods and relevant prescriptions for test methods given in the generic specification, prescriptions for sampling and for the preparation of specimen, recommended test severities and preferred acceptance criteria. The sectional specification also outlines the structure and scope of the test schedules which are to be applied in all subordinate detail specifications.

For the scope of fixed resistors, the numeric references to the sectional specifications reach from IEC 60115-2 for leaded fixed low power film resistors to currently IEC 60115-9 for fixed surface mount resistor networks with individually measurable resistors. The variety of sectional specifications may be adapted to the portfolio of different technologies of fixed resistors.

**Detail specification**

Detail specifications give directly, or by making reference to other documents, all information necessary to completely describe a given type and range of fixed resistors, including prescriptions of all values for dimensions and characteristics. They also give all information required for the quality assessment of the covered type and range of fixed resistors within a suitable quality assessment system, including prescriptions for all applied test severities and acceptance criteria, and the completed test schedules.

Detail specifications can be either specifications within the IEC system, another specification system linked to IEC, or specified by the manufacturer or user. For the scope of fixed resistors, the numeric references to detail specifications are e.g. IEC 60115-2-101; if related to the sectional specification, IEC 60115-2; and if related to the ancillary blank detail specification, IEC 60115-2-1.

**Blank detail specification**

The hierarchical system of specifications is supplemented by one or more blank detail specification to a sectional specification, which are used to ensure a uniform presentation of detail specifications. The blank detail specifications provide the specification writer with a template on the layout to be adopted and on the information to be given and with guidance for the preparation of detail specifications in line with the requirements of the superior generic or sectional specifications. Blank detail specifications are not considered as relevant specifications since they do not themselves describe any particular component.

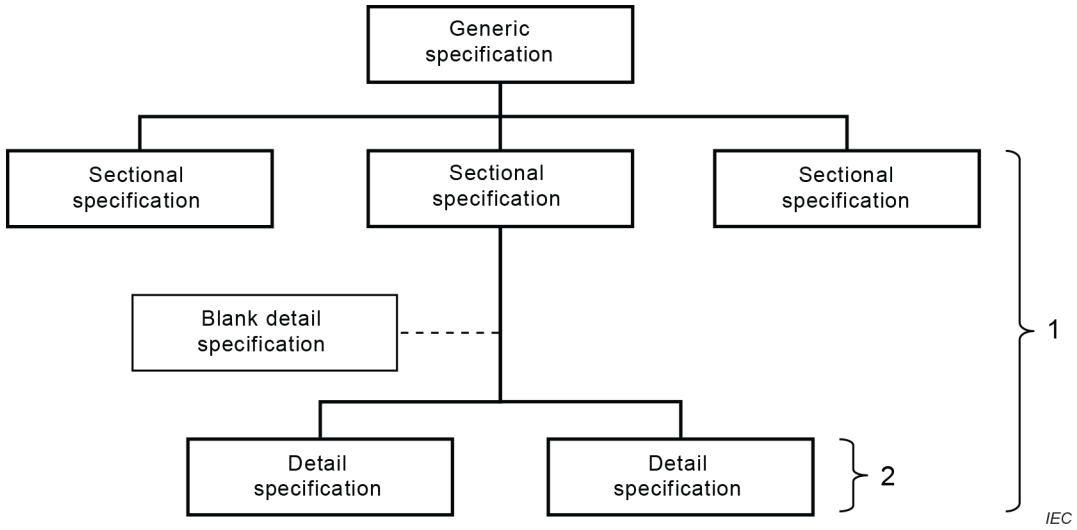
The presence of an established hierarchical specification system with blank detail specifications permits the preparation of detail specifications even outside of the relevant IEC technical committee.

For the scope of fixed resistors, the numeric references to blank detail specifications are e.g. IEC 60115-2-1: if related to the sectional specification, IEC 60115-2.

**Relevant specification**

In this system the term "relevant specification" addresses subordinate specifications containing specific requirements, where applicable.

Any generic or sectional specification may use abstract and universal references to subordinate specifications of either hierarchical level by use of the expression "relevant specification".




**Key**

1 Indicates the range of "Relevant specifications" to the superior generic specification, where applicable.

2 Indicates the range of "Relevant specifications" to the superior sectional specification, where applicable.

**Figure 1 – Hierarchical system of specifications**