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Marking codes for resistors and capacitors

Codes de marquage des résistances et des condensateurs

[IEC 60062:2016](#)

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Marking codes for resistors and capacitors

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Codes de marquage des résistances et des condensateurs

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MARKING CODES FOR RESISTORS AND CAPACITORS

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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.

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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 60062:2016](#)

IEC 60757, *Code for designation of colours* [standards/sist/678b5a91-72a8-4c16-92cd-fdc9fed20d70/iec-60062-2016](#)

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.

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.

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. 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). Table 1 summarizes the colours with all assigned parameters and their respective values.

Table 1 – Code colour prescriptions

Colour		Example	Significant numeral	Multiplier	Tolerance %	TCR $10^{-6}/K$
Code						
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	—	—

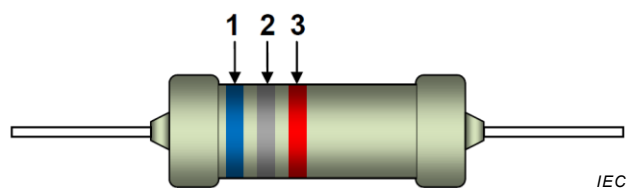
NOTE 1 The code letters are as defined in IEC 60757-
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NOTE 2 The colours shown here as example are not intended as normative reference, but are applied for the purpose of consistent illustration only.

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 %.



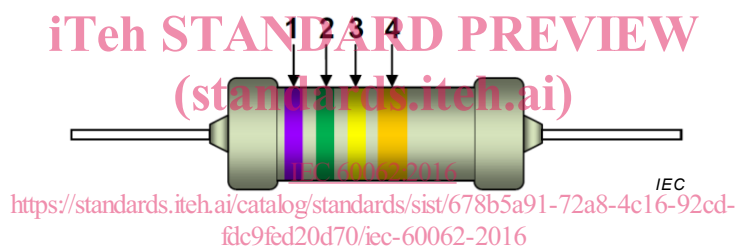
Key:

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

Figure 1 – Colour marking of a resistor 6,8 k Ω , 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 k Ω resistor with a tolerance of ± 5 %.



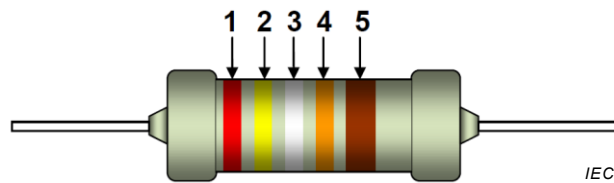
Key:

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

Figure 2 – Colour marking of a resistor 750 k Ω , 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 k Ω 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 k Ω , tolerance $\pm 1\%$

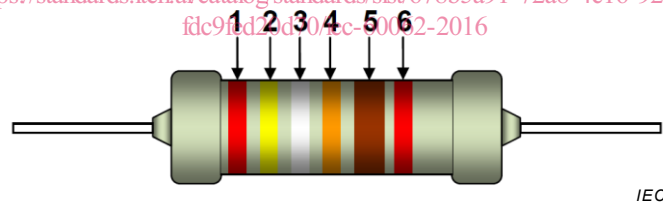
3.4 Methods for TCR marking

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.

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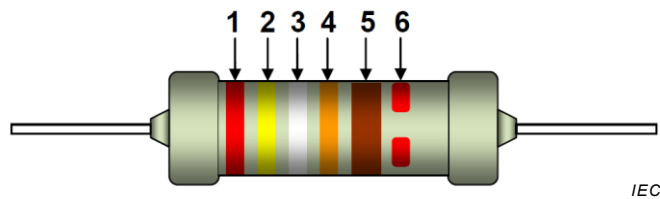
**Key:**

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 6th 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:

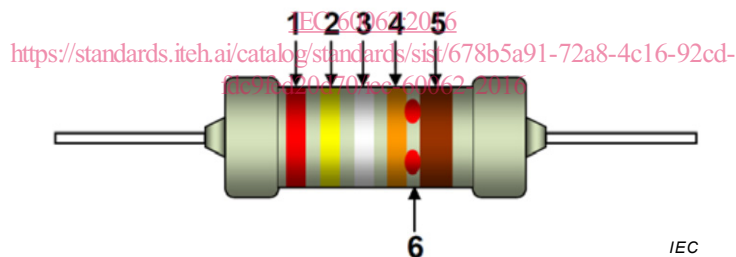
1: 1 st band	1 st numeral	Red = 2
2: 2 nd band	2 nd numeral	Yellow = 4
3: 3 rd band	3 rd numeral	White = 9
4: 4 th band	Multiplier	Orange = $\times 10^3$
5: 5 th band	Tolerance	Brown = $\pm 1\%$
6: 6 th band	TCR	Red = $\pm 50 \times 10^{-6}/K$

Figure 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: 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 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.

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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	L10
1 mΩ	1L0	10 mΩ	10L	0,15 mΩ	L15
1,5 mΩ	1L5	15 mΩ	15L	0,332 mΩ	L332
3,32 mΩ	3L32	33,2 mΩ	33L2	0,1 Ω	R10
1 Ω	1R0	10 Ω	10R	0,15 Ω	R15
1,5 Ω	1R5	15 Ω	15R	0,332 Ω	R332
3,32 Ω	3R32	33,2 Ω	33R2	100 Ω	100R
1 kΩ	1K0	10 kΩ	10K	150 Ω	150R
1,5 kΩ	1K5	15 kΩ	15K	332 Ω	332R
3,32 kΩ	3K32	33,2 kΩ	33K2	100 kΩ	100K
1 MΩ	1M0	10 MΩ	10M	150 kΩ	150K
1,5 MΩ	1M5	15 MΩ	15M	332 kΩ	332K
3,32 MΩ	3M32	33,2 MΩ	33M2	100 MΩ	100M
1 GΩ	1G0	10 GΩ	10G	150 MΩ	150M
1,5 GΩ	1G5	15 GΩ	15G	332 MΩ	332M
3,32 GΩ	3G32	33,2 GΩ	33G2	100 GΩ	100G
				150 GΩ	150G
				332 GΩ	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
1 mΩ	1L00	10 mΩ	10L0	0,15 mΩ	L150
1,5 mΩ	1L50	15 mΩ	15L0	0,332 mΩ	L332
3,32 mΩ	3L32	33,2 mΩ	33L2	0,1 Ω	R100
1 Ω	1R00	10 Ω	10R0	0,15 Ω	R150
1,5 Ω	1R50	15 Ω	15R0	0,332 Ω	R332
3,32 Ω	3R32	33,2 Ω	33R2	100 Ω	100R
1 kΩ	1K00	10 kΩ	10K0	150 Ω	150R
1,5 kΩ	1K50	15 kΩ	15K0	332 Ω	332R
3,32 kΩ	3K32	33,2 kΩ	33K2	100 kΩ	100K
1 MΩ	1M00	10 MΩ	10M0	150 kΩ	150K
1,5 MΩ	1M50	15 MΩ	15M0	332 kΩ	332K
3,32 MΩ	3M32	33,2 MΩ	33M2	100 MΩ	100M
1 GΩ	1G00	10 GΩ	10G0	150 MΩ	150M
1,5 GΩ	1G50	15 GΩ	15G0	332 MΩ	332M
3,32 GΩ	3G32	33,2 GΩ	33G2	100 GΩ	100G
				150 GΩ	150G
				332 GΩ	332G

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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