

Workmanship requirements for soldered electronic assemblies —

Part 4: Terminal assemblies

The European Standard EN 61192-4:2003 has the status of a British Standard

ICS 31.190

National foreword

This British Standard is the official English language version of EN 61192-4:2003. It is identical with IEC 61192-4:2003.

The UK participation in its preparation was entrusted to Technical Committee EPL/501, Electronic assembly technology, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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Summary of pages

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Workmanship requirements for soldered electronic assemblies
Part 4: Terminal assemblies
(IEC 61192-4:2002)

Exigences relatives à la qualité
d'exécution des assemblages
électroniques brasés
Partie 4: Assemblage au moyen
de bornes
(CEI 61192-4:2002)

Anforderungen an die Ausführungsqualität
von Lötbaugruppen
Teil 4: Baugruppen mit Lötstützpunkten
(IEC 61192-4:2002)

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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.

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CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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

Foreword

The text of document 91/335/FDIS, future edition 1 of IEC 61192-4, prepared by IEC TC 91, Electronics assembly technology, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61192-4 on 2003-03-01.

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) 2003-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-03-01

This standard should be used in conjunction with the following parts of EN 61192, under the general title *Workmanship requirements for soldered electronic assemblies*:

Part 1: General
Part 2: Surface-mount assemblies
Part 4: Terminal assemblies

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61192-4:2002 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This part of IEC 61192, combined with IEC 61192-1, is used to meet the end-product requirements defined in IEC 61191-1 and IEC 61191-4.

This standard may be used to enable the suppliers and users of terminal electronic assemblies to specify good manufacturing practices as part of a contract.

The respective requirements and guidelines for surface-mount assemblies, and through-hole attachment, are included in separate but related standards.

WORKMANSHIP REQUIREMENTS FOR SOLDERED ELECTRONIC ASSEMBLIES –

Part 4: Terminal assemblies

1 Scope

This part of IEC 61192 specifies general requirements for workmanship in terminal soldered assemblies on organic substrates, on printed boards, and on similar laminates attached to the surface(s) of inorganic substrates.

It applies to assemblies that are totally terminals or mixed assemblies that include surface-mounting or other related assembly technologies, for example through-hole, wires.

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 60194, *Printed board design, manufacture and assembly – Terms and definitions*

IEC 60749:1996, *Semiconductor devices – Mechanical and climatic test methods*
Amendment 2:2001

IEC 61189-3, *Test methods for electrical materials, interconnection structures and assemblies – Part 3: Test methods for interconnection structures (printed boards)*

IEC 61191-1, *Printed board assemblies – Part 1: Generic specification – Requirements for soldered electrical and electronic assemblies using surface mount and related assembly technologies*

IEC 61191-4, *Printed board assemblies – Part 4: Sectional specification – Requirements for terminal soldered assemblies*

IEC 61192-1, *Workmanship requirements for soldered electronic assemblies – Part 1: General*

IEC 61192-2, *Workmanship requirements for soldered electronic assemblies – Part 2: Surface-mount assemblies*

IEC 61192-3, *Workmanship requirements for soldered electronic assemblies – Part 3: Through-hole mount assemblies*

3 Terms and definitions

For the purposes of this part of IEC 61192, the definitions of IEC 60194 apply.

4 General requirements

The requirements of IEC 61192-1 are mandatory for this standard.

4.1 Classification

The classification of assemblies is divided into three levels, levels A, B, and C. Definitions of the classification categories and the status of product for each level are given in IEC 61192-1. In general, status is divided into three workmanship conditions as follows:

- a) Target
- b) Acceptable
- c) Nonconforming

4.2 Conflict

Accept and/or reject decisions shall be based on applicable documentation such as contracts, drawings, specifications and reference documents.

In the event of conflict, the following order of precedence shall apply:

- a) procurement documents as agreed between user and supplier;
- b) master assembly drawing;
- c) IEC 61191-1 and IEC 61192-1;
- d) this standard;
- e) other documents to the extent that they are specified in this standard.

4.3 Inspection technique

For visual inspection, individual specifications may call for magnification aids for examining printed-board assemblies.

Binocular vision should be used, and may be accomplished with a single large field magnifier. Magnification of at least 3× shall be used for conventional inserted printed board assemblies. Higher magnifications than 10× will not be found practicable for routine high-speed scanning inspection but will be needed sometimes for detailed diagnosis or referee purposes.

4.4 Interpretation of requirements

Unless otherwise specified by the user, the word "shall", signifies that the requirement is mandatory. Deviation from any "shall" requirement requires written acceptance by the user, for example via assembly drawing, specification or contract provision.

The words "should" and "may" reflect recommendations and guidance, respectively, and are used whenever it is intended to express non-mandatory provisions.

5 Process characterization

5.1 Wire preparation processes

Sufficient insulation shall be stripped from the wire or leads to provide for insulation clearances as specified. Chemical stripping agents shall be used for solid wire only and shall be neutralized or removed prior to soldering. After insulation removal, deformation of remaining insulation shall not exceed 20 % of the insulation thickness. In stripping insulation, care should be taken to avoid nicking or otherwise damaging the wire or the remaining insulation.

For level A or B assemblies, the number of damaged or severed strands in a single wire shall not exceed the limits given in Table 1. For wires used at a potential of 6 kV, or greater, or for level C assemblies, there shall be no broken strands; nicked strands shall be according to Table 1. Insulation discoloration resulting from thermal stripping is permissible.

Table 1 – Nicked or broken strand limits

Number of strand	Maximum allowable nicked or broken strands	
	Level A and B	Level C
Less than 7	0	0
7-15	1	0
16-18	2	0
19-25	3	0
26-36	4	0
37-40	5	0
41 or more	6	0

Portions of stranded wire which will be soldered shall be tinned prior to mounting. The solder shall penetrate to the inner strands of the wire and shall wet the tinned portion of the wire. Wicking of solder under the insulation shall be minimized.

5.2 Terminal mounting processes

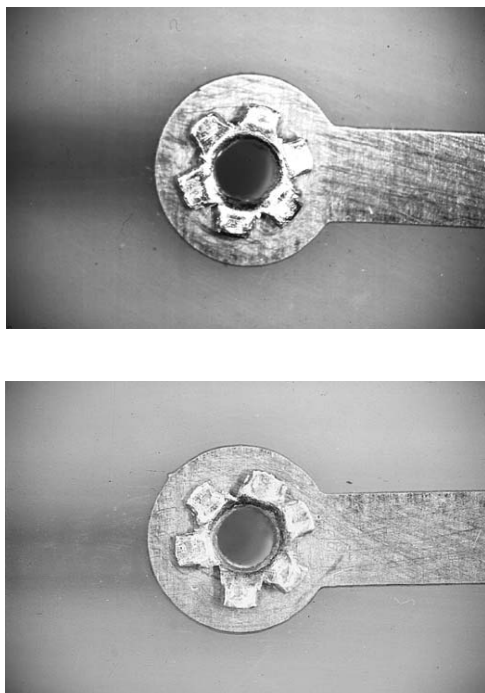
Terminals not connected to printed wiring or ground planes shall be of the rolled flange configuration (see Figure 1). A printed foil land may be used as a seating surface for a rolled flange provided that the land is isolated and not connected to active printed wiring or ground plane.

The shank of the terminal shall be neither perforated nor split, cracked, or otherwise discontinuous to the extent that oils, flux, inks, or other substances utilized for processing the printed board can be entrapped. Circumferential cracks or splits in the shank are not acceptable regardless of extent.

The rolled flange shall not be split, cracked, or otherwise discontinuous to the extent that flux, oils, inks, or other liquid substances utilized for processing the printed board can be entrapped within the mounting hole. After rolling, the rolled area shall be free of circumferential splits or cracks, but may have a maximum of three radial splits or cracks provided that the splits or cracks are separated by at least 90° and do not extend into the barrel of the terminal (see Figure 1).

Flared flange terminals shall be mounted in non-interfacial plated through-holes provided the mounting is in conjunction with a land or ground plane on the flared side as shown in Figure 2; they shall not be flared to the base material of the printed board. Funnel shoulder terminals shall not be used.

Flared flanges shall be formed to an included angle of between 35° and 120° and, shall extend between 0,4 mm and 1,5 mm beyond the surface of the land, provided minimum electrical spacing requirements are maintained and the flare diameter does not exceed the diameter of the land.



IEC 2918/02

Target – Level A, B, C

- 1 Funnel set uniformly, split and formed concentric to hole.

Acceptable – Level A, B

Nonconforming – Level C

- 1 Flange splits down to board but not into barrel.

Figure 1 – Funnel flange, controlled split