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INTERNATIONAL STANDARD

Packaging of components for automatic handling – Part 3-1: Packaging of surface mount components on continuous tapes – Type V – Pressed carrier tapes

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International Standard IEC 60286-3-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

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

FDIS	Report on voting
40/1972/FDIS	40/1981/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.

IEC 60286-3-1 is to be used in conjunction with IEC 60286-3.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all parts of the IEC 60286 series, under the general title *Packaging of components for automatic handling*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

- reconfirmed,
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A bilingual version of this publication may be issued at a later date.

PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –

Part 3-1: Packaging of surface mount components on continuous tapes – Type V – Pressed carrier tapes

INTRODUCTION

Tape packaging meets the requirements of automatic component placement machines and also covers the use of tape packing for components for test purposes and other operations.

This International Standard describes a carrier tape comprising concave cavities formed by compression of bulk carrier material. This specification is for size 1608 and smaller.

1 General

1.1 Scope

This part of IEC 60286 is applicable to the taping of surface mount components using carrier tapes which have concave cavities ed by compression of the base material.

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60286-3:2007, *Packing of components for automatic handling – Part 3: Packing of surface mount components on continuous tapes*

2 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60286-3, as well as the following, apply.

2.1
pressed carrier tape
carrier tape with concave cavities formed by compression of the base material

2.2
fluff
fibre from the base material attached inside the cavity

2.3
burr
surface projection of tape unintentially produced when cavity is formed

2.4
deformation
bulge on the inner wall of the cavity

2.5
puff
bulge on the reverse side of the cavity

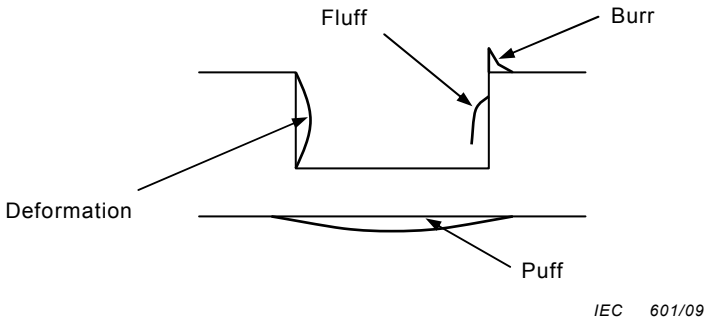

Figure 1 – Sectional view of component cavity

3 Tape dimensions

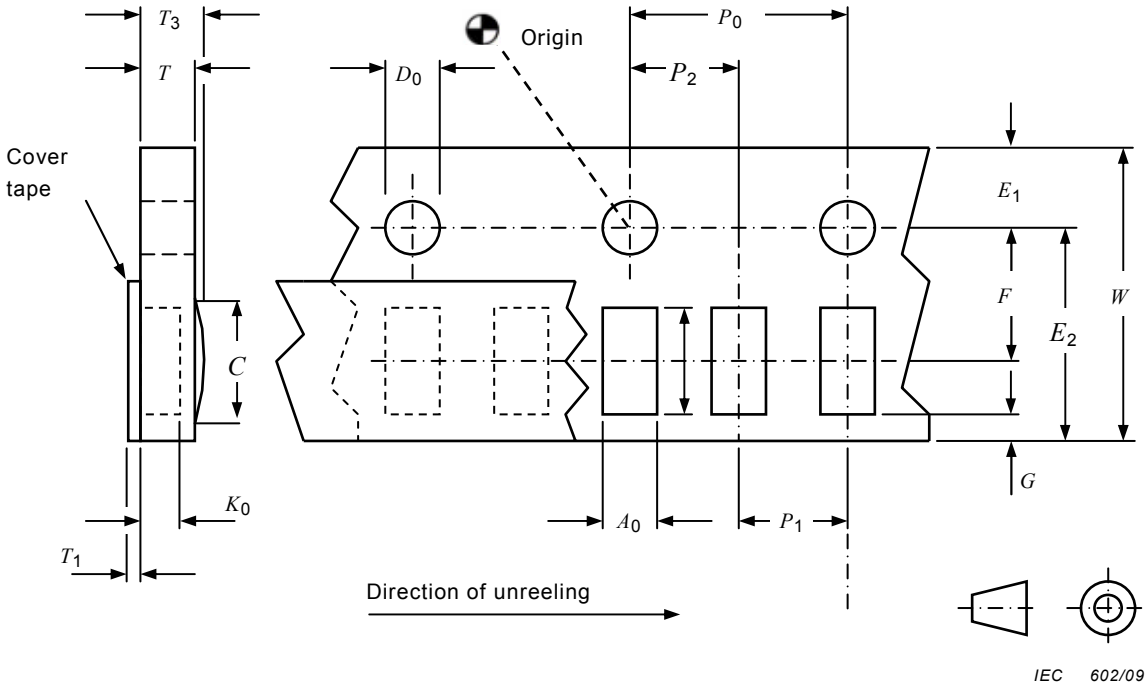

Figure 2 – Dimensions

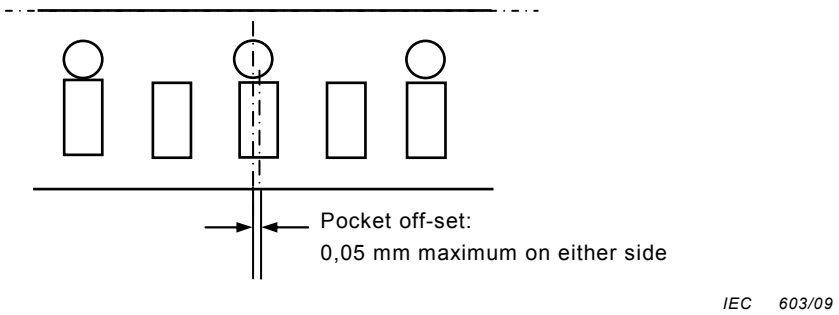

Figure 3 – Maximum allowed pocket offset

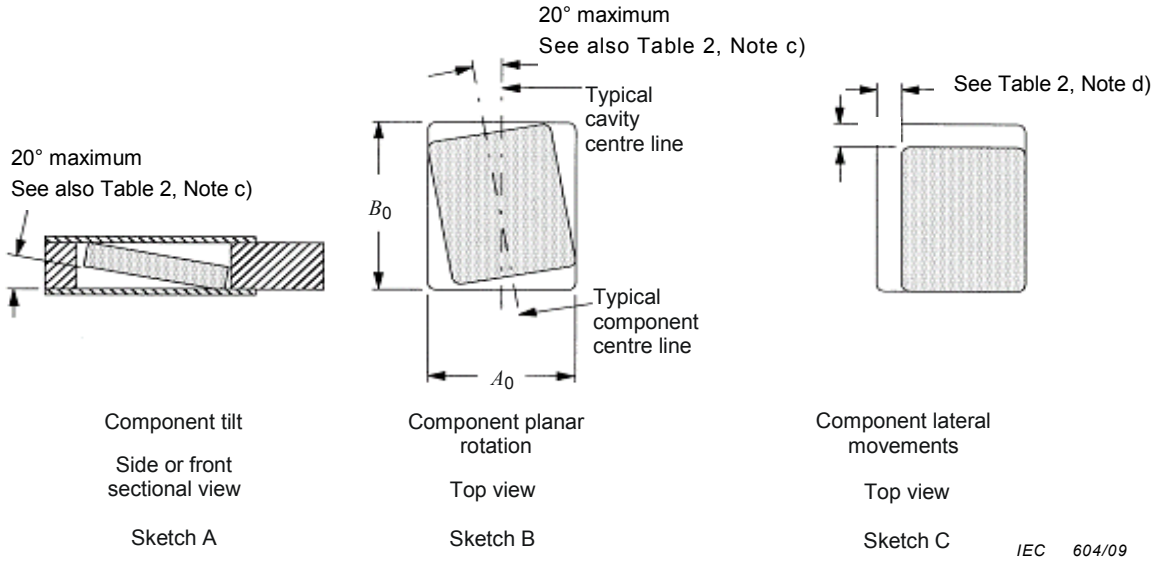

Figure 4 – Maximum component tilt, rotation and lateral movement

Table 1 – Constant dimensions of 8 mm pressed carrier tape

Tape size mm	D_0 mm	E_1 mm	G_{min} mm	P_0 mm	T_{max} mm	$T_{1\ max}$ mm	T_3-T_{max} mm	Cumulative pitch (over 10 pitches) mm
8	$1{,}5^{+0{,}1}_{0}$	1,75 ± 0,1	0,75	4,0 ± 0,1	1,1	0,1	0,1	±0,1

Table 2 – Variable dimensions of 8 mm pressed carrier tape

Tape size mm	$C_{max.}$ mm	$E_{2\ min}$ mm	F mm	P_1 mm	P_2 mm	W mm	A_0, B_0, K_0 mm
8	4,35	6,25	3,5 ± 0,05	2,0 ± 0,05	2,0 ± 0,05	$8{,}0\ ^{+0{,}3}_{-0{,}1}$	see NOTE

NOTE The nominal dimensions of the component compartment should be derived from the relevant component specification. The tolerances on the nominal sizes of the compartment should be selected so that the components cannot change their orientation within the tape and can be easily removed from the tape, with the following characteristics.

There should be sufficient clearance surrounding the component so that

a) the component does not protrude above the top surface of the carrier tape,

b) the component can be removed from the cavity in a vertical direction without mechanical restriction after the top cover tape has been removed,

c) the rotation of the component is limited to a 20° maximum tilt (see Figure 2, sketch A) and a 20° maximum planar rotation (see Figure 3, sketch B),

d) the maximum lateral movement allowed is 0,3 mm except for 1005M sized components where the maximum should be 0,20 mm and for 0603M sized components the maximum should be 0,12 mm (see Annex A).

For defined component positioning, the pocket positions should be defined to an origin point. This origin is the centre of the index hole, defined by the crosshair of the dimensions E_1 and P_0. The centre of the component compartment is defined by P_2 and F, relative to the sprocket hole, as shown in Figure 2 with tolerances given in the table above.

Preferred dimensions for components should be taken from the relevant IEC specifications.

Dimensions $A_0 \leq B_0$, unless otherwise specified in the component detail specification.

For components with size designation of 1005M or smaller, the puff ($T_3 - T$) should be limited to 0,05 mm maximum.

If positioning precision is required, for example when components ≤ size 1005M are mounted in narrow space, then the tolerance on D_0 should be (+0,05 / 0,00) mm.

4 Polarity and orientation of components in the tape

Requirements shall be in accordance with IEC 60286-3, 4.1, 4.2.1 and 4.2.3.

5 Fixing of components and additional tape requirements

Requirements shall be in accordance with IEC 60286-3, 5.1, 5.2, 5.4, 5.5, 5.6, 5.7 and 5.8 and the following.

5.1 Specific requirements for Type V tapes

5.1.1 Minimum bending radius

The minimum bending radius (R_{min}) shall be 25 mm.

5.1.2 Measurement method for carrier tape thickness (T and T_3)

The equipment used to conduct these measurements shall be an external micrometer with a measuring pressure of 1,5 N or smaller. The probe shall be made of super-hard material and the diameter of the probe head shall be 2,0 mm.

The thickness of the carrier tape shall be measured with an accuracy of 0,001 mm. The dimension of the thickness excluding the puff of the bottom of the cavity is T, when the flat side is measured adjacent to the sprocket holes. The dimension of the thickness including the puff on the bottom of the cavity is T_3.

Measurement shall be made at the points shown in Figure 5.

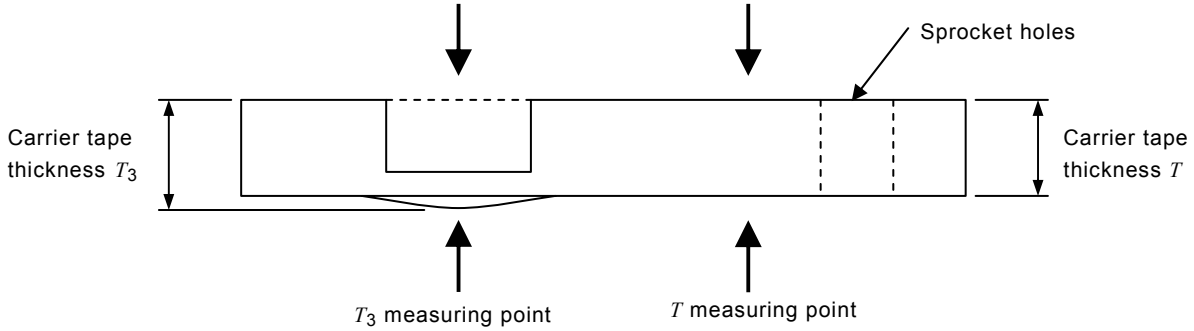

Figure 5 – Carrier tape thickness sectional

5.1.3 Measurement method for cavity (A_0 and B_0)

A measuring viewing scope with 10x magnification or more shall be used.

For dimensions A_0 and B_0 the minimum value including deformation of material shall be measured using an adequate light source to illuminate the surface of the tape and allow measurement of the features as shown in Figure 6. Fluff should be excluded from the dimension.

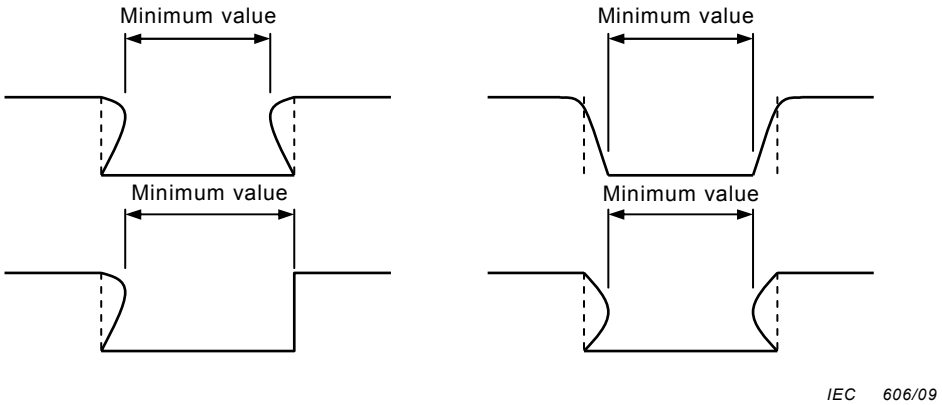

Figure 6 – Cavity cross-section

5.1.4 Measurement method for Cavity depth (dimension K_0)

A non-contact measuring system should be used.

The cavity depth K_0 is defined as the distance between the centre of the bottom of the cavity and the carrier surface at the centre point between the sprocket hole and the cavity.

A measurement can be performed according to Figure 7.

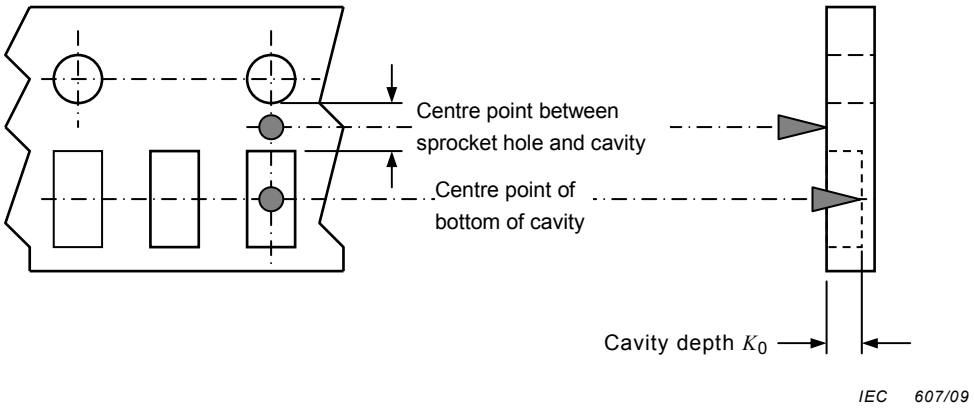

Figure 7 – Cavity depth dimension

6 Packing

Requirements shall be in accordance with IEC 60286-3, 7.1, 7.2 and 7.3.

7 Marking

Requirements shall be in accordance with IEC 60286-3, Clause 8.

Annex A
(informative)

Specific requirements for Type V

A.1 Burr, fluff, deformation and puff

The cavity should not have any burr, fluff, deformation and puff of carrier tape as they may affect removal of components.

A.2 Movement of components within the cavity

Movement of components within the cavity should be restricted, as shown below, as indicated in Figure A.1.

Size 1608M : lateral movement, all axes <0,3 mm

Size 1005M : lateral movement, all axes <0,2 mm

Size 0603M : lateral movement, all axes <0,12 mm

Table A.1 gives recommended tolerances of the cavity for the component sizes used above.

NOTE Cavities should be sized to allow as little movement as possible, but should be large enough to allow for tolerances in the dimensions of both the cavity and the component. The tolerance of the component and the cavity should be as small as possible when considering components that are to be mounted in a narrow space.

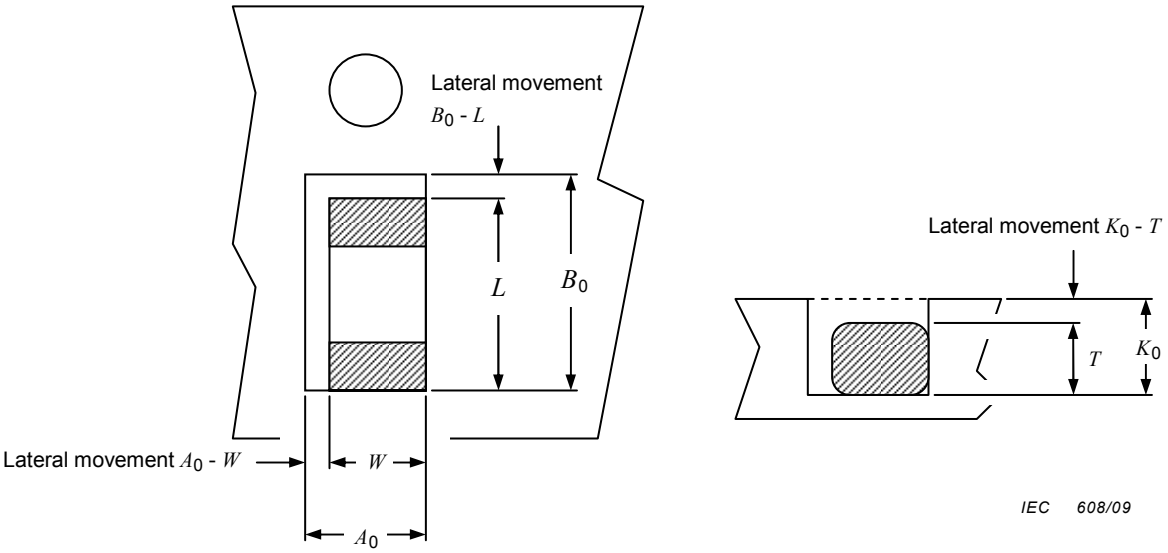

Figure A.1 – Movement of components within the cavity

Table A.1 – Recommended dimension tolerances of cavity

Component size	Dimension tolerance of cavity		
	B_0 mm	A_0 mm	K_0 mm
0603M	±0,03	±0,03	±0,03
1005M	±0,05	±0,05	±0,05
1608M	±0,05	±0,05	±0,05

A.3 Peel force of the cover tape

Peel force of the cover tape should be restricted as shown below.

Table A.2 – Peel force

Tape Width W	Peel force
8 mm	0,1 N to 1,0 N
NOTE 1 For ultra small components 0603M size or smaller, the mass is so light that components may run-off from the component compartment when the cover tape is peeled. For these component sizes it is recommended to use a peel force of 0,2 N ± 0,1 N. NOTE 2 Peel force of cover tape is known to be affected by aging. Above specifications should be valid for 7 days after sealing. NOTE 3 Reverse vending of tape should be avoided	

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