BS EN 60286-4:2013

BSI Standards Publication

Packaging of components for automatic handling

Part 4: Stick magazines for electronic components encapsulated in packages of different forms

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National foreword

This British Standard is the UK implementation of EN 60286-4:2013. It is identical to IEC 60286-4:2013. It supersedes BS EN 60286-4:1998 which is withdrawn.

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.

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Packaging of components for automatic handling - Part 4: Stick magazines for electronic components encapsulated in packages of different forms

(IEC 60286-4:2013)

Emballage des composants pour opérations automatisées – Partie 4: Magasins chargeurs pour composants électroniques encapsulés dans des boîtiers de différentes formes
(CEI 60286-4:2013)

Gurtung und Magazinierung von Bauteilen für automatische Verarbeitung - Teil 4: Stangenmagazine für elektronische Bauelemente mit verschiedenen Gehäusen
(IEC 60286-4:2013)

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Foreword

The text of document 40/2230/FDIS, future edition 3 of IEC 60286-4, prepared by IEC TC 40, "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60286-4:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-05-30
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-08-30

This document supersedes EN 60286-4:1998.

EN 60286-4:2013 includes the following significant technical changes with respect to EN 60286-4:1998:

Clause 4 describes the guidelines for customer specific stick magazine design. It replaces the magazine design rules for IEC outlined components and rules for orientation of components in stick magazines which have been moved to Annexes Z to D.

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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The text of the International Standard IEC 60286-4:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

ISO 11469	NOTE Harmonized as EN ISO 11469.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60191-3	1999	Mechanical standardization of semiconductor devices - Part 3: General rules for the preparation of outline drawings of integrated circuits	EN 60191-3	1999
IEC 60747-1 + corr. August + A1	2006 2008 2010	Semiconductor devices - Part 1: General	-	-

CONTENTS

PACKAGING OF COMPONENTS FOR AUTOMATIC HANDLING –

Part 4: Stick magazines for electronic components encapsulated in packages of different forms

1 Scope

This part of IEC 60286 is applicable to stick magazines (including end stoppers) intended to be used for storage of electronic components, for transport from the manufacturer to the customer and for in-house use in the manufacturing plant. They are also used to feed automatic placement machines for surface mounting as well as for through-hole mounting of electronic 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 60191-3:1999, *Mechanical standardization of semiconductor devices – Part 3: General rules for the preparation of outline drawings of integrated circuits*

IEC 60747-1:2006, *Semiconductor devices – Part 1: General*
Amendment 1:2010

3 Terms, definitions and conventions

3.1 Terms and definitions

For the purposes of this document, the following definitions apply.

3.1.1
stick magazine
elongated container which has an appropriate cross section designed to accommodate devices

Note 1 to entry: Alternative terms such as tube, rail and magazine may be used.

3.1.2
end stoppers
mechanism placed at each end of the stick magazine to keep the devices from falling out of the stick magazine

Note 1 to entry: Alternative terms such as pins, plugs, end plugs, nails, retainers etc. may be used, but for the purposes of this standard "end stopper" shall be used.

3.2 Conventions

All dimensions in tables and figures representing sizes are in millimetres. All dimensions in tables and figures representing angles or radii are in degrees.

4 Shape and cross-section of stick magazine

Examples of typical and customized cross-sections for stick magazines are given in Figure 1.

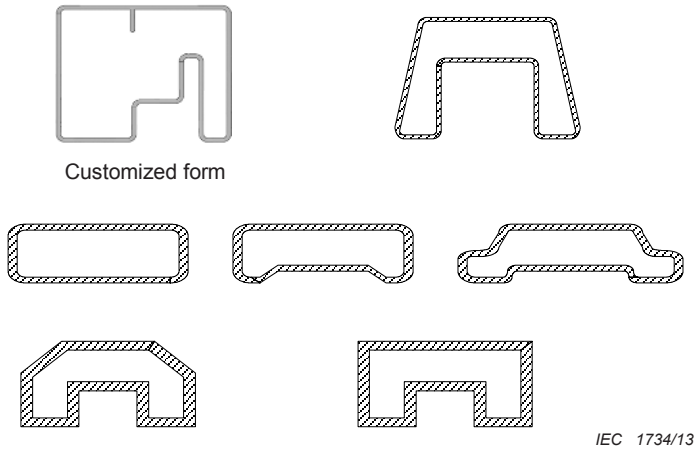


Figure 1 – Shape and cross-sections of stick magazines

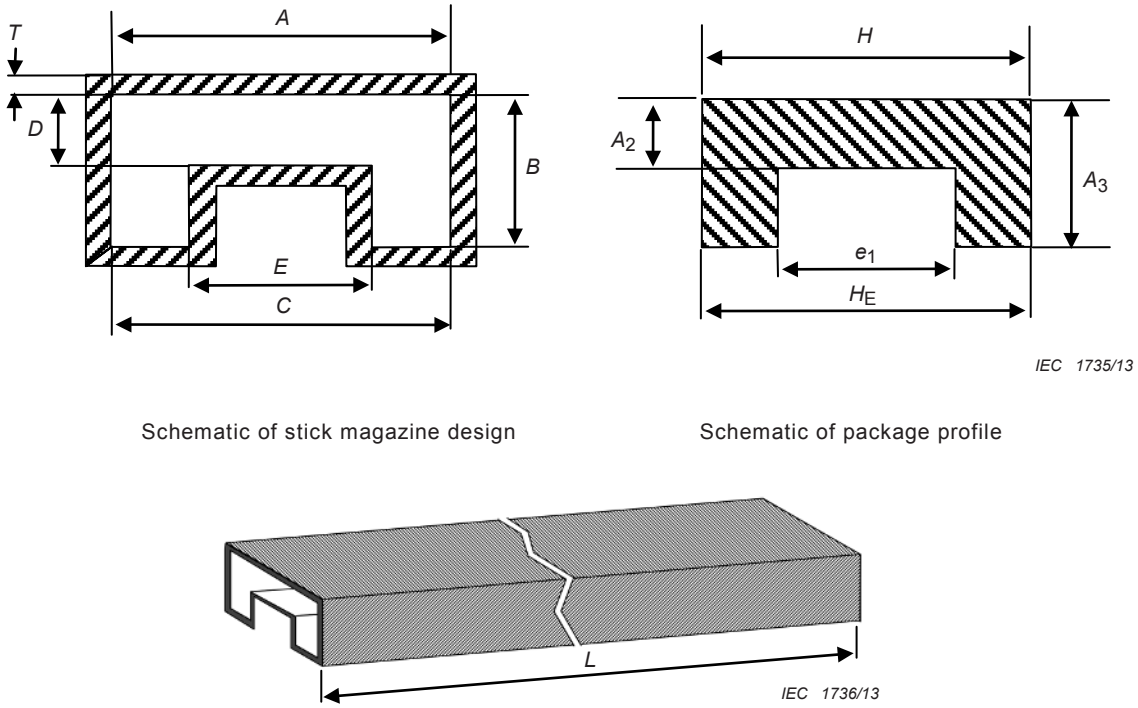
Internal stick magazine configuration shall be such that the individual component is protected from damage, maintains a fixed orientation and slides freely when one end is elevated at a minimum angle of 30°.

As magazine material over time is changing, the level of elevation of 30° may not be sufficient for freely sliding of components. In this case, to allow proper transition of the component from the magazine to a horizontal surface, the level of elevation should be kept to a minimum.

5 Dimensions of stick magazines

5.1 General

Because the shape of the cross-section varies, the controlled distance tolerances should conform to the values in Table 1, Table 2 and Figure 2. This table provides the tolerances to the package profile dimensions, which is a summary of the tolerances for various standard outlines (see Annexes A, B and C).



Schematic of stick magazine design

Schematic of package profile

Figure 2 – Schematic of stick magazine design and schematic of package profile

Table 1 – Tolerances to the package profile dimensions

Functional cross reference		Tolerances to package profile dimensions
Stick magazine	Package profile	
A	*H*	Package dimension $^{+0,5}_{-0,0}$
B	A_3	
C	H_E	
D	A_2	Package dimension ± 0,2
E	e_1	
NOTE 1 A_2 is the body height of the component.		
NOTE 2 A_3 is the total package height of the component.		

NOTE Additional protection of the component can be given by individual design to prevent cross traversing to the stick magazine length (prevention of bend leads).

Table 2 – Principle of stick magazine requirements

Dimension	Nominal value and tolerances
All radii	0,5° to 1,5°
L	530 mm max.
T	0,6 mm –0,15 / +0,2

5.2 Materials

The material shall be conductive, static dissipative or antistatic (a measuring method and requirements are under consideration).

The loaded magazines shall be suitable to withstand transport and storage without danger of giving off vapours or of contaminating the surface of the terminations, which could make soldering difficult or deteriorate the component properties or terminations by chemical action.

As a minimum, the component device type, manufacturer's name or trade mark and date code shall be legible without removal of the components from the stick magazine. Where the stick material is not transparent, a suitable window or a series of windows/holes shall be provided for inspection purposes.

5.3 Recycling

Stick magazines should be made of recyclable material. When such material is used the magazine shall be permanently marked with the recycling symbol.

The end-stoppers should be of the same material as the stick magazine. This does not apply to PVC-free type stick magazines, see Table 3.

Table 3 – Material reference for magazines and stoppers

Magazine type	Magazine material	Stopper material
PVC type	PVC (hard type)	PVC (soft type)
PVC free type	PVC free (e.g. PC or PET)	PVC free (e.g. Elastomer (thermoplastic))

ISO 11469 should be used.

6 Mechanical stability

The mechanical stability of a loaded magazine during storage, transport and use shall be such that the components are adequately retained, without deformation of the terminations or other damage, in order to maintain their orientation within the magazine, yet enabling them to be easily removed.

The magazine, which should not exceed 530 mm in length, shall also be suitable for use with automatic placement machines or test equipment, and should be capable of bending in the length axis through a radius of 600 mm. They shall be so designed that they can be stacked in the machines and shall not overturn.

7 End stoppers and spacers

End stoppers may be used to close the ends of the stick magazines, and spacers may be used to limit the movement of the components within the stick magazines.

For end stoppers and spacers the following rules apply:

a) They shall be of any suitable material, preferably recyclable. When such a material is used and size permits, end stoppers and spacers shall be marked with the recycling symbol.
b) They shall be of static dissipative or antistatically-coated material, and spacers shall be of adequate compliance to prevent component damage.
c) End stoppers shall stay in place at the ends of the magazines until they are intentionally removed, and shall be easily removable to disperse the devices without damaging the stick magazines.

8 Orientation of the components in the stick magazine

See IEC 60191-3:1999, Annex G.

Rule (see also Annex D).

Integrated circuit packages shall be put in stick magazines with the terminal No. 1 mark orientation. The side with the mark has to exit first from the carrier.

When the packages are in the carrier and viewed from the top, the terminal No. 1 mark shall be left or in the lower left corner, and component marking shall be readable from the left to right.

9 Marking

The magazines shall be marked "Dissipative" or "Antistatic" as applicable.

The direction of unloading shall be marked on the magazines.

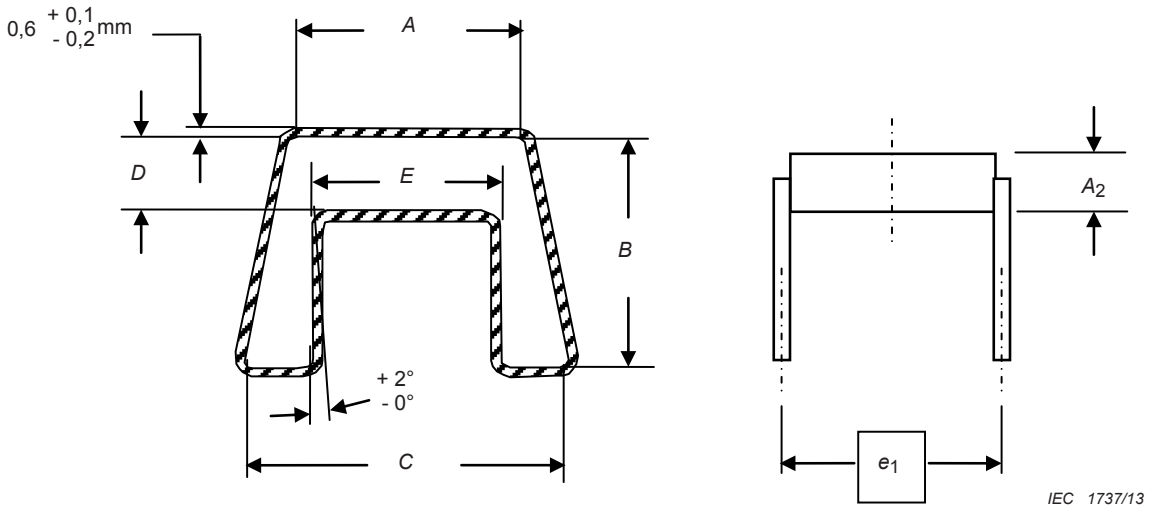
If the components are electrostatically sensitive and require special precautions during handling, the magazines shall also be marked as required in Clause 8 of IEC 60747-1:2006, Amendment 1:2010.

Annex A
(informative)

DIL packages for through-hole mount

See IEC 60191-2, code 050G:1978, code 51G:1987 and code 60G:1987.

The principle of the functional dimensions of stick magazines for DIL package outlines with 6 to 48 terminals, and with a terminal row spacing of 3, 4 or 6 modules (module e = 2,54 mm = 0,1 inch) is as shown in Figure A.1. The functional dimensions, derived from outer and inner dimensions, are given in Tables A.1, A.2 and A.3. These dimensions apply to ceramic, plastic and side brazed termination packages.



Magazine section Component cross-section

All radii: 0,5 mm to 1,5 mm.

Figure A.1 – DIL packages for through-hole mounting

Other shapes are permitted within the dimensions given for outline families covered by this standard.

Stick magazine dimensions for DIL packages with terminal row spacing e_1 are given below.

Table A.1 – e_1 = 3 modules e

Dimensions mm	Low profile package height A_2 2,0 to 3,5	Regular profile package height A_2 >3,5 to 4,6
A	9,3 ± 0,5	9,3 ± 0,5
B	12,0 ± 0,5	13,5 ± 0,5
C	13,5 ± 0,5	15,5 ± 0,5
D	4,0 ± 0,2	5,1 ± 0,2
E	5,4 ± 0,2	5,4 ± 0,2

Table A.2 – e_1 = 4 modules e

Dimensions mm	**Low profile package height A_2 2,0 to 3,5**	**Regular profile package height A_2 >3,5 to 4,6**
A	12,0 ± 0,5	12,0 ± 0,5
B	12,0 ± 0,5	13,5 ± 0,5
C	18,0 ± 0,5	18,0 ± 0,5
D	4,0 ± 0,2	5,1 ± 0,2
E	8,2 ± 0,2	8,2 ± 0,2

Table A.3 – e_1 = 6 modules e

Dimensions mm	**Low profile package height A_2 2,0 to 3,5**	**Regular profile package height A_2 > 3,5 to 4,6**
A	17,3 ± 0,5	17,3 ± 0,5
B	12,0 ± 0,5	13,5 ± 0,5
C	23,0 ± 0,5	23,0 ± 0,5
D	4,0 ± 0,2	5,1 ± 0,2
E	12,5 ± 0,2	12,5 ± 0,2

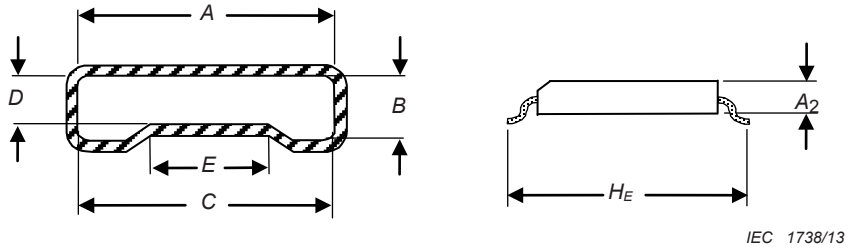
Preferred maximum magazine length: 530 mm.

Annex B
(informative)

SO packages for surface mounting

See IEC 60191-2, code 075E:1990 and code 076E:1990.

The principle of the functional dimensions of stick magazines for SO packages with 4 to 28 terminals, and with a maximum width H_E of 6,7 mm or 10,7 mm and a maximum height A_2 of 1,8 mm or 2,45 mm respectively, is as given in Figure B.1 and in Table B.1.



Magazine section Component cross-section

Figure B.1 – SO packages for surface mounting

Table B.1 – Stick magazine dimensions for SO packages

Dimensions	Package outline type (see IEC 60191-2)	
mm	076E01 – 076E07	075E01 – 075E06
A	7,0 min.	11,0 min.
B	110 % to 135 % of A_2.	110 % to 135 % of A_2.
C	110 % to 135 % of H_E	110 % to 135 % of H_E
D	2,8 min.	3,8 min.
E	3,3 max.	7,1 max.
Magazine material thickness	0,45 – 0,8	0,45 – 0,8
Length	530 max.	530 max.

Annex C
(informative)

Leaded chip carrier packages (PLCC) for surface mounting

See IEC 60191-2, code 102E:2001 and code 112E:1990.

The principle of the functional dimensions for PLCC stick magazines is shown in Figure C.1 with variants of cross-sections. The functional dimensions derived from outer and inner dimensions are given in Table C.1.

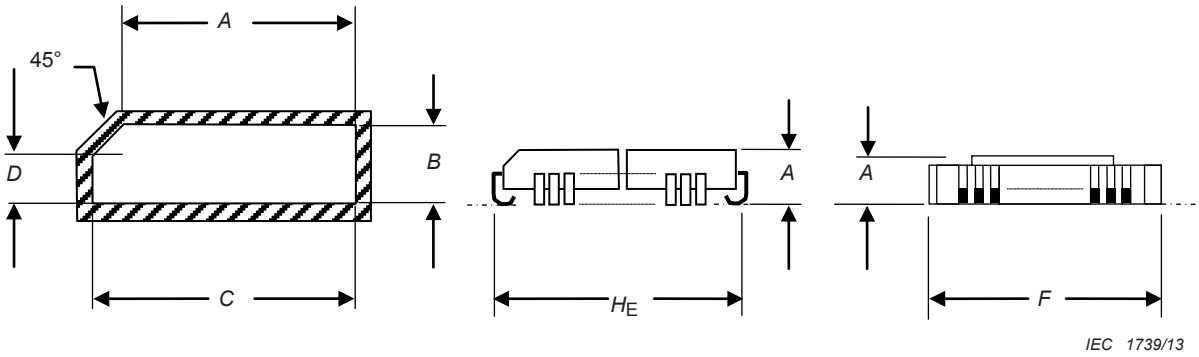


Figure C.1 – Leaded chip carrier packages (PLCC) for surface mounting

Table C.1 – Stick magazine dimensions for PLCC packages

Dimensions	**Package outline type (see IEC 60191-2)**	
mm	102E02 – 102E07	112E01 – 112E05
C	Package width *F* + allowance of 0,6 min. to 0,9 max.	Package width H_E + allowance of 0,6 min. to 0,9 max.
B, D	110 % to 135 % of package thickness *A*	
A	*A* equals the length where at the set dimension *D*. the tube is curved inward by 45° until it reaches height *B*	
Magazine material thickness	0,5 – 1,0	
Length	530 max.	

Annex D
(normative)

Rule for the orientation of integrated circuit packages in handling and shipping carriers such as stick magazines and rails (from IEC 60191-3:1999, Annex G)

D.1 Overview

The users of integrated circuits which are supplied by different manufacturers need to have integrated circuit packages oriented in a standard way in handling and shipping carriers such as stick magazines and rails.

For this reason a rule is required to designate the orientations of the integrated circuit packages relative to their stick magazines or rails and code mark in stick magazines or rails.

D.2 Rule

Integrated circuit packages shall be put in carrier packages such as stick magazines and rails with the terminal No. 1 mark oriented so that the side with the mark exits first from the carrier.

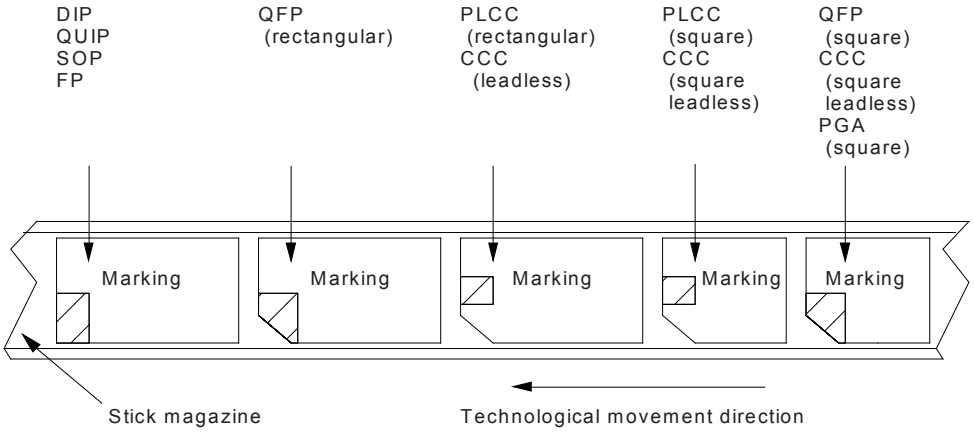
When the packages are in the carrier and viewed from the top, the terminal No. 1 mark shall be to the left or in the lower left corner, and marking shall be right side up and readable from the left to the right.

For examples: see Figure D.1.

Terminal No. 1 exits as first terminal of the row which contains terminal No.1 in case of magazines containing packages like DIP (dual-line package), QUIP (Quad in-line package), SOP (small outline package), FP (flatpack), QFP (quad flatpack), CCC (ceramic chip carrier), or PGA (pin grid array),

or

the row which contains terminal No. 1 in its centre exits first, in the case of magazines containing packages like PLCC (plastic leaded chip carrier), or CCC (ceramic chip carrier).



All packages in this figure are viewed from the top

IEC 1740/13

Figure D.1 – Five examples of the terminal No. 1 marking locations

Bibliography

IEC 60191-2, *Mechanical standardization of semiconductor devices – Part 2: Dimensions*
http://std.iec.ch/

ISO 11469, *Plastics – Generic identification and marking of plastic products*

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