

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Measurement of the dimensions of a cylindrical component with axial terminations

(standards.iteh.ai)

Mesure des dimensions d'un composant cylindrique à sorties axiales

[IEC 60294:2012](https://standards.iteh.ai/catalog/standards/sist/2dee110f-4c6b-4b67-bff2-0922ecadc405/iec-60294-2012)

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OF A CYLINDRICAL COMPONENT WITH AXIAL TERMINATIONS****FOREWORD**

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International Standard IEC 60294 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This second edition cancels and replaces the first edition, published in 1969, and constitutes a technical revision.

The main technical changes with respect to the first edition are the following:

- employment of SI units only, causing deletion of all imperial dimensions,
- reduction of the tolerance on the chamfer depth in Figure 1 and Figure 2,
- elaboration of the method for coating material extending onto wire terminations,
- elaboration of the method for the overall body diameter, and
- introduction of requirements on information to be given in a relevant specification.

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

FDIS	Report on voting
40/2154/FDIS	40/2166/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 web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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MEASUREMENT OF THE DIMENSIONS OF A CYLINDRICAL COMPONENT WITH AXIAL TERMINATIONS

1 Scope

This International Standard applies to cylindrical capacitors and resistors for use in electronic equipment.

This standard gives methods for measurement of the body length and for checking the excessive protective coating extending onto the wire terminations of components with axial wire terminations. It further provides a method for checking the overall body diameter of cylindrical components with axial wire terminations.

NOTE A measuring method for components with unidirectional terminations is given in IEC 60717.

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 60301, *Preferred diameters of wire terminations of capacitors and resistors*

3 Body length <https://standards.iteh.ai/catalog/standards/sist/2dee110f-4c6b-4b67-bff2-0922ecadc405/iec-60294-2012>

3.1 General

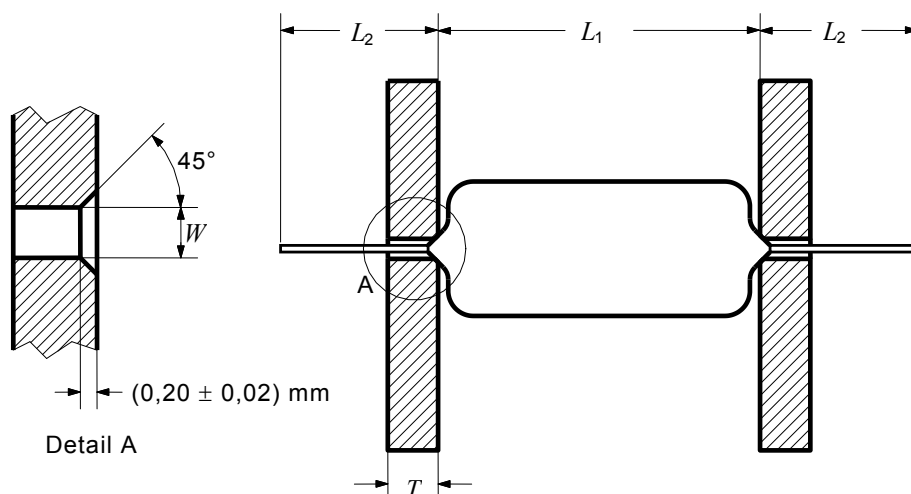
The length of the body shall be measured by inserting the wire terminations into slots or bores of a pair of gauge plates and by moving these plates parallel to each other until the component body is clamped without deforming the body or the wire terminations.

The plates shall be considered sufficiently close to parallel if, allowing for the size of plate and the distance between the component and the measuring device, the error in measurement due to this cause does not exceed 0,05 mm.

Components with axial wire terminations shall be measured using the standard gauge plates of 3.2, unless glass-metal seals or other discontinuities in the wire terminations require the use of the special gauge plate of 3.3.

3.2 Standard gauge plates for components with axial wire terminations

The gauge plate defined in Figure 1 shall be used for components with axial wire terminations, unless prescribed otherwise by the relevant specification.



Key

- L_1 Length of the component body
- L_2 Length of the wire terminations
- T Thickness of the gauge plates
- W Slot width or bore diameter

IEC 1428/12

Figure 1 – Standard gauge plates

The width of the slot, or the diameter of the bore in the gauge plates, W , shall be selected from Table 1, according to the nominal diameter of the wire termination.

Table 1 – Slot width or hole diameter for standard gauge plates

Diameter d^a of the wire terminations	Slot width W^b in the gauge plates
$d \leq 0,45$ mm	$(0,80 \pm 0,02)$ mm
$0,45$ mm $< d \leq 0,70$ mm	$(1,00 \pm 0,02)$ mm
$0,70$ mm $< d \leq 0,90$ mm	$(1,20 \pm 0,02)$ mm
$0,90$ mm $< d \leq 1,15$ mm	$(1,50 \pm 0,02)$ mm
$1,15$ mm $< d \leq 1,32$ mm	$(1,80 \pm 0,02)$ mm
$1,32$ mm $< d \leq 2,00$ mm	$(3,00 \pm 0,02)$ mm
^a Nominal diameter of the lead wire, permissible tolerance on the diameter d according to IEC 60301. ^b Dimension W is the bore diameter if the gauge plates are made with cylindrical holes instead of slots.	

The prescribed tolerance of the slot width or bore diameter W only needs to be maintained near the prescribed inner chamfer of the slot or hole.

The length of the component body L_1 shall be taken as the distance between the inside faces of the gauge plates.

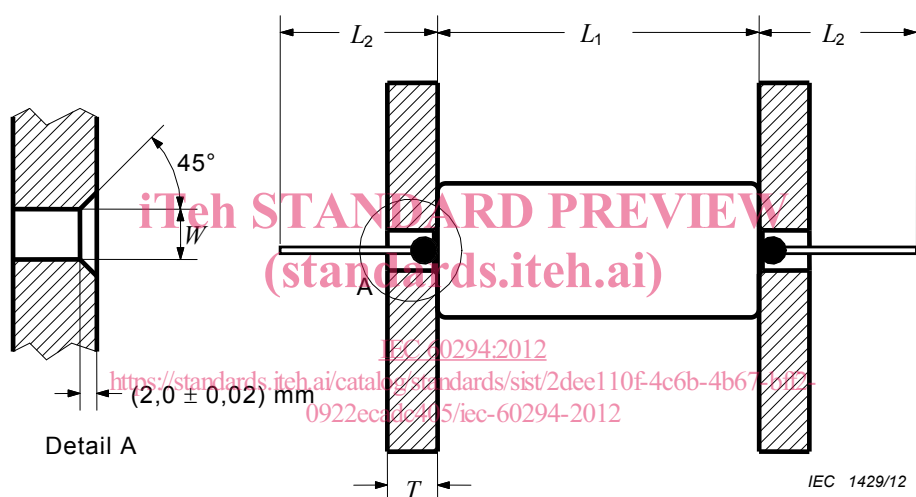
The thickness T of the gauge plate shall be sufficient to ensure mechanical stability and precision of the measurement; it has no significance to the length measurement. Unless otherwise specified by the relevant specification, the thickness T shall be

$$T = (4,0 \pm 0,05) \text{ mm.}$$

The determination of the free length of a wire termination, L_2 , should be based on the same reference plane which is used to measure the length of the component body, i.e. the inner surface of the gauge plate.

3.3 Special gauge plates for components with glass-metal seals or other discontinuities in their axial wire terminations

The gauge plate defined in Figure 2 shall be used for components with discontinuities in their axial wire terminations, e.g. glass-metal seals or external welds, unless otherwise prescribed by the relevant specification.



Key

- L_1 Length of the component body
- L_2 Length of the wire terminations
- T Thickness of the gauge plates
- W Slot width or bore diameter

Figure 2 – Special gauge plates

The length of the component body L_1 shall be taken as the distance between the inside faces of the gauge plates.

Unless otherwise specified by the relevant specification, the width of the slot, or the diameter of the bore in the gauge plates, W , shall be

$$W = (4,0 \pm 0,02) \text{ mm.}$$

The prescribed tolerance of the slot width or bore diameter W only needs to be maintained near the prescribed inner chamfer of the slot or bore.

The thickness T of the gauge plate shall be sufficient to ensure mechanical stability and precision of the measurement; it has no significance to the length measurement. Unless otherwise specified by the relevant specification, the thickness T shall be

$$T = (4,0 \pm 0,05) \text{ mm.}$$

The determination of the free length of a wire termination, L_2 , should be based on the same reference plane which is used to measure the length of the component body, i.e. the inner surface of the gauge plate.

4 Coating material extending onto wire terminations

If the relevant specification permits the extension of coating material onto the wire terminations, it shall prescribe a permissible length of excessive coating on a wire termination, c_{\max} . If not prescribed directly, the permissible length shall be determined from

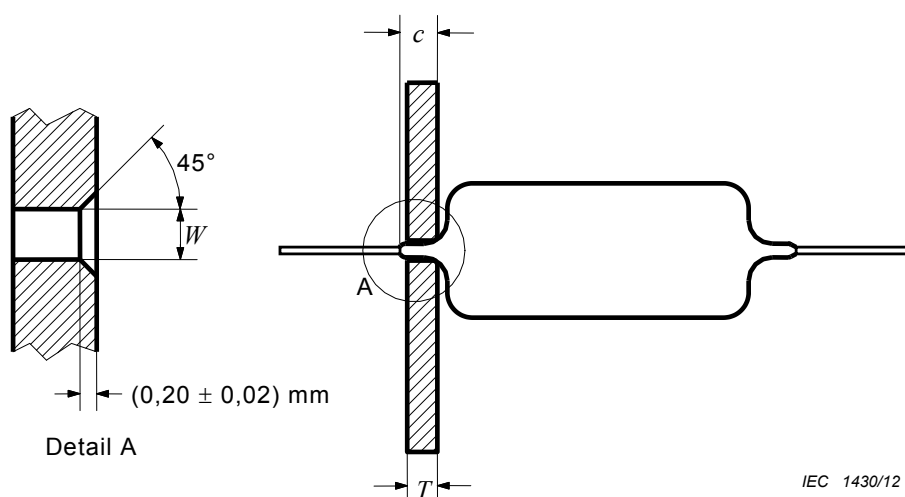
$$c_{\max} = \frac{L_c - L_1}{2}$$

where

L_c is the maximum component length between clean leads, as prescribed by the relevant specification;

L_1 is the length of the component body.

Compliance of a component's coating material extending onto the wire terminations with such a prescribed maximum permissible extension length shall be checked by visual inspection of the wire termination protruding perpendicularly through the dedicated gauge plate, which is pressed against the component body without deforming the body or the wire terminations, see Figure 3.



Key

- c Length of the excess coating on the wire terminations
- T Thickness of the gauge plates
- W Bore diameter or slot width

Figure 3 – Gauge plate for checking coating material extended onto a wire termination

The diameter of the bore, or the width of the slot in the gauge plates, W , shall be selected from Table 1 according to the nominal diameter of the wire termination.

The thickness T of the gauge plate is determined by the permissible length of excessive coating to be checked

$$T = (c_{\max} \pm 0,05 \text{ mm})$$

where

c_{\max} is the maximum length of coating on the wire termination, as prescribed by the relevant specification.

5 Overall body diameter

Compliance of a component's overall diameter with a prescribed maximum body diameter shall be checked by passing the component through a straight tube diameter gauge, as shown in Figure 4.



Key

- D_T Inner diameter of the straight tube
- L_T Length of the straight tube
- T_T Wall thickness of the straight tube

Figure 4 – Straight tube diameter gauge

The orifice of the diameter gauge is formed by the inner diameter D_T of the straight tube, with

$$D_T = (D_{\max} + 0,1 \text{ mm}) \pm 0,05 \text{ mm}$$

where

D_{\max} is the maximum component body diameter, as prescribed by the relevant specification.

The maximum diameter of the component, as given by the relevant specification, needs to take into account the permissible irregularities in the shape of the body, such as bow, caps on resistors and wire wrapping as part of the terminations of ceramic capacitors, etc.

The length L_T of the straight tube shall meet the following requirement

$$L_T \geq L_{\max}$$

where

L_{\max} is the maximum component body length, as prescribed by the relevant specification.