IEC 60063

Edition 3.0 2015-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Preferred number series for resistors and capacitors

Séries de valeurs normales pour résistances et condensateurs

IEC 60063:2015-03(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PREFERRED NUMBER SERIES FOR RESISTORS AND CAPACITORS

FOREWORD

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International Standard IEC 60063 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This third edition cancels and replaces the second edition published in 1963 and constitutes a technical revision.

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

– revision of the information on a relationship between an E Series and the tolerance of a resistance or capacitance value of a respective component;
– introduction of advice on a possible deduction from the marking of a component to an associated E Series and also to an associated tolerance;
– complete editorial revision.

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The text of this standard is based on the following documents:

FDIS	Report on voting
40/2340A/FDIS	40/2370/RVD

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

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- replaced by a revised edition, or
- amended.

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PREFERRED NUMBER SERIES FOR RESISTORS AND CAPACITORS

1 Scope

This International Standard provides series of preferred values for the resistance of resistors and for the capacitance of capacitors.

The definition of such series with a defined numeric resolution is a basic prerequisite for the marking and coding of capacitors and resistors with their respective capacitance or resistance values as described in IEC 60062.

NOTE The number series defined in this standard are based on progressive ratios of $\sqrt[i]{10}$, with $r = 3 \cdot 2^i$, and i being a whole number in the range of 0 to 6, hence e.g. of $\sqrt[12]{10}$.

This system of progressive ratios had been established prior to the 1952 release of the first edition of this standard[1] as a consequence of the standardisation of tolerances at ±5 %, ±10 % and ±20 % and the related commercial practice. An adoption of the ISO practice, based on a $\sqrt[10]{10}$ system, was never considered achievable.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60062, *Marking codes for resistors and capacitors*

3 Terms and definitions

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

3.1
E series
infinite series of numeric values with a given number of elements per decade, rounded or derived from the elements of a geometric series

Note 1 to entry: The number of elements within a decade, r, is given in the designation of the E series, Er, e.g. E24 for a number series with 24 values per decade.

4 Number series

4.1 Number series with two significant digits

The series E24, E12, E6 and E3 with two significant digits are the decimal multiples and sub-multiples of the respective values given in Table 1.

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[1] IEC 60063:1952, *Series of preferred values and their associated tolerances for resistors and capacitors*

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Table 1 – Number series with two significant digits

E24	E12	E6	E3
10	10	10	10
11			
12	12		
13			
15	15	15	
16			
18	18		
20			
22	22	22	22
24			
27	27		
30			
33	33	33	
36			
39	39		
43			
47	47	47	47
51			
56	56		
62			
68	68	68	
75			
82	82		
91			

The E24 series is derived from a geometric series composed of values, rounded to two significant digits, of the theoretical numbers

$$v = \left(\sqrt[24]{10}\right)^n$$

where

v is a value of the E24 series, and

n is a whole positive or negative number.

NOTE The values of the E24 series in the range of 27 through 47, and the value 82, divert from the exact mathematical rule. However, a correction of this deviation has never seemed appropriate in light of the historical relevance of this series, having been established prior to the 1952 release of the first edition of this standard.

The E12 series is derived from the E24 series by omitting every second term, and likewise is the E6 series derived from the E12 series and the E3 series derived from the E6 series by omitting every second term thereof.

4.2 Number series with three significant digits

The series E192, E96 and E48 with three significant digits are the decimal multiples and sub-multiples of the respective values given in Table 2.

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