

# Detail Specification: Fixed low power film resistors — Metal film resistors on high grade ceramic, conformal coated or molded, axial or preformed leads

ICS 31.040.10

# National foreword

This British Standard is the UK implementation of EN 140101-806:2008+A1:2013, incorporating corrigendum October 2009. It supersedes BS EN 140101-806:2008, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

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.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2008

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ISBN 978 0 580 83116 4

## Amendments/corrigenda issued since publication

| Date            | Comments                                                             |
|-----------------|----------------------------------------------------------------------|
| 31 January 2010 | Implementation of CENELEC corrigendum October 2009: Table 6 replaced |
| 31 March 2014   | Implementation of CEN amendment A1:2013                              |
|                 |                                                                      |
|                 |                                                                      |

**Detail Specification:  
Fixed low power film resistors -  
Metal film resistors on high grade ceramic,  
conformal coated or molded, axial or preformed leads**

Spécification particulière:  
Résistances fixes à couche  
et à faible dissipation -  
Résistances à couche métallique  
sur céramique de qualité supérieure,  
moulée ou disposant  
d'un revêtement enrobant,  
avec des sorties préformées ou axiales

Bauartspezifikation:  
Schicht-Festwiderstände  
niedriger Belastbarkeit -  
Metallschichtwiderstände auf hochwertiger  
Keramik, mit konformer Umhüllung und  
axialen oder vorgeformten Anschlüssen

This European Standard was approved by CENELEC on 2007-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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## CENELEC

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 40XB, Resistors.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 140101-806 on 2007-11-01.

This European Standard supersedes CECC 40 101-806:1997.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2008-11-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2010-11-01

Preceding documents on the subject covered by this specification have been:

- only on resistors without established reliability, now Version A:
  - CECC 40 101-012: 1978-09; 1981-10; 1983-09; 1992-11
  - CECC 40 101-013: 1978-09; 1981-10; 1983-09; 1992-11
  - CECC 40 101-014: 1978-09; 1981-10
  - CECC 40 101-015: 1981-10; 1983-09; 1992-11
  - CECC 40 101-016: 1978-09; 1981-10; 1983-09; 1992-11
  - CECC 40 101-017: 1978-09; 1981-10; 1983-09; 1992-11
  - CECC 40 101-018: 1981-01; 1983-09; 1992-11
  - CECC 40 101-022: 1977-07
  - CECC 40 101-023: 1977-07
  - CECC 40 101-025: 1977-06
  - CECC 40 101-033: 1981-10; 1983-09
  - CECC 40 101-039: 1982-04; 1986-05
  - CECC 40 101-040: 1982-04; 1984-06
  - CECC 40 101-041: 1984-00
  - CECC 40 101-042: 1984-00
  - CECC 40 101-045: 1985-07; 1987-01; 1992-11; 1995-05
  - CECC 40 101-048: 1992-02; 1992-10
- only on resistors with established reliability, now Version E:
  - CECC 40 101-046: 1987-11
  - CECC 40 101-047: 1988-07; 1989-08; 1990-12; 1993-02; 1995-06

Compared to the superseded standard, the following changes have been implemented:

- modification of the title;
- elimination of style E;
- revised tables for resistance range and tolerance on rated resistance in 1.3;
- introduction of temperature coefficients  $\pm 10 \cdot 10^{-6}/K$  and  $\pm 5 \cdot 10^{-6}/K$  in 1.4;
- introduction of stability classes 0,25, 0,1 and 0,05 in 1.3 and 1.6;
- introduction of a test on the resistance to electrostatic discharge (ESD) in 1.6 and Annex A;
- introduction of description and test methods for lead-free soldering in 1.9.3 and Annex A;
- introduction of code letters for temperature coefficient (TCR) as in EN 60062;
- revision of ordering information in 1.8.4;

- revised information on pulse load capability in 1.9.5;
- revised information on resistance drift in 1.9.6;
- adoption of the IECQ rules of procedure, IEC QC 001002-3;
- revision of the sample quantities and the sequence of tests in Annex A;
- editorial revision.

This specification is part of a series of documents describing fixed low power film resistors as follows.

- EN 60115-1 Fixed resistors for use in electronic equipment – Part 1: Generic specification (IEC 60115-1, mod.)
- EN 140100 Sectional specification: Fixed low power film resistors
- this detail specification.

Any detail specification within this series is written on the basis of

- EN 140101 Blank detail specification: Fixed low power film resistors.

## Foreword to amendment A1

This document (EN 140101-806:2008/A1:2013) has been prepared by CLC/TC 40XB "Resistors".

The following dates are fixed:

- |                                                                                                                                                 |       |            |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|
| • latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2014-10-14 |
| • latest date by which the national standards conflicting with this document have to be withdrawn                                               | (dow) | 2016-10-14 |

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

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|                                                                                                                                                                |                                                                                                                                                                               |
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| <p>Specification available from:<br/>CENELEC Central Secretariat, Rue de Stassart 35,<br/>B-1050 Brussels, or from the addresses shown on the inside cover</p> | <p><b>EN 140101-806</b></p>                                                                |
| <p>Electronic components of assessed quality in accordance with:<br/>EN 60115-1:2001 + A1:2001<br/>EN 140100:2008<br/>EN 140101:2008</p>                       | <p><b>Issue 2</b><br/>March 2008</p>                                                                                                                                          |
| <p>Other shapes are permitted within the given dimensions.<br/><b>Figure 1 – Outline and dimensions (see Table 1)</b></p>                                      | <p>Fixed low power film resistors</p>                                                                                                                                         |
|                                                                                                                                                                | <p>Metal film resistors on high grade ceramic, conformal coated or molded, axial or preformed lead-free leads</p>                                                             |
|                                                                                                                                                                | <p>Assessment level EZ <sup>a</sup><br/>Version A: with 100 %-test<br/>Version E: with failure rate level and 100 %-test<br/>Stability classes 0,05; 0,1; 0,25; 0,5; 1; 2</p> |
| <p><sup>a</sup> For explanation on assessment level EZ see 2.1.1.</p>                                                                                          |                                                                                                                                                                               |

## 1 Characteristics and ratings

Various parameters of this component are precisely defined in this specification. Unspecified parameters may vary from one component to another.

### 1.1 Dimensions and ratings

**Table 1 – Style and dimensions**

| Style                                                                                                                                                                                                                                                                                          |                   | Length <i>L</i><br>mm |      | Diameter <i>D</i><br>mm |      | <i>d</i> <sup>a</sup><br>mm | <i>e</i> <sup>b</sup><br>mm | <i>c</i> <sup>c</sup><br>mm<br>max. | Mass <sup>d</sup><br>mg<br>max. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|------|-------------------------|------|-----------------------------|-----------------------------|-------------------------------------|---------------------------------|
| Code                                                                                                                                                                                                                                                                                           | Size <sup>d</sup> | min.                  | max. | min.                    | max. |                             |                             |                                     |                                 |
| A                                                                                                                                                                                                                                                                                              | 0204              | 3,0                   | 4,0  | 1,3                     | 1,9  | 0,4 / 0,5                   | 7,5                         | 0,5                                 | 130                             |
| B                                                                                                                                                                                                                                                                                              | 0207              | 5,0                   | 6,5  | 2,0                     | 2,5  | 0,6                         | 10,0                        | 0,5                                 | 280                             |
| C                                                                                                                                                                                                                                                                                              | 0411              | 7,5                   | 10,7 | 3,0                     | 4,0  | 0,6 / 0,7                   | 15,0                        | 0,5                                 | 600                             |
| D                                                                                                                                                                                                                                                                                              | 0414              | 10,0                  | 12,0 | 3,6                     | 4,1  | 0,8                         | 17,5                        | 1,0                                 | 790                             |
| <p><sup>a</sup> Permissible tolerance according to HD 349 S1.<br/><sup>b</sup> Standard distance for the axis to bent leads. Smaller modules may be agreed between manufacturer and customer.<br/><sup>c</sup> Length of excess protective coating.<br/><sup>d</sup> For information only.</p> |                   |                       |      |                         |      |                             |                             |                                     |                                 |

The minimum lead length of 21 mm is valid for tape packaging according to EN 60286-1 only (free lead length).

Taping according to EN 60286-1 or preformed leads are permitted. Details to be agreed between manufacturer and customer. For preformed leads the length of excess protective coating may be larger than given in Table 1.

Information about manufacturers who have components qualified to this detail specification is available in the **approvals section of the website** <http://www.iecq.org>

Table 2a – Ratings for stability classes 2; 1; 0,5

| Style | Stability class | Rated dissipation<br>$P_{70}$<br>mW | Limiting element voltage<br>d.c. or a.c. (r.m.s.) $U_{\max}$<br>V | Insulation voltage<br>d.c. or a.c. (peak) $U_{\text{ins}}$<br>V |            |
|-------|-----------------|-------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|------------|
|       |                 |                                     |                                                                   | 1 min                                                           | continuous |
| A     | 2; 1; 0,5       | 400                                 | 200                                                               | 300                                                             | 75         |
| B     | 2; 1; 0,5       | 600                                 | 300                                                               | 500                                                             | 75         |
| C     | 2; 1; 0,5       | 800                                 | 500                                                               | 750                                                             | 75         |
| D     | 2; 1; 0,5       | 900                                 | 500                                                               | 750                                                             | 75         |

Table 2b – Ratings for stability class 0,25

| Style | Stability class | Rated dissipation<br>$P_{70}$<br>mW | Limiting element voltage<br>d.c. or a.c. (r.m.s.) $U_{\max}$<br>V | Insulation voltage<br>d.c. or a.c. (peak) $U_{\text{ins}}$<br>V |            |
|-------|-----------------|-------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|------------|
|       |                 |                                     |                                                                   | 1 min                                                           | continuous |
| A     | 0,25            | 250                                 | 200                                                               | 300                                                             | 75         |
| B     | 0,25            | 400                                 | 300                                                               | 500                                                             | 75         |
| C     | 0,25            | 500                                 | 500                                                               | 750                                                             | 75         |
| D     | 0,25            | 600                                 | 500                                                               | 750                                                             | 75         |

Table 2c – Ratings for stability class 0,1; 0,05

| Style | Stability class | Rated dissipation<br>$P_{70}$<br>mW | Limiting element voltage<br>d.c. or a.c. (r.m.s.) $U_{\max}$<br>V | Insulation voltage<br>d.c. or a.c. (peak) $U_{\text{ins}}$<br>V |            |
|-------|-----------------|-------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|------------|
|       |                 |                                     |                                                                   | 1 min                                                           | continuous |
| A     | 0,1; 0,05       | 75                                  | 200                                                               | 300                                                             | 75         |
| B     | 0,1; 0,05       | 125                                 | 300                                                               | 500                                                             | 75         |
| C     | 0,1; 0,05       | 150                                 | 500                                                               | 750                                                             | 75         |
| D     | 0,1; 0,05       | 175                                 | 500                                                               | 750                                                             | 75         |

Table 2d – Ratings for 0  $\Omega$  resistors

| Style | Maximum current<br>$I_{\max}$<br>A | Maximum resistance<br>$R_{\max}$<br>m $\Omega$ | Insulation voltage<br>d.c. or a.c. (peak) $U_{\text{ins}}$<br>V |            |
|-------|------------------------------------|------------------------------------------------|-----------------------------------------------------------------|------------|
|       |                                    |                                                | 1 min                                                           | continuous |
| A     | 3                                  | 20                                             | 300                                                             | 75         |
| B     | 5                                  | 20                                             | 500                                                             | 75         |

## 1.2 Derating curve

Resistors covered by this specification are derated according to the following diagram:

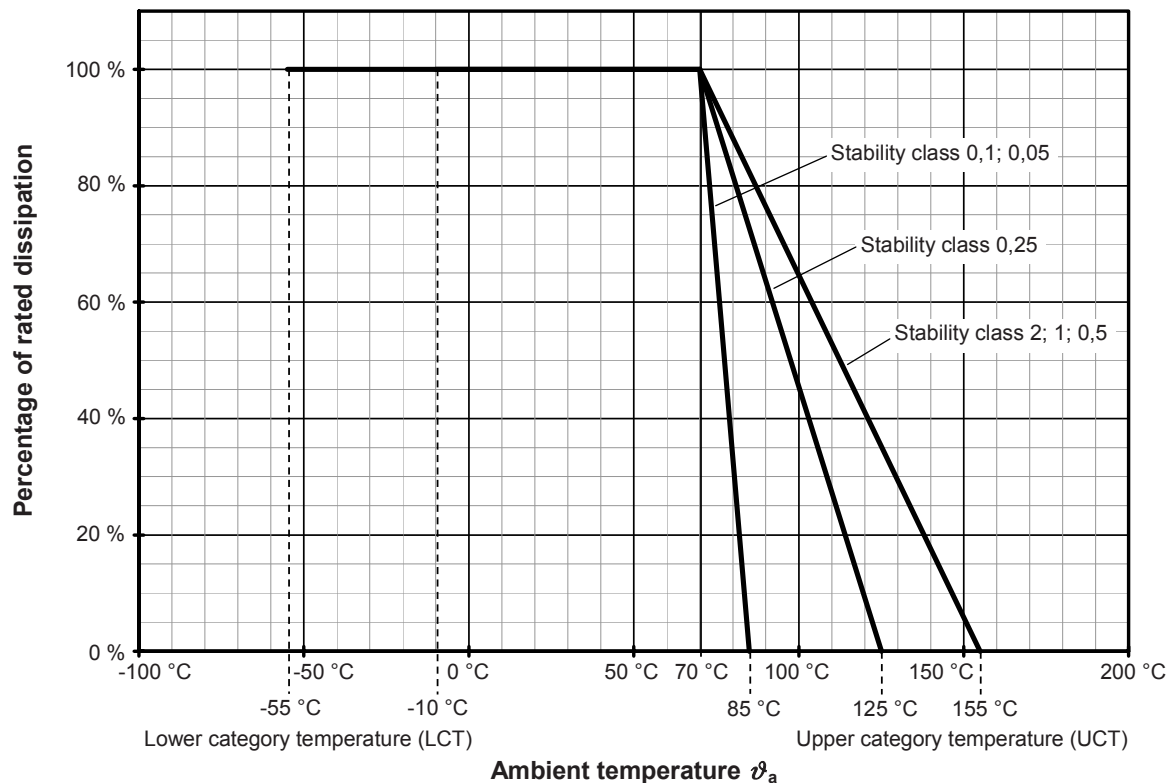


Figure 2 – Derating curve

Refer to Table 6 for the category temperatures of the stability classes.

## 1.3 Resistance range and tolerance on rated resistance

### 1.3.1 Version A

The following combinations of temperature coefficient and tolerance on rated resistance may be approved only. Products from this extent shall be used for the Qualification approval according to 2.2.1 and for the Quality conformance inspection according to 2.3. Resistance values of an E-series according to IEC 60063 shall be used.

The qualification of resistance values below or beyond the specified resistance values is permitted, if they fulfil the requirements of the closest stability class (e.g. Style B 1 % > 10 MΩ shall fulfil the requirements of stability class 2).

Table 3a – Resistance range and tolerance on rated resistance for Version A

| Style | Tolerance on rated resistance |                   | Temperature coefficient<br>$10^{-6}/K^b$ | Resistance range   | Stability class <sup>c</sup> |
|-------|-------------------------------|-------------------|------------------------------------------|--------------------|------------------------------|
|       | %                             | Code <sup>a</sup> |                                          |                    |                              |
| A     | ± 5                           | J                 | ± 50                                     | 0,22 Ω to < 1 Ω    | 1                            |
|       | ± 1                           | F                 | ± 50                                     | 1 Ω to < 10 Ω      | 0,5                          |
|       |                               |                   | ± 50; ± 25                               | 10 Ω to 332 kΩ     | 0,5                          |
|       |                               |                   |                                          | 10 Ω to 332 kΩ     | 0,25                         |
|       |                               |                   |                                          | > 332 kΩ to 10 MΩ  | 2                            |
|       | ± 0,5                         | D                 | ± 50; ± 25                               | 10 Ω to 332 kΩ     | 0,25                         |
|       |                               |                   |                                          | 10 Ω to 332 kΩ     | 0,5                          |
|       | ± 0,25                        | C                 | ± 25; ± 15; ± 10                         | 22 Ω to 332 kΩ     | 0,25                         |
|       |                               |                   | ± 25; ± 15; ± 10; ± 5                    | 43 Ω to < 100 Ω    | 0,1                          |
|       |                               |                   |                                          | 100 Ω to 100 kΩ    | 0,05                         |
|       |                               |                   |                                          | > 100 kΩ to 221 kΩ | 0,1                          |
|       | ± 0,1                         | B                 | ± 25; ± 15; ± 10                         | 43 Ω to 332 kΩ     | 0,25                         |
|       |                               |                   | ± 25; ± 15; ± 10; ± 5                    | 43 Ω to < 100 Ω    | 0,1                          |
|       |                               |                   |                                          | 100 Ω to 100 kΩ    | 0,05                         |
|       |                               |                   |                                          | > 100 kΩ to 221 kΩ | 0,1                          |
| B     | ± 5                           | J                 | ± 50                                     | 0,22 Ω to < 1 Ω    | 1                            |
|       |                               |                   |                                          | > 10 MΩ to 22 MΩ   | 2                            |
|       | ± 1                           | F                 | ± 50                                     | 1 Ω to < 10 Ω      | 0,5                          |
|       |                               |                   | ± 50; ± 25                               | 10 Ω to 1 MΩ       | 0,5                          |
|       |                               |                   |                                          | 10 Ω to 1 MΩ       | 0,25                         |
|       |                               |                   |                                          | > 1 MΩ to 10 MΩ    | 2                            |
|       | ± 0,5                         | D                 | ± 50; ± 25                               | 10 Ω to 1 MΩ       | 0,25                         |
|       |                               |                   |                                          | 10 Ω to 1 MΩ       | 0,5                          |
|       | ± 0,25                        | C                 | ± 25; ± 15; ± 10                         | 22 Ω to 1 MΩ       | 0,25                         |
|       |                               |                   | ± 25; ± 15; ± 10; ± 5                    | 43 Ω to < 100 Ω    | 0,1                          |
|       |                               |                   |                                          | 100 Ω to 270 kΩ    | 0,05                         |
|       |                               |                   |                                          | > 270 kΩ to 510 kΩ | 0,1                          |
|       | ± 0,1                         | B                 | ± 25; ± 15; ± 10                         | 43 Ω to 1 MΩ       | 0,25                         |
|       |                               |                   | ± 25; ± 15; ± 10; ± 5                    | 43 Ω to < 100 Ω    | 0,1                          |
|       |                               |                   |                                          | 100 Ω to 270 kΩ    | 0,05                         |
|       |                               |                   |                                          | > 270 kΩ to 510 kΩ | 0,1                          |

Table 3a – Resistance range and tolerance on rated resistance for Version A (continued)

| Style                                                                             | Tolerance on rated resistance |                   | Temperature coefficient<br>10 <sup>-6</sup> /K <sup>b</sup> | Resistance range   | Stability class <sup>b</sup> |
|-----------------------------------------------------------------------------------|-------------------------------|-------------------|-------------------------------------------------------------|--------------------|------------------------------|
|                                                                                   | %                             | Code <sup>a</sup> |                                                             |                    |                              |
| C                                                                                 | ± 5                           | J                 | ± 50                                                        | 0,22 Ω to < 1 Ω    | 1                            |
|                                                                                   | ± 1                           | F                 | ± 50                                                        | 1 Ω to < 10 Ω      | 0,5                          |
|                                                                                   |                               |                   | ± 50; ± 25                                                  | 10 Ω to 2,43 MΩ    | 0,5                          |
|                                                                                   |                               |                   |                                                             | 10 Ω to 2,43 MΩ    | 0,25                         |
|                                                                                   |                               |                   |                                                             | > 2,43 MΩ to 22 MΩ | 2                            |
|                                                                                   | ± 0,5                         | D                 | ± 50; ± 25                                                  | 10 Ω to 2,43 MΩ    | 0,25                         |
|                                                                                   |                               |                   |                                                             | 10 Ω to 2,43 MΩ    | 0,5                          |
|                                                                                   | ± 0,25                        | C                 | ± 25; ± 15; ± 10                                            | 22 Ω to 1,5 MΩ     | 0,25                         |
|                                                                                   |                               |                   | ± 25; ± 15; ± 10; ± 5                                       | 43 Ω to < 100 Ω    | 0,1                          |
|                                                                                   |                               |                   |                                                             | 100 Ω to 470 kΩ    | 0,05                         |
|                                                                                   |                               |                   |                                                             | > 470 kΩ to 1 MΩ   | 0,1                          |
|                                                                                   | ± 0,1                         | B                 | ± 25; ± 15; ± 10                                            | 43 Ω to 1,5 MΩ     | 0,25                         |
|                                                                                   |                               |                   | ± 25; ± 15; ± 10; ± 5                                       | 43 Ω to < 100 Ω    | 0,1                          |
|                                                                                   |                               |                   |                                                             | 100 Ω to 470 kΩ    | 0,05                         |
|                                                                                   |                               |                   |                                                             | > 470 kΩ to 1 MΩ   | 0,1                          |
| D                                                                                 | ± 5                           | J                 | ± 50                                                        | 0,22 Ω to < 1 Ω    | 1                            |
|                                                                                   | ± 1                           | F                 | ± 50                                                        | 1 Ω to < 10 Ω      | 0,5                          |
|                                                                                   |                               |                   | ± 50; ± 25                                                  | 10 Ω to 2,43 MΩ    | 0,5                          |
|                                                                                   |                               |                   |                                                             | 10 Ω to 2,43 MΩ    | 0,25                         |
|                                                                                   |                               |                   |                                                             | > 2,43 MΩ to 22 MΩ | 2                            |
|                                                                                   | ± 0,5                         | D                 | ± 50; ± 25                                                  | 10 Ω to 2,43 MΩ    | 0,25                         |
|                                                                                   |                               |                   |                                                             | 10 Ω to 2,43 MΩ    | 0,5                          |
|                                                                                   | ± 0,25                        | C                 | ± 25; ± 15; ± 10                                            | 22 Ω to 1,5 MΩ     | 0,25                         |
|                                                                                   |                               |                   | ± 25; ± 15; ± 10; ± 5                                       | 43 Ω to < 100 Ω    | 0,1                          |
|                                                                                   |                               |                   |                                                             | 100 Ω to 470 kΩ    | 0,05                         |
|                                                                                   |                               |                   |                                                             | > 470 kΩ to 1 MΩ   | 0,1                          |
|                                                                                   | ± 0,1                         | B                 | ± 25; ± 15; ± 10                                            | 43 Ω to 1,5 MΩ     | 0,25                         |
|                                                                                   |                               |                   | ± 25; ± 15; ± 10; ± 5                                       | 43 Ω to < 100 Ω    | 0,1                          |
|                                                                                   |                               |                   |                                                             | 100 Ω to 470 kΩ    | 0,05                         |
|                                                                                   |                               |                   |                                                             | > 470 kΩ to 1 MΩ   | 0,1                          |
| 0 Ω resistors according to Table 2d for styles A and B.                           |                               |                   |                                                             |                    |                              |
| <sup>a</sup> Code letters according to EN 60062.                                  |                               |                   |                                                             |                    |                              |
| <sup>b</sup> For the category temperatures of stability classes refer to Table 6. |                               |                   |                                                             |                    |                              |

### 1.3.2 Version E

The following combinations of temperature coefficient, tolerance on rated resistance, resistance range and E-series according to IEC 60063 are permitted only. Products from this extent shall be used for the Qualification approval according to 2.2.2 and for the Quality conformance inspection according to 2.3.

**Table 3b – Resistance range and tolerance on rated resistance for Version E**

| Style                                                                             | Tolerance on rated resistance |                   | Temperature coefficient<br>$10^{-6}/K$ | Resistance range                   | Stability class <sup>b</sup> | E series |
|-----------------------------------------------------------------------------------|-------------------------------|-------------------|----------------------------------------|------------------------------------|------------------------------|----------|
|                                                                                   | %                             | Code <sup>a</sup> |                                        |                                    |                              |          |
| A                                                                                 | $\pm 1$                       | F                 | $\pm 50$                               | 1 $\Omega$ to 332 k $\Omega$       | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 340 k $\Omega$ to 5,11 M $\Omega$  | 2                            |          |
|                                                                                   | $\pm 0,5$                     | D                 | $\pm 25$                               | 49,9 $\Omega$ to 332 k $\Omega$    | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 340 k $\Omega$ to 511 k $\Omega$   | 2                            |          |
|                                                                                   | $\pm 0,1$                     | B                 | $\pm 15$                               | 100 $\Omega$ to 332 k $\Omega$     | 0,25                         | E192     |
|                                                                                   |                               |                   |                                        |                                    |                              |          |
| B                                                                                 | $\pm 1$                       | F                 | $\pm 50$                               | 1 $\Omega$ to 1 M $\Omega$         | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 1,02 M $\Omega$ to 5,11 M $\Omega$ | 1                            |          |
|                                                                                   |                               |                   |                                        | 5,23 M $\Omega$ to 10 M $\Omega$   | 2                            |          |
|                                                                                   | $\pm 0,5$                     | D                 | $\pm 25$                               | 10 $\Omega$ to 1 M $\Omega$        | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 100 $\Omega$ to 499 k $\Omega$     | 0,25                         |          |
|                                                                                   | $\pm 0,1$                     | B                 | $\pm 15$                               | 100 $\Omega$ to 499 k $\Omega$     | 0,25                         | E192     |
| C                                                                                 | $\pm 1$                       | F                 | $\pm 50$                               | 1 $\Omega$ to 2,43 M $\Omega$      | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 2,49 M $\Omega$ to 5,11 M $\Omega$ | 1                            |          |
|                                                                                   |                               |                   |                                        | 5,23 k $\Omega$ to 10 M $\Omega$   | 2                            |          |
|                                                                                   | $\pm 0,5$                     | D                 | $\pm 25$                               | 10 $\Omega$ to 1 M $\Omega$        | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 100 $\Omega$ to 681 k $\Omega$     | 0,25                         |          |
|                                                                                   | $\pm 0,1$                     | B                 | $\pm 15$                               | 100 $\Omega$ to 681 k $\Omega$     | 0,25                         | E192     |
| D                                                                                 | $\pm 1$                       | F                 | $\pm 50$                               | 1 $\Omega$ to 2,43 M $\Omega$      | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 2,49 M $\Omega$ to 5,11 M $\Omega$ | 1                            |          |
|                                                                                   |                               |                   |                                        | 5,23 M $\Omega$ to 21,5 M $\Omega$ | 2                            |          |
|                                                                                   | $\pm 0,5$                     | D                 | $\pm 25$                               | 10 $\Omega$ to 1,5 M $\Omega$      | 0,5                          | E96      |
|                                                                                   |                               |                   |                                        | 100 $\Omega$ to 1 M $\Omega$       | 0,25                         |          |
|                                                                                   | $\pm 0,1$                     | B                 | $\pm 15$                               | 100 $\Omega$ to 1 M $\Omega$       | 0,25                         | E192     |
| 0 $\Omega$ resistors according to Table 2d for styles A and B.                    |                               |                   |                                        |                                    |                              |          |
| <sup>a</sup> Code letters according to EN 60062.                                  |                               |                   |                                        |                                    |                              |          |
| <sup>b</sup> For the category temperatures of stability classes refer to Table 6. |                               |                   |                                        |                                    |                              |          |