BS EN 60062:2016

Incorporating corrigendum December 2016

BSI Standards Publication

Marking codes for resistors and capacitors (IEC 60062:2016)

National foreword

This British Standard is the UK implementation of EN 60062:2016. It is identical to IEC 60062:2016, incorporating corrigendum December 2016. It supersedes BS EN 60062:2005 which is withdrawn.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum December 2016 is indicated in the text by AC1 AC1.

The UK participation in its preparation was entrusted to Technical Committee EPL/40X, Capacitors and resistors for electronic equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Amendments/corrigenda issued since publication

Date	Text affected
31 January 2017	Implementation of IEC corrigendum December 2016

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60062

October 2016

ICS 31.020

Supersedes EN 60062:2005

English Version

Marking codes for resistors and capacitors (IEC 60062:2016)

Codes de marquage des résistances et des condensateurs (IEC 60062:2016)

Kennzeichnung von Widerständen und Kondensatoren (IEC 60062:2016)

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CENELEC

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

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European foreword

The text of document 40/2465/FDIS, future edition 6 of IEC 60062, prepared by IEC/TC 40 "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60062:2016.

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)	2017-05-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2019-08-16

This document supersedes EN 60062:2005.

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Endorsement notice

The text of the International Standard IEC 60062:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

ISO 1043-1	NOTE	Harmonized as EN ISO 1043-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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.

Publication	Year	Title	EN/HD	Year
IEC 60063	-	Preferred number series for resistors and capacitors	EN 60063	-
IEC 60757	-	Code for designation of colours	HD 457 S1	-
ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MARKING CODES FOR RESISTORS AND CAPACITORS

FOREWORD

International Standard IEC 60062 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This sixth edition cancels and replaces the fifth edition published in 2004 and constitutes a technical revision.

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

- introduction of the new code colour pink for the coding of the multiplier 10^{-3};
- introduction of new subclauses, 3.2 Prescription of code colours, 3.3 Methods for marking resistance value and tolerance, 3.4 Methods for TCR marking, for improved clarity, the subjects of colour assignment, coding of R value and tolerance, and coding of TCR is dealt with in separate clauses;
- inclusion of illustrations for TCR marking by interrupted colour band;
- inclusion of a new subclause on a fixed length code marking, fixed length code marking of resistance values with up to 3 significant digits, hence a fixed code length of 4 digits, and

fixed length code marking of capacitance values with up to 2 significant digits, hence a fixed code length of 3 digits;

- introduction of two new clauses, Clause 6, Coding of properties specific to capacitors and Clause 7, Coding of properties specific to resistors;
- introduction of Annex A, Special three character coding of resistance value with three significant numerals.

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

FDIS	Report on voting
40/2465/FDIS	40/2473/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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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.

MARKING CODES FOR RESISTORS AND CAPACITORS

1 Scope

This International Standard specifies designation and marking codes for capacitors and resistors.

It provides coding methods for the resistance or capacitance value and its tolerance, including colour coding for resistors.

It provides coding for parameters specific either to capacitors, like e.g. the dielectric material, or to resistors, like e.g. the temperature coefficient of resistance (TCR).

It also provides date code systems suitable for the marking of small components.

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 60063, *Preferred number series of resistors and capacitors*

IEC 60757, *Code for designation of colours*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

3 Colour code for fixed resistors

3.1 General rules

Colour code is applied in a sequence of individual solid colour bands.

[AC1⟩ Wherever possible, the first band shall be the one nearest to the end of the resistor and the bands shall be so placed and spaced that there can be no confusion in reading the coding.

The design width of the band used for marking the tolerance shall be at least 1,5 times the width of the other bands in order to avoid any confusion.

NOTE The design width is not intended to be measured. ⟨AC1]

Any additional coding shall be so applied as not to confuse the coding for value and tolerance.

Although colour bands are expected to be complete rings around the perimeter of a cylindrical resistor body, incidental interruption of a band shall be permissible if at least two thirds of the band is visible from any radial angle of view.

3.2 Prescription of code colours

The colours black, brown, red, orange, yellow, green, blue, violet, grey and white are used for the coding of the figures 0 through 9 for each significant numeral. [AC1) Complemented with the colours silver, gold and pink, they are also used for the coding of the multiplier, the tolerance and the temperature coefficient of resistance (TCR). (AC1] Table 1 summarizes the colours with all assigned parameters and their respective values.

Table 1 – Code colour prescriptions

Colour			Significant numeral	Multiplier	Tolerance	TCR
	Code	Example			%	10^{-6}/K
None	—		—	—	±20	—
Pink	PK		—	10^{-3}	—	—
Silver	SR		—	10^{-2}	±10	—
Gold	GD		—	10^{-1}	±5	—
Black	BK		0	1	—	±250
Brown	BN		1	10^{1}	±1	±100
Red	RD		2	10^{2}	±2	±50
Orange	OG		3	10^{3}	±0,05	±15
Yellow	YE		4	10^{4}	±0,02	±25
Green	GN		5	10^{5}	±0,5	±20
Blue	BU		6	10^{6}	±0,25	±10
Violet	VT		7	10^{7}	±0,1	±5
Grey	GY		8	10^{8}	±0,01	±1
White	WH		9	10^{9}	—	—

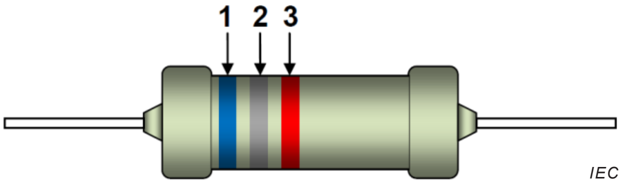
NOTE 1 The code letters are as defined in IEC 60757.

NOTE 2 The colours shown here as example are not intended as normative reference, but are applied for the purpose of consistent illustration only.

3.3 Methods for marking resistance value and tolerance

3.3.1 Marking of resistance values with two significant numerals

Resistors with a tolerance of ±20 %, whose resistance values are described with two significant numerals, are marked with a three-band colour code, consisting of two bands for the significant numerals, followed by one band for the multiplier. The absence of the fourth band indicates the tolerance of ±20 %. Figure 1 illustrates this with a 6,8 kΩ resistor with a tolerance of ±20 %.



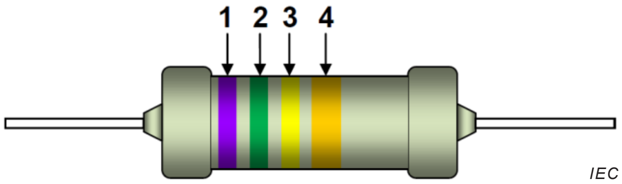
Key:

1: 1st band	1st numeral	Blue = 6
2: 2nd band	2nd numeral	Grey = 8
3: 3rd band	Multiplier	Red = $\times$ 10^2

Figure 1 – Colour marking of a resistor 6,8 kΩ, tolerance ±20 %

3.3.2 Marking of resistance values with two significant numerals and tolerance

Resistors with a tolerance tighter than ±20 %, whose resistance values are described with two significant numerals, are marked with a four-band colour code, consisting of two bands for the significant numerals, followed by one band for the multiplier, followed by the last and wider band showing the tolerance. Figure 2 illustrates this with a 750 kΩ resistor with a tolerance of ±5 %.



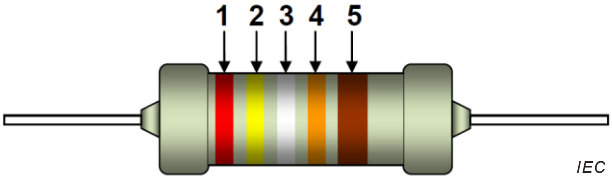
Key:

1: 1st band	1st numeral	Violet = 7
2: 2nd band	2nd numeral	Green = 5
3: 3rd band	Multiplier	Yellow = $\times$ 10^4
4: 4th band	Tolerance	Gold = ±5 %

Figure 2 – Colour marking of a resistor 750 kΩ, tolerance ±5 %

3.3.3 Marking of resistance values with three significant numerals and tolerance

Resistors, whose resistance values are described with three significant numerals, are marked with a five-band colour code, consisting of three bands for the significant numerals, followed by one band for the multiplier, followed by the last and wider band showing the tolerance. Figure 3 illustrates this with a 249 kΩ resistor with a tolerance of ±1 %.



Key:

1: 1^{st} band	1^{st} numeral	Red = 2
2: 2^{nd} band	2^{nd} numeral	Yellow = 4
3: 3^{rd} band	3^{rd} numeral	White = 9
4: 4^{th} band	Multiplier	Orange = $\times$ 10^3
5: 5^{th} band	Tolerance	Brown = $\pm$1 %

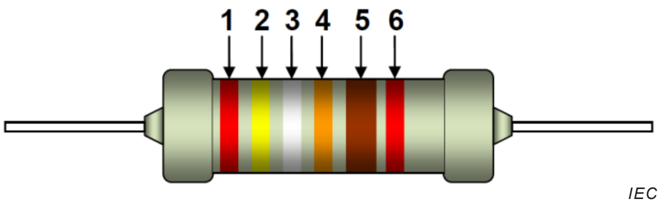
Figure 3 – Colour marking of a resistor 249 kΩ, tolerance ±1 %

3.4 Methods for TCR marking

Colour-code marking of the temperature coefficient shall only be used in combination with a resistance coding for three significant numerals and is additional to the marking of resistance value and tolerance as prescribed in 3.3.3.

One of the following methods should be used for the indication of temperature coefficients with a code colour as prescribed in Table 1, where the tolerance band is consistently maintained as the single wider band.

a) The TCR is marked by means of a colour band as the sixth band, as shown in Figure 4.



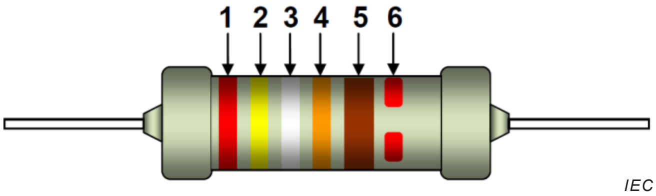
Key:

1: 1^{st} band	1^{st} numeral	Red = 2
2: 2^{nd} band	2^{nd} numeral	Yellow = 4
3: 3^{rd} band	3^{rd} numeral	White = 9
4: 4^{th} band	Multiplier	Orange = $\times$ 10^3
5: 5^{th} band	Tolerance	Brown = $\pm$1 %
6: 6^{th} band	TCR	Red = $\pm 50 \times 10^{-6}$/K

Figure 4 – Colour marking of a resistor with a 6^{th} band for TCR marking

NOTE The prescription of prior revisions of this standard about the sixth band to be the wider band has been changed here as it has been found to be a reason of confusion with component users about the tolerance marking.

b) The TCR is marked by means of an interrupted colour band as the sixth band, as shown in Figure 5.



Key:

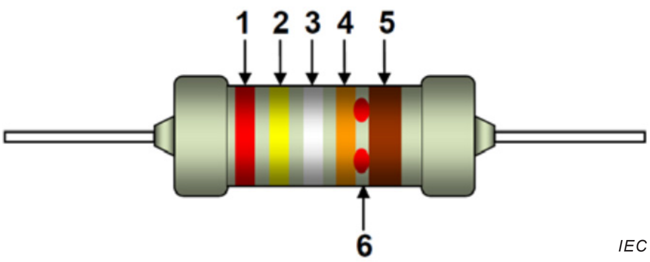
1: 1st band	1st numeral	Red = 2
2: 2nd band	2nd numeral	Yellow = 4
3: 3rd band	3rd numeral	White = 9
4: 4th band	Multiplier	Orange = $\times 10^3$
5: 5th band	Tolerance	Brown = ± 1 %
6: 6th band	TCR	Red = $\pm 50 \times 10^{-6}$/K

Figure 5 – Colour marking of a resistor with an interrupted 6th band for TCR marking

c) Other method of colour marking for TCR.

Other methods of colour marking for TCR may be used if they are clearly described by the documentation and specification of the respective resistor, and if they do not risk confusion with any of the methods given above.

An illustration of a possible similar method is given in Figure 6, adopting the general principles of TCR marking for a situation with insufficient axial length for a dedicated 6th solid or interrupted band.



Key:

1: 1st band	1st numeral	Red = 2
2: 2nd band	2nd numeral	Yellow = 4
3: 3rd band	3rd numeral	White = 9
4: 4th band	Multiplier	Orange = $\times 10^3$
5: 5th band	Tolerance	Brown = ± 1 %
6: 6th dots	TCR	Red = $\pm 50 \times 10^{-6}$/K

Figure 6 – Colour marking of a resistor using an alternative method of inter-band colour dots for TCR marking

4 Letter and numeral code for resistance and capacitance values

4.1 General rules

The value code shall use 3, 4 or 5 characters consisting of 2 figures and a letter, 3 figures and a letter, or 4 figures and a letter, as required.

The code letters replace the decimal point as shown in the respective examples below.

The value code shall be written in succession, without any space in between.

The value code may be succeeded by a code letter for tolerance as specified in Clause 5.

Any additional code letter or numeral shall appear after the tolerance letter and shall be applied in a way not confusing the coding for value and tolerance.

The codes given in Clause 4, 5, 6 and 7 are intended for the marking of components, and are also suitable for the building of part numbers and component ordering codes.

4.2 Resistors

4.2.1 The RKM code system

4.2.1.1 General rule

The RKM code system has emerged from the coding of resistance values in the range of single ohm through some mega ohm, which initially required the multiplier characters R, K and M for coding.

The letters L, R, K, M and G are used as multipliers for 10^{-3}, 1, 10^{3}, 10^{6} and 10^{9}, respectively, of the resistance value expressed in ohm.

The letters L, R, K, M and G are consistently written as capital letters in this coding, regardless of the convention for SI prefixes using a lower-case k as the decimal multiplier for 10^{3}, kilo.

NOTE The letter L is introduced as a code letter since the SI prefix using a lower-case m as the decimal multiplier for 10^{-3}, milli, is not applicable in light of the established use of the upper-case M for 10^{6}, mega.

4.2.1.2 Coding of resistance values with up to 3 significant numerals

The resistance value expressed in ohm is identified by a code using L, R, K, M, or G as multiplier and as decimal point at the same time, as shown in Table 2. The length of the code depends on the actual number of significant numerals of the resistance value.

Table 2 – Coding of resistance values with up to 3 significant numerals

Resistance	Code	Resistance	Code	Resistance	Code
–	–	–	–	0,1 mΩ 0,15 mΩ 0,332 mΩ	L10 L15 L332
1 mΩ 1,5 mΩ 3,32 mΩ	1L0 1L5 3L32	10 mΩ 15 mΩ 33,2 mΩ	10L 15L 33L2	0,1 Ω 0,15 Ω 0,332 Ω	R10 R15 R332
1 Ω 1,5 Ω 3,32 Ω	1R0 1R5 3R32	10 Ω 15 Ω 33,2 Ω	10R 15R 33R2	100 Ω 150 Ω 332 Ω	100R 150R 332R
1 kΩ 1,5 kΩ 3,32 kΩ	1K0 1K5 3K32	10 kΩ 15 kΩ 33,2 kΩ	10K 15K 33K2	100 kΩ 150 kΩ 332 kΩ	100K 150K 332K
1 MΩ 1,5 MΩ 3,32 MΩ	1M0 1M5 3M32	10 MΩ 15 MΩ 33,2 MΩ	10M 15M 33M2	100 MΩ 150 MΩ 332 MΩ	100M 150M 332M
1 GΩ 1,5 GΩ 3,32 GΩ	1G0 1G5 3G32	10 GΩ 15 GΩ 33,2 GΩ	10G 15G 33G2	100 GΩ 150 GΩ 332 GΩ	100G 150G 332G

4.2.1.3 Fixed length coding of resistance values with up to 3 significant numerals

The use of the RKM code system for the identification of resistance values in a database related application, like e.g. in a prescription for an ordering designation, may require the use of a fixed length code. If the resistance values to be coded consist of up to three significant numerals, such a fixed length RKM code system has a consistent length of 4 characters, as shown in Table 3.

Table 3 – Fixed length coding of resistance values with up to 3 significant numerals

Resistance	Code	Resistance	Code	Resistance	Code
–	–	–	–	0,1 mΩ	L100
				0,15 mΩ	L150
				0,332 mΩ	L332
1 mΩ	1L00	10 mΩ	10L0	0,1 Ω	R100
1,5 mΩ	1L50	15 mΩ	15L0	0,15 Ω	R150
3,32 mΩ	3L32	33,2 mΩ	33L2	0,332 Ω	R332
1 Ω	1R00	10 Ω	10R0	100 Ω	100R
1,5 Ω	1R50	15 Ω	15R0	150 Ω	150R
3,32 Ω	3R32	33,2 Ω	33R2	332 Ω	332R
1 kΩ	1K00	10 kΩ	10K0	100 kΩ	100K
1,5 kΩ	1K50	15 kΩ	15K0	150 kΩ	150K
3,32 kΩ	3K32	33,2 kΩ	33K2	332 kΩ	332K
1 MΩ	1M00	10 MΩ	10M0	100 MΩ	100M
1,5 MΩ	1M50	15 MΩ	15M0	150 MΩ	150M
3,32 MΩ	3M32	33,2 MΩ	33M2	332 MΩ	332M
1 GΩ	1G00	10 GΩ	10G0	100 GΩ	100G
1,5 GΩ	1G50	15 GΩ	15G0	150 GΩ	150G
3,32 GΩ	3G32	33,2 GΩ	33G2	332 GΩ	332G

4.2.1.4 Coding of resistance values with more than 3 significant numerals

Resistance values expressed by four significant numerals should be coded as in the examples shown in Table 4.

Table 4 – Coding of resistance values with 4 significant numerals

Resistance	Code
59,04 Ω	59R04
590,4 Ω	590R4
5,904 kΩ	5K904
59,04 kΩ	59K04

For the benefit of a consistent coding style, coding of resistance values with four significant numerals should preferably be presented at a fixed length of five characters.

The same principles should be applied for the coding of resistance values with more than four significant numerals.

4.2.2 Three-character code system for resistors

The resistance value expressed in ohm is identified by a three-character code as in the examples shown in Table 5.

Due to the possibility of expressing only two significant numerals of a resistance value, the three character code system is applicable to values from an E series up to E24, as defined in

IEC 60063, only. Therefore it should be used for the coding of resistors with a tolerance of 5 % or wider.

Table 5 – Coding of resistance values in the three-character code system

Resistance	Code
0,1 mΩ to 0,91 mΩ	L10 to L91
1 mΩ to 9,1 mΩ	1L0 to 9L1
10 mΩ to 91 mΩ	10L to 91L
0,1 Ω to 0,91 Ω	R10 to R91
1 Ω to 9,1 Ω	1R0 to 9R1
10 Ω to 91 Ω	100 to 910
100 Ω to 910 Ω	101 to 911
1 kΩ to 9,1 kΩ	102 to 912
10 kΩ to 91 kΩ	103 to 913
100 kΩ to 910 kΩ	104 to 914
1 MΩ to 9,1 MΩ	105 to 915
10 MΩ to 91 MΩ	106 to 916
100 MΩ to 910 MΩ	107 to 917
1 GΩ to 9,1 GΩ	108 to 918
10 GΩ to 91 GΩ	109 to 919

The three-character code system is not suitable for the coding of resistance values below 0,1 mΩ, or for resistance values above 99 GΩ.

4.2.3 The four-character code system for resistors

The resistance value expressed in ohm is identified by a four-character code as in the examples shown in Table 6.

The four-character code expresses three significant numerals of a resistance value, which makes it applicable for values from an E48, E96 or E192 series, as defined in IEC 60063. Therefore it should be used for the coding of resistors with a tolerance of 2 %, 1 % or tighter.

Table 6 – Coding of resistance values in the four-character code system

Resistance	Code
0,1 mΩ to 0,976 mΩ	L100 to L976
1 mΩ to 9,76 mΩ	1L00 to 9L76
10 mΩ to 97,6 mΩ	10L0 to 97L6
0,1 Ω to 0,976 Ω	R100 to R976
1 Ω to 9,76 Ω	1R00 to 9R76
10 Ω to 97,6 Ω	10R0 to 97R6
100 Ω to 976 Ω	1000 to 9760
1 kΩ to 9,76 kΩ	1001 to 9761
10 kΩ to 97,6 kΩ	1002 to 9762
100 kΩ to 976 kΩ	1003 to 9763
1 MΩ to 9,76 MΩ	1004 to 9764
10 MΩ to 97,6 MΩ	1005 to 9765
100 MΩ to 976 MΩ	1006 to 9766
1 GΩ to 9,76 GΩ	1007 to 9767
10 GΩ to 97,6 GΩ	1008 to 9768
100 GΩ to 976 GΩ	1009 to 9769

The four-character code system is not suitable for the coding of resistance values below 0,1 mΩ, or for resistance values above 999 GΩ.

4.3 Capacitors

4.3.1 The multiplier code system for capacitors

4.3.1.1 General rule

The letters p, n, μ, m and F are used as multipliers for 10^{-12}, 10^{-9}, 10^{-6}, 10^{-3} and 1, respectively, of the capacitance value expressed in farad.

The letters p, n, μ and m are consistently written in lower-case, while the unit farad is expressed by the upper-case letter F.

NOTE 1 Where the lower case character p is not available, an upper case character P is a suitable replacement.

NOTE 2 Where the lower case character μ is not available, a character u in lower case or in upper case is a suitable replacement.

4.3.1.2 Coding of capacitance values with up to 2 significant numerals

The capacitance value expressed in farad is identified by a code using p, n, μ, m, or F as multiplier and as decimal point at the same time, as shown in Table 7. The length of the code depends on the actual number of significant numerals of the capacitance value.

Table 7 – Coding of capacitance values with up to 2 significant numerals

Capacitance	Code	Capacitance	Code	Capacitance	Code
–	–	–	–	0,1 pF	p10
				0,15 pF	p15
1 pF	1p0	10 pF	10p	100 pF	100p
1,5 pF	1p5	15 pF	15p	150 pF	150p
1 nF	1n0	10 nF	10n	100 nF	100n
1,5 nF	1n5	15 nF	15n	150 nF	150n
1 µF	1µ0	10 µF	10µ	100 µF	100µ
1,5 µF	1µ5	15 µF	15µ	150 µF	150µ
1 mF	1m0	10 mF	10m	100 mF	100m
1,5 mF	1m5	15 mF	15m	150 mF	150m
1 F	1F0	10 F	10F	100 F	100F
1,5 F	1F5	15 F	15F	150 F	150F

4.3.1.3 Fixed length coding of capacitance values with up to 2 significant numerals

The use of the code system for the identification of capacitance values in a database related application, like e.g. in a prescription for an ordering designation, may require the use of a fixed length code. If the capacitance values to be coded consist of up to two significant numerals, such a fixed length code system has a consistent length of three characters, as shown in Table 8.

Table 8 – Fixed length coding of capacitance values with up to 2 significant numerals

Capacitance	Code	Capacitance	Code	Capacitance	Code
–	–	–	–	0,1 pF	p10
				0,15 pF	p15
1 pF	1p0	10 pF	10p	100 pF	n10
1,5 pF	1p5	15 pF	15p	150 pF	n15
1 nF	1n0	10 nF	10n	100 nF	µ10
1,5 nF	1n5	15 nF	15n	150 nF	µ15
1 µF	1µ0	10 µF	10µ	100 µF	m10
1,5 µF	1µ5	15 µF	15µ	150 µF	m15
1 mF	1m0	10 mF	10m	100 mF	F10
1,5 mF	1m5	15 mF	15m	150 mF	F15
1 F	1F0	10 F	10F	–	–
1,5 F	1F5	15 F	15F		

4.3.1.4 Coding of capacitance values with more than 2 significant numerals

Capacitance values expressed by three significant numerals should be coded as in the examples shown in Table 9.

Table 9 – Coding of capacitance values with 3 significant numerals

Capacitance	Code
33,2 pF	33p2
332 pF	332p
3,32 nF	3n32
33,2 nF	33n2

For the benefit of a consistent coding style, coding of capacitance values with three significant numerals should preferably be presented at a fixed length of four characters.

The same principles should be applied for the coding of capacitance values with more than three significant numerals.

4.3.2 Three-character code systems for capacitors

4.3.2.1 The picofarad based three-character code system

The capacitance value expressed in picofarad is identified by a three-character code as illustrated in Table 10.

NOTE The picofarad based three-character code system for low or medium capacitance is typically used for ceramic capacitors and for film capacitors.

Table 10 – Coding of capacitance values in the picofarad based three-character code system

Capacitance	Code
0,1 pF to 0,9 pF	0R1 to 0R9 [a] 0p1 to 0p9
1 pF to 9,1 pF	1R0 to 9R1 [a] 1p0 to 9p1
10 pF to 91 pF	100 to 910
100 pF to 910 pF	101 to 911
1 nF to 9,1 nF	102 to 912
10 nF to 91 nF	103 to 913
100 nF to 910 nF	104 to 914
1 µF to 9,1 µF	105 to 915
10 µF to 91 µF	106 to 916
100 µF to 910 µF	107 to 917

[a] The decimal point code with a letter R may be used for coding of capacitance values in the picofarad based three-character code system in light of its introduction prior to establishing "p" marking code.

4.3.2.2 The microfarad based three-character code system

The capacitance value expressed in microfarad is identified by a three-character code as illustrated in Table 11.

NOTE The microfarad based three-character code system for large capacitance is typically used for aluminium electrolytic capacitors and for double layer capacitors.

Table 11 –Coding of capacitance values in the microfarad based three-character code system

Capacitance	Code
0,1 μF to 0,9 μF	0R1 to 0R9 [a] 0μ1 to 0μ9
1 μF to 9,1 μF	1R0 to 9R1 [a] 1μ0 to 9μ1
10 μF to 91 μF	100 to 910
100 μF to 910 μF	101 to 911
1 mF to 9,1 mF	102 to 912
10 mF to 91 mF	103 to 913
100 mF to 910 mF	104 to 914
1 F to 9,1 F	105 to 915
10 F to 91 F	106 to 916
100 F to 910 F	107 to 917

[a] The decimal point code with a letter R may be used for coding of capacitance values in the microfarad based three-character code system in light of its introduction prior to establishing "μ" marking code.

5 Letter code for tolerance on capacitance or resistance values

5.1 General rules

If tolerance coding is desired, the code letter for tolerance shall be placed after the coding of the capacitance or resistance value.

The code letter for tolerance shall be applied in a way which cannot lead to confusion between the coding of the capacitance or resistance value.

5.2 Coding of symmetrical relative tolerances

The letters given in Table 12 shall be used for indicating the symmetrical relative tolerance on resistance and capacitance values.

Table 12 – Letter code for symmetrical relative tolerances

Tolerance %	Code letter
±0,005	E
±0,01	L
±0,02	P
±0,05	W
±0,1	B
±0,25	C
±0,5	D
±1	F
±2	G
±3	H
±5	J
±10	K
±20	M
±30	N

5.3 Coding of asymmetrical relative tolerances

For the coding of asymmetrical relative tolerances, the letters given in Table 13 shall be used.

Table 13 – Letter code for asymmetrical relative tolerances

Tolerance %	Code letter
-10 +30	Q
-10 +50	T
-20 +50	S
-20 +80	Z

Asymmetrical relative tolerances as given in Table 13 are common for some types of capacitors.

5.4 Coding of symmetrical absolute tolerances

For tolerances on capacitance values below 10 pF, relative tolerances are no longer applicable. Then absolute tolerances, i.e. fixed values, shall be used with code letters as given in Table 14.

Table 14 – Letter code for symmetrical absolute tolerances of capacitors

Tolerance pF	Code letter
±0,1	B
±0,25	C
±0,5	D
±1	F
±2	G

5.5 Other coding of tolerances

For tolerances for which no code letter has been laid down in the tables of Clause 5, the letter A shall be used.

The letter A indicates that the tolerance is to be identified in other documents, like e.g. a relevant component specification.

6 Coding of properties specific to capacitors

6.1 General rules

If the coding of other properties specific to capacitors is desired, the respective code letter(s) shall be placed after the coding of the capacitance value and of the tolerance.

The code letter(s) for properties specific to capacitors shall be applied in a way which cannot lead to confusion with the coding of the capacitance value and tolerance.

6.2 Coding of the dielectric material of plastic film capacitors

The letters given in Table 15 shall be used to indicate the dielectric material of plastic film capacitors.

Table 15 – Letter code for the dielectric material of plastic film capacitors

Dielectric material	Coding as in ISO 1043-1	Code letter
Polycarbonate	PC	V
Polyphenylensulfide	PPS	H
Polyethylene naphtalate	PEN	N
Polypropylene	PP	P
Polystyrene	PS	S
Polyethylene terephtalate	PET	T M[a]

[a] The code letter “M” remains a permissible choice considering that it has been introduced many years ago by JIS.

7 Coding of properties specific to resistors

7.1 General rules

If the coding of other properties specific to resistors is desired, the respective code letter(s) shall be placed after the coding of the resistance value and of the tolerance.

The code letter(s) for properties specific to resistors shall be applied in a way which cannot lead to confusion with the coding of the resistance value and tolerance.

7.2 Coding of the temperature coefficient of resistance

The letters given in Table 16 shall be used to indicate the temperature coefficient of resistance (TCR).

Table 16 – Letter code for the temperature coefficient of resistance

TCR 10^{-6}/K	**Code letter**
[a]	Z
±2 500	Y
±1 500	X
±1 000	W
±500	V
±250	U
±150	T
±100	S
±50	R
±25	Q
±15	P
±10	N
±5	M
±2	L
±1	K
±0,5	J
±0,2	H
±0,1	G

[a] Refer to the product specification for information on the temperature coefficient.

For temperature coefficients for which no code letter has been laid down, the letter Z shall be used. The letter Z indicates that the temperature coefficient of resistance is to be identified in other documents, like e.g. a relevant component specification.

8 Date code system for capacitors and resistors

8.1 General rules

Any date code marking shall be applied separately from any other marking for the capacitance or resistance value, tolerance and specific properties.

The date code marking shall be applied in a way which cannot lead to confusion with other markings.

8.2 Two-character codes for year and month

8.2.1 Choice of a repetition cycle

There are two options available for the marking of year and month of manufacture in a two-character code system:

- two-character codes for year and month in a twenty-year cycle;
- two-character codes for year and month in a ten-year cycle.

Both code systems use the same coding for the month as given in Table 17.

Table 17 – Character code letters for the month

Month	Character	Month	Character
January	1	July	7
February	2	August	8
March	3	September	9
April	4	October	O
May	5	November	N
June	6	December	D

8.2.2 Two-character codes for year and month in a twenty-year cycle

The two-character code for year and month in a twenty-year cycle is composed of

- a code letter for the year, as given in Table 18, directly succeeded by
- a code letter for the month, as given in Table 17,

without any space in between.

Table 18 – Code letters for the year in a twenty-year cycle

Year	Letter	Year	Letter	Year	Letter	Year	Letter	Year	Letter
|	|	1997	J	2006	U	2014	E	2023	R
↓	↓	1998	K	2007	V	2015	F	2024	S
1990	A	1999	L	2008	W	2016	H	2025	T
1991	B	2000	M	2009	X	2017	J	2026	U
1992	C	2001	N			2018	K	2027	V
1993	D	2002	P	2010	A	2019	L	2028	W
1994	E	2003	R	2011	B	2020	M	2029	X
1995	F	2004	S	2012	C	2021	N	|	|
1996	H	2005	T	2013	D	2022	P	↓	↓
NOTE These codes, which indicate the year, repeat after each cycle of 20 years.									

EXAMPLES:

March 1998 = K3

November 1999 = LN

April 2013 = D4

March 2018 = K3

8.2.3 Two-character codes for year and month in a ten-year cycle

The two-character code for year and month in a ten-year cycle is composed of

- a code numeral for the year, as given in Table 19, directly succeeded by
- a character code for the month, as given in Table 17,

without any space in between.

Table 19 – Code letters for the year in a ten-year cycle

Year	Numeral	Year	Numeral	Year	Numeral
|	|	2007	7	2015	5
↓	↓	2008	8	2016	6
2000	0	2009	9	2017	7
2001	1			2018	8
2002	2	2010	0	2019	9
2003	3	2011	1	|	|
2004	4	2012	2	↓	↓
2005	5	2013	3		
2006	6	2014	4		
NOTE These codes, which indicate the year, repeat after each cycle of 10 years.					

EXAMPLES:

March 2008 = 83
November 2009 = 9N
April 2013 = 34
March 2018 = 83

8.3 Four-character codes for year and week

8.3.1 Choice of a repetition cycle

There are three options available for the marking of year and week of manufacture in a four-character code system:

- fully numerical code providing a hundred-year cycle;
- alphanumerical twenty-year cycle code;
- alphanumerical ten-year cycle code.

The following provisions apply for the calendar week, in accordance with ISO 8601:

- the calendar week starts on a Monday, and
- the first calendar week of a year is the one with the first Thursday of the respective year.

8.3.2 Fully numerical four-numeral code

The fully numerical four-numeral system consists of

- the last two numerals of the year, directly succeeded by
- the number of the week.

The coding of the year repeats in a hundred-year cycle.

EXAMPLES:

5^{th} week of 2006	= 0605
42^{nd} week of 2013	= 1342

8.3.3 Alphanumerical twenty-year cycle code

The alphanumerical twenty-year cycle code consist of

- the code letter for a year as defined in Table 18, directly succeeded by
- the separation character "W", initiating the designation of a week in accordance with ISO 8601, directly succeeded by
- the number of the week.

The code letters for year in Table 18 are defined in a twenty-year cycle.

EXAMPLES:

5^{th} week of 2006	= UW05
42^{nd} week of 2013	= DW42

8.3.4 Alphanumerical ten-year cycle code

The alphanumerical ten-year cycle code consists of

- the code number for a year as defined in Table 19, directly succeeded by
- the separation character "W", initiating the designation of a week in accordance with ISO 8601, directly succeeded by
- the number of the week.

The code numbers for year in Table 19 are defined in a ten-year cycle.

EXAMPLES:

5^{th} week of 2006	= 6W05
42^{nd} week of 2013	= 3W42

8.4 Single-character code for year and month

Where a coding of year and month of manufacture is required on very small components, such as e.g. surface mount devices (SMD), the special single-character code as given in Table 20 may be used.

The relatively short repetition cycle of only four years for this code system should be noted.

Table 20 – Single-character code for year and month at a 4-year cycle

Year	Month	Letter	Year	Month	Letter	Year	Month	Letter	Year	Month	Letter
2001	Jan.	A	2002	Jan.	N	2003	Jan.	a	2004	Jan.	n
2005	Feb.	B	2006	Feb.	P	2007	Feb.	b	2008	Feb.	p
2009	Mar.	C	2010	Mar.	Q	2011	Mar.	c	2012	Mar.	q
2013	Apr.	D	2014	Apr.	R	2015	Apr.	d	2016	Apr.	r
2017	May	E	2018	May	S	2019	May	e	2020	May	s
2021	Jun.	F	2022	Jun.	T	2023	Jun.	f	2024	Jun.	t
	Jul.	G		Jul.	U		Jul.	g		Jul.	u
	Aug.	H		Aug.	V		Aug.	h		Aug.	v
	Sep.	J		Sep.	W		Sep.	j		Sep.	w
	Oct.	K		Oct.	X		Oct.	k		Oct.	x
	Nov.	L		Nov.	Y		Nov.	l		Nov.	y
	Dec.	M		Dec.	Z		Dec.	m		Dec.	z

NOTE 1 These codes which indicate the year and month by one capital letter and small letter, except “I” and “O”, repeat after each cycle of 4 years.

NOTE 2 If there is a possibility that a single lower-case letter could be read as an upper-case letter, for example, v for V, the lower-case letter could be marked with a cross bar above it.

EXAMPLES:

March 2002 = Q

March 2004 = q

March 2006 = Q

April 2013 = D.

Annex A
(informative)

Special three-character code system for resistors

A special three-character code system exists for the marking of resistance values with three significant numerals with only three characters in total.

NOTE 1 A limitation applies as this system is not capable of coding E192 values.

This code system is particularly suited for situations where the marking of E48 or E96 resistance values, as defined in IEC 60063, is desired, but the surface area available for marking does not permit the printing of four characters in a sufficiently readable size, as it would be required for marking a regular four-character code as given in 4.2.3.

The special three-character code is composed of

- a code number for the significant numerals of the resistance value, as given in Table A.1, directly succeeded by
- a code letter for the multiplier, as given in Table A.2,

without any space in between.

Table A.1 – Coding of the significant numerals of the E96 series

Significant numerals	Code number	Significant numerals	Code number	Significant numerals	Code number	Significant numerals	Code number
100	01	178	25	316	49	562	73
102	02	182	26	324	50	576	74
105	03	187	27	332	51	590	75
107	04	191	28	340	52	604	76
110	05	196	29	348	53	619	77
113	06	200	30	357	54	634	78
115	07	205	31	365	55	649	79
118	08	210	32	374	56	665	80
121	09	215	33	383	57	681	81
124	10	221	34	392	58	698	82
127	11	226	35	402	59	715	83
130	12	232	36	412	60	732	84
133	13	237	37	422	61	750	85
137	14	243	38	432	62	768	86
140	15	249	39	442	63	787	87
143	16	255	40	453	64	806	88
147	17	261	41	464	65	825	89
150	18	267	42	475	66	845	90
154	19	274	43	487	67	866	91
158	20	280	44	499	68	887	92
162	21	287	45	511	69	909	93
165	22	294	46	523	70	931	94
169	23	301	47	536	71	953	95
174	24	309	48	549	72	976	96

Table A.2 – Coding of the multiplier

Multiplier	Code letter
0,001	Z
0,01	Y
0,1	X
1	A
10	B
100	C
1 000	D
10 000	E
100 000	F
NOTE It has been noted that alternative to B also the letter H is occasionally used for the coding of the multiplier 10.	

EXAMPLE:

68X represents 49,9 Ω

where

68 is the code number for the significant numerals 499 of the resistance value, and

X is the code letter for the multiplier 0,1.

NOTE 2 The origin of this special coding method is attributed to EIA, whereupon a number of adaptations can be found under a designation such as EIA SMD resistor coding scheme, or EIA E96 coding scheme.

NOTE 3 A similar coding method is presented in the document MIL-PRF-55342, where a partly different assignment of code letters to the multipliers is used:

x 0,01	R
x 0,1	S
x 1	A
x 10	B
x 100	C
x 1000	D
x 10000	E

[AC1⟩ Annex X
(informative)

Cross-reference for references to the previous edition of this standard ⟨AC1]

The revision of this standard has resulted in a new numbering for some clauses and tables. [AC1⟩ Table X.1 ⟨AC1] provides cross-references for the clause numbering of this standard compared to the fifth edition. [AC1⟩ Table X.2 ⟨AC1] provides cross-references for the table numbering of this standard compared to the previous edition.

[AC1⟩ Table X.1 – Cross-reference to Clauses ⟨AC1]

IEC 60062:2004, 5th edition Clause	[AC1⟩ IEC 60062:2016, 6th edition Clause ⟨AC1]	Notes
1	1	–
2	2	–
3	3	See details below
3.1 3.2 3.3	3.1	Clauses merged into a single subclause 3.1
3.4	3.2 3.3 3.4	Subclause 3.4 split into separate subclauses
3.4.1 3.4.2	Figure 2 Figure 3	Subclauses converted into Figures in 3.3
3.4.3	Figure 4	Subclause converted into a Figure in 3.4
4	4	See details below
4.1.1 4.1.2 4.1.3	4.1	Subclauses merged into a single subclause 4.1
4.2	4.2	See details below
4.2.1	4.2.1.1 4.2.1.2 4.2.1.4	Subclause 4.2.1 split into separate subclauses
4.2.2 4.2.3	4.2.2 4.2.3	–
4.3	4.3.1 4.3.2	Subclause 4.3 split into separate subclauses
5	5 5.1	See details below
5.1 5.2 5.3 5.4	5.2 5.3 5.4 5.5	–
5.5	7.2	–
6	8	See details below
6.1	8.2 8.2.1	–
6.1.1 6.1.2	8.2.2 8.2.3	–
6.2	8.3	–
6.2.1 6.2.2 6.2.3	8.3.2 8.3.3 8.3.4	–
6.3 6.3.1	8.4	Subclause merged into a subclause
7	6.2	–

[AC1) Table X.2 – Cross-reference to Tables (AC1]

IEC 60062:2004 5th edition Table	[AC1) IEC 60062:2016 6th edition Table (AC1]	Notes
1	1	Revised table
2a	2	Revised table
2b	4	–
3	5	Revised table
4	6	Revised table
5a	7	Revised table
5b	9	Revised table
6	12	–
7	13	–
8	14	–
9	16	–
10a	18	–
10b	17	–
11a	19	–
11b	17	–
12	20	–
13	15	–

Bibliography

ISO 1043-1, *Plastics – Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics*

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