

---

---

**Podrobna specifikacija: pritrjeni, majhnih moči, nežični, zelo stabilni upori za površinsko namestitvev (SMD) – Pravokotni – Razreda stabilnosti 0,1 in 0,25**

Detail specification: Fixed low power non wire-wound high stability surface mount (SMD) resistors – Rectangular – Stability classes 0,1; 0,25

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 140401-804:2005](https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005)

<https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 140401-804:2005

<https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005>

EUROPEAN STANDARD

**EN 140401-804**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2005

ICS 31.040.10

English version

**Detail specification: Fixed low power non wire-wound high stability  
surface mount (SMD) resistors –  
Rectangular –  
Stability classes 0,1; 0,25**

Spécification particulière:  
Résistances fixes non bobinées  
à faible dissipation pour montage  
en surface (CMS) –  
Rectangulaire –  
Catégories de stabilité 0,1; 0,25

Bauartspezifikation:  
Oberflächenmontierbare  
nichtdrahtgewickelte Festwiderstände  
(SMD) niedriger Belastbarkeit  
mit hoher Stabilität –  
Rechteckig –  
Stabilitätsklassen 0,1; 0,25

ITEH STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 140401-804:2005  
This European Standard was approved by CENELEC on 2004-10-01. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**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 Unique Acceptance Procedure and was approved by CENELEC as EN 140401-804 on 2004-11-01.

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) 2005-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-10-01

This specification is part of 4 documents describing fixed resistors for surface mount technology as follows:


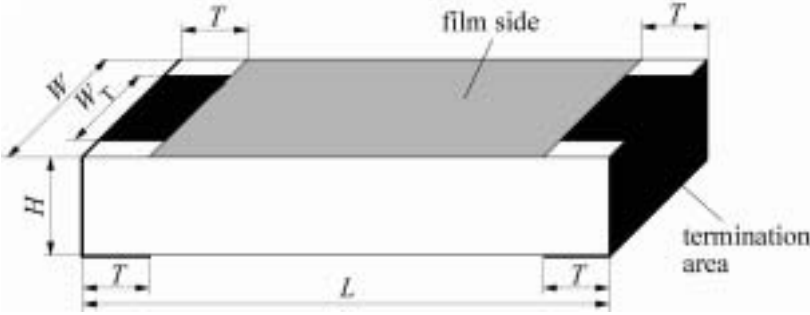
EN 60115-1	Fixed resistors for use in electronic equipment – Part 1: Generic specification (IEC 60115-1, mod.)
EN 140400	Sectional specification: Fixed low power surface mount (SMD) resistors
EN 140401	Blank Detail Specification: Fixed low power non wire-wound surface mount (SMD) resistors
EN 140401-804	Detail specification: Fixed low power non-wirewound high stability surface mount (SMD) resistors – Rectangular – Stability classes 0,1; 0,25

[SIST EN 140401-804:2005](https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005)

<https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005>

**Contents**

1	Characteristics and ratings .....	4
1.1	Dimensions and Ratings .....	4
1.2	Derating curve .....	5
1.3	Resistance range and tolerance on rated resistance .....	6
1.4	Variation of resistance with temperature and temperature rise .....	8
1.5	Climatic categories .....	8
1.6	Limits for change of resistance at tests .....	8
1.7	Non-linear properties .....	9
1.8	Marking, packaging and ordering designation .....	10
1.8.1	Component .....	10
1.8.2	Package .....	10
1.8.3	Packaging / Taping .....	10
1.8.4	Ordering information .....	10
1.9	Additional information (not for inspection purpose) .....	11
1.9.1	Storage .....	11
1.9.2	Mounting .....	11
1.9.3	Soldering process .....	11
1.9.4	Conductive gluing .....	11
1.9.5	Use of cleaning solvents .....	11
1.9.6	Pulse load capability .....	12
1.9.7	Variation of resistance value (drift) for lifetimes up to 200 000 h .....	15
1.9.8	Dissipation notes .....	16
1.9.9	Current noise .....	16
2	Quality assessment procedures .....	17
2.1	General .....	17
2.1.1	Zero defect approach .....	17
2.1.2	100 %-Test .....	17
2.1.3	0 Ω -Resistor .....	17
2.1.4	Certificate of Conformity (CoC) .....	17
2.1.5	Certified test records .....	17
2.1.6	Failure rate level (only version E) .....	17
2.2	Qualification Approval .....	18
2.2.1	Version A .....	18
2.2.2	Version E .....	18
2.3	Quality conformance inspection .....	18
2.3.1	Qualification approval according to EN 100114-2 .....	18
2.3.2	Technology approval according to EN 100114-6 .....	18
2.3.3	Non-conforming items .....	18
	Annex A (normative) Fixed sample size Qualification Approval and Quality Conformance Inspection test schedule for fixed low power surface mount (SMD) resistors .....	19
	Annex B (informative) Letter symbols and abbreviations .....	23
	Annex C (normative) Standards referred to in this specification .....	24

Specification available from the National Committees members of CENELEC	<b>EN 140401-804</b>	
Electronic components of assessed quality in accordance with: EN 60115-1:2001 EN 140400:2003 EN 140401:2002	<b>Issue 1</b>	
 <p>Other shapes are permitted within the given dimensions.</p> <p><b>Figure 1 – Outline and dimensions (see Table 1)</b></p>	<p>Fixed low power non wire-wound high stability surface mount (SMD) resistors with rectangular base without leads Style: RR</p> <p>Ceramic substrate with protected, insulated, resistance film and solder terminations, typically thin film</p> <p>Assessment level EZ<sup>a</sup> Version A: with 100 %-test Version E: with failure rate level and 100 %-test</p> <p>Stability classes 0,1 and 0,25</p>	
<sup>a</sup> For explanations on assessment level EZ see 2.1.1.		

## 1 Characteristics and ratings

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

### 1.1 Dimensions and ratings

SIST EN 140401-804:2005

<https://standards.itech.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b51400103550/en-140401-804:2005>

**Table 1 – Style and dimensions**

Style		Length <i>L</i> mm		Width <i>W</i> mm		Height <i>H</i> mm		Termination <i>T</i> mm		Weight <sup>a</sup> mg
metric	inch	min.	max.	min.	max.	min.	max.	min.	max.	max.
RR 1005M	RR 0402	0,95	1,10	0,45	0,60	0,25	0,40	0,05/0,1 <sup>b</sup>	0,35	0,8
RR 1608M	RR 0603	1,50	1,70	0,75	0,95	0,35	0,55	0,10	0,50	2,1
RR 2012M	RR 0805	1,85	2,15	1,10	1,40	0,35	0,65	0,15	0,60	6,0
RR 3216M	RR 1206	2,90	3,35	1,45	1,75	0,35	0,65	0,25	0,75	10,0
RR 5025M	RR 2010	4,80	5,20	2,30	2,70	0,35	0,75	0,35	0,85	30,0

<sup>a</sup> For information only.

<sup>b</sup> First figure indicates the termination width on the film side, second figure on the reverse side.

Termination:  $W_T \geq 0,75 \cdot W$   
Thickness: 0,005 to 0,05 mm

**Table 2a – Ratings for stability class 0,25**

Style	Stability class	Rated dissipation $P_{70}$ mW	Limiting element voltage d.c. or a.c. (r.m.s) $U_{max}$ V	Insulation voltage d.c. or a.c. (peak) $U_{ins}$ V	
				1 min	continuous
RR 1005M	0,25	63	50	75	75
RR 1608M	0,25	100	75	100	75
RR 2012M	0,25	125	150	200	75
RR 3216M	0,25	250	200	300	75
RR 5025M	0,25	330	300	300	75

Table 2b – Ratings for stability class 0,1

Style	Stability class	Rated dissipation $P_{70}$ mW	Limiting element voltage d.c. or a.c. (r.m.s) $U_{max}$ V	Insulation voltage d.c. or a.c. (peak) $U_{ins}$ V	
				1 min	continuous
RR 1005M	0,1	50	25	75	75
RR 1608M	0,1	75	50	100	75
RR 2012M	0,1	100	75	200	75
RR 3216M	0,1	125	150	300	75
RR 5025M	0,1	250	200	300	75

Table 2c – Ratings for 0 Ω resistors

Style	Maximum current $I_{max}$ A	Maximum resistance value <sup>a</sup> $R_{max}$ mΩ	Insulation voltage d.c. or a.c. (peak) $U_{ins}$ V	
			1 min	continuous
RR 1005M	0,63	20	75	75
RR 1608M	1	20	100	75
RR 2012M	1,5	20	200	75
RR 3216M	2,0	20	300	75
RR 5025M	3,0	20	300	75

<sup>a</sup> The resistance value shall be measured on the film side.

ITeh STANDARD PREVIEW

(standards.iteh.ai)

1.2 Derating curve

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

[SIST EN 140401-804:2005](https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005)

[https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-](https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005)

[b514d01eb315/sist-en-140401-804-2005](https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005)

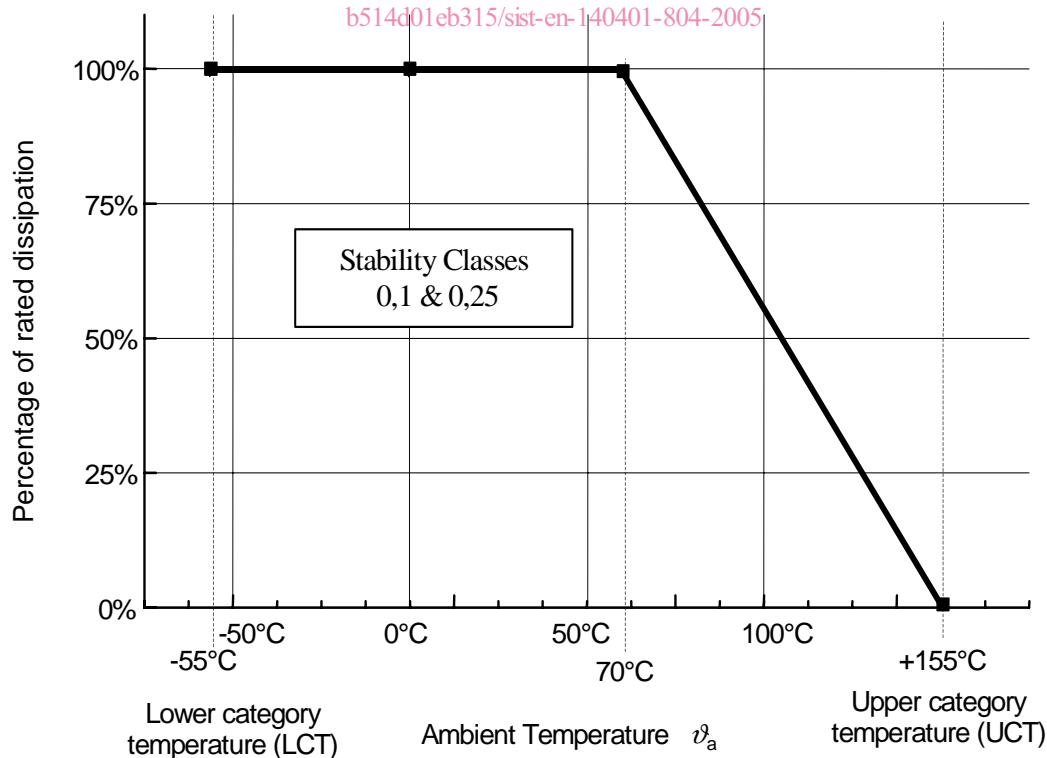


Figure 2 – Derating curve

For the category temperatures of stability classes refer to Table 6.

### 1.3 Resistance range and tolerance on rated resistance

#### Version A:

The following combinations of temperature coefficient, tolerance on rated resistance shall be used for qualification approval according to 2.2.1 and quality conformance inspection according to 2.3. Resistance values of 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. RR 1608M 1 % > 260 k $\Omega$  shall fulfil the requirements of stability class 0,1 or 0,25).

**Table 3a – Resistance range, tolerance on rated resistance for version A**

Style	Tolerance on rated resistance		Temperature coefficient ppm/K	Resistance range	Stability class
	%	Code <sup>a</sup>			
RR 1005M	$\pm 1$	F	$\pm 25$	100 $\Omega$ to 49,9 k $\Omega$	0,1
				100 $\Omega$ to 49,9 k $\Omega$	0,25
	$\pm 0,5$	D	$\pm 10; \pm 25$	100 $\Omega$ to 49,9 k $\Omega$	0,1
				100 $\Omega$ to 49,9 k $\Omega$	0,25
	$\pm 0,1$	B	$\pm 10$	100 $\Omega$ to 49,9 k $\Omega$	0,1
				100 $\Omega$ to 49,9 k $\Omega$	0,25
RR 1608M	$\pm 1$	F	$\pm 25$	100 $\Omega$ to 261 k $\Omega$	0,1
				100 $\Omega$ to 261 k $\Omega$	0,25
	$\pm 0,5$	D	$\pm 10; \pm 25$	100 $\Omega$ to 261 k $\Omega$	0,1
				100 $\Omega$ to 261 k $\Omega$	0,25
	$\pm 0,1$	B	$\pm 10$	100 $\Omega$ to 261 k $\Omega$	0,1
				100 $\Omega$ to 261 k $\Omega$	0,25
RR 2012M	$\pm 1$	F	$\pm 25$	100 $\Omega$ to 301 k $\Omega$	0,1
				100 $\Omega$ to 301 k $\Omega$	0,25
	$\pm 0,5$	D	$\pm 10; \pm 25$	100 $\Omega$ to 301 k $\Omega$	0,1
				100 $\Omega$ to 301 k $\Omega$	0,25
	$\pm 0,1$	B	$\pm 10$	100 $\Omega$ to 301 k $\Omega$	0,1
				100 $\Omega$ to 301 k $\Omega$	0,25
RR 3216M	$\pm 1$	F	$\pm 25$	100 $\Omega$ to 1 M $\Omega$	0,1
				100 $\Omega$ to 1 M $\Omega$	0,25
	$\pm 0,5$	D	$\pm 10; \pm 25$	100 $\Omega$ to 1 M $\Omega$	0,1
				100 $\Omega$ to 1 M $\Omega$	0,25
	$\pm 0,1$	B	$\pm 10$	100 $\Omega$ to 1 M $\Omega$	0,1
				100 $\Omega$ to 1 M $\Omega$	0,25
RR 5025M	$\pm 1$	F	$\pm 25$	100 $\Omega$ to 3,01 M $\Omega$	0,1
				100 $\Omega$ to 3,01 M $\Omega$	0,25
	$\pm 0,5$	D	$\pm 10; \pm 25$	100 $\Omega$ to 3,01 M $\Omega$	0,1
				100 $\Omega$ to 3,01 M $\Omega$	0,25
	$\pm 0,1$	B	$\pm 10$	100 $\Omega$ to 3,01 M $\Omega$	0,1
				100 $\Omega$ to 3,01 M $\Omega$	0,25
0 $\Omega$ -resistors according to Table 2c for all styles.					
<sup>a</sup> Code letters according to EN 60062.					



**Version E:**

The following combinations of temperature coefficient, tolerance on rated resistance and E-series according to IEC 60063 shall be used for qualification approval according to 2.2.2 and quality conformance inspection according to 2.3 and are permitted only:

**Table 3b – Resistance range, tolerance on rated resistance for version E**

Style	Tolerance on rated resistance		Temperature coefficient ppm/K	Resistance range	Stability class	E series
	%	Code <sup>a</sup>				
RR 1005M	± 1	F	± 25	100 Ω to 49,9 kΩ	0,1	E96
				100 Ω to 49,9 kΩ	0,25	
	± 0,1	B	± 10	100 Ω to 49,9 kΩ	0,1	E192
				100 Ω to 49,9 kΩ	0,25	
RR 1608M	± 1	F	± 25	100 Ω to 261 kΩ	0,1	E96
				100 Ω to 261 kΩ	0,25	
	± 0,1	B	± 10	100 Ω to 261 kΩ	0,1	E192
				100 Ω to 261 kΩ	0,25	
RR 2012M	± 1	F	± 25	100 Ω to 301 kΩ	0,1	E96
				100 Ω to 301 kΩ	0,25	
	± 0,1	B	± 10	100 Ω to 301 kΩ	0,1	E192
				100 Ω to 301 kΩ	0,25	
RR 3216M	± 1	F	± 25	100 Ω to 1 MΩ	0,1	E96
				100 Ω to 1 MΩ	0,25	
	± 0,1	B	± 10	100 Ω to 1 MΩ	0,1	E192
				100 Ω to 1 MΩ	0,25	
RR 5025M	± 1	F	± 25	100 Ω to 3,01 MΩ	0,1	E96
				100 Ω to 3,01 MΩ	0,25	
	± 0,1	B	± 10	100 Ω to 3,01 MΩ	0,1	E192
				100 Ω to 3,01 MΩ	0,25	
0 Ω-resistors according to Table 2c for all styles.						
<sup>a</sup> Code letters according to EN 60062.						

#### 1.4 Variation of resistance with temperature and temperature rise

Table 4 – Temperature coefficients and percentage change of resistance (acc. to EN 140400, Table 2)

Temperature coefficient		Limit of resistance change $\Delta R/R$ (%)		
ppm/K	Code <sup>a</sup>	Stability classes 0,1 ; 0,25		
		Temp. charact. 20 °C / 70 °C	LCT / Ref. temp. -55 °C / 20 °C	Ref. temp. / UCT 20 °C / 155 °C
± 25	D	± 0,125	± 0,188	± 0,338
± 10	F	± 0,050	± 0,075	± 0,135

<sup>a</sup> Code letter according to EN 140400, Table 2.

Table 5 – Limit of temperature rise

Stability class	Limit of temperature rise at rated dissipation
0,1 ; 0,25	$T_r \leq 85$ K

The thermal resistance is calculated to  $R_{th} = T_r / P_{70}$ .

#### 1.5 Climatic categories

Table 6 – Climatic categories

Stability class	Climatic category (LCT / UCT / Duration)
0,1 ; 0,25	55 / 155 / 56

SIST EN 140401-804:2005

#### 1.6 Limits for change of resistance at tests

Table 7 – Limits for change of resistance at tests

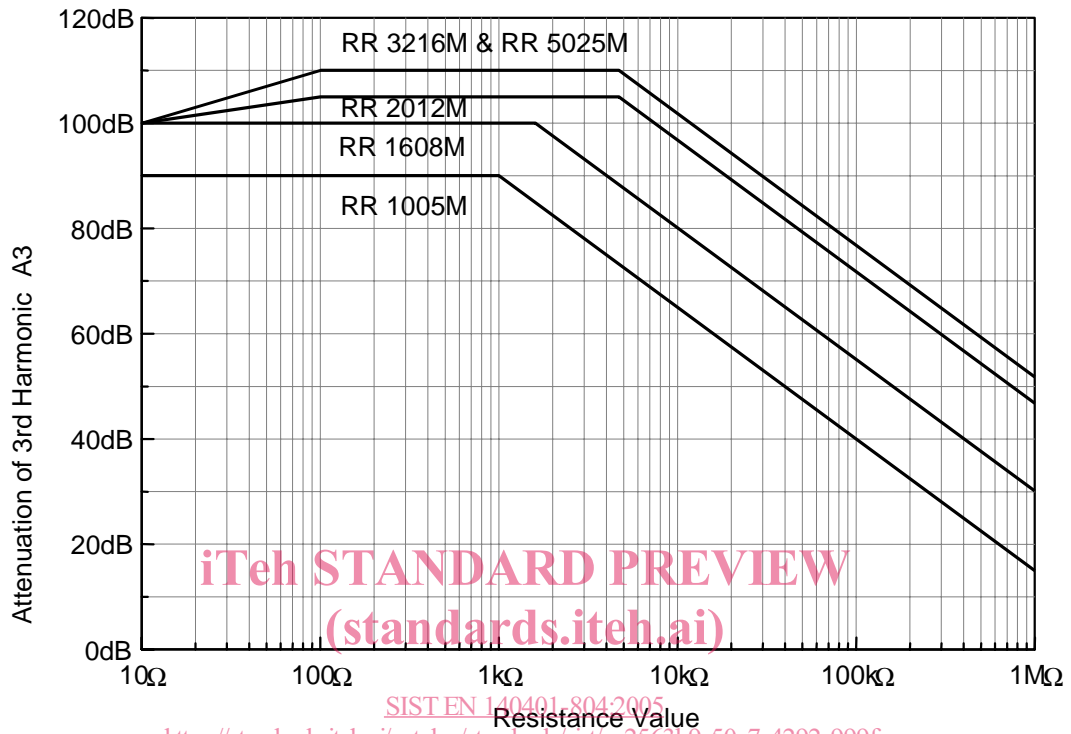
Stability class	Limit of resistance change $\Delta R/R$			
	EN 60115-1, 4.23 Climatic sequence 4.24 Damp heat, steady state 4.25.3 Endurance at upper category temperature	EN 60115-1, 4.25.1 Endurance at 70 °C  1 000 h   Extended, 8 000 h		EN 60115-1, 4.13 Overload 4.18 Resistance to soldering heat 4.19 Rapid change of temperature 4.22 Vibration 4.33 Substrate bending test
0,25	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,25 \% R + 0,05 \Omega)$	$\pm (0,5 \% R + 0,05 \Omega)$	$\pm (0,05 \% R + 0,01 \Omega)$
0,1	$\pm (0,1 \% R + 0,02 \Omega)$	$\pm (0,1 \% R + 0,02 \Omega)$	$\pm (0,25 \% R + 0,02 \Omega)$	$\pm (0,05 \% R + 0,01 \Omega)$

<sup>a</sup> Tightening of the general definition of stability classes against the requirements of EN 140400, 2.1.4.

### 1.7 Non-linear properties

(for resistance values  $\geq 10 \Omega$ )

If measurement of non-linearity is required according to 2.1.2, measured values shall be above the limits given in the diagram below. The resistors shall be tested according to IEC/TR 60440 where the test voltage shall be the rated voltage.



**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
SIST EN 140401-804:2005  
<https://standards.iteh.ai/catalog/standards/sist/ca2563b9-50a7-4292-999f-b514d01eb315/sist-en-140401-804-2005>

**Figure 3 – Limits of non-linearity in resistors**