

Coatings for loaded printed wire boards (conformal coatings) —

Part 2: Methods of test

The European Standard EN 61086-2:2004 has the status of a
British Standard

ICS 29.035.20

National foreword

This British Standard is the official English language version of EN 61086-2:2004, including Corrigendum January 2005. It is identical with IEC 61086-2:2004. It supersedes BS EN 61086-2:1995 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/15, Insulating material, to Subcommittee GEL/15/3, Material specifications, 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 subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 20, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
15575 Corrigendum No. 1	28 April 2006	Corrections to Normative References, Clause 6.1.2, Clause 7.8.1.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 May 2004

© BSI 2006

ISBN 0 580 43792 2

**Coatings for loaded printed wire boards
(conformal coatings)
Part 2: Methods of test
(IEC 61086-2:2004)**

Revêtements appliqués
sur les cartes de câblage imprimées
(revêtements enrobants)
Partie 2: Méthodes d'essai
(CEI 61086-2:2004)

Beschichtungen für bestückte
Leiterplatten (conformal coatings)
Teil 2: Prüfverfahren
(IEC 61086-2:2004)

This European Standard was approved by CENELEC on 2004-04-01. 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

The text of document 15C/1546/FDIS, future edition 2 of IEC 61086-2, prepared by SC 15C, Specifications, of IEC TC 15, Insulating materials, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61086-2 on 2004-04-01.

This European Standard supersedes EN 61086-2:1994.

This edition, which is presented in a new layout, includes the following significant technical changes from EN 61086-2:1994:

- a) a new specimen A has been added;
- b) new cleaning and test procedures have been added.

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) | 2005-01-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2007-04-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61086-2:2004 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	4
1 Scope.....	5
2 Normative references	5
3 Test specimens	6
3.1 Specimen A.....	6
3.2 Specimen B.....	7
3.3 Specimen C.....	7
3.4 Specimen D.....	7
4 Environmental exposure of coated specimens	8
4.1 Thermal cycling – Method.....	8
4.2 Thermal shock – Method	8
4.3 Thermal ageing	8
4.4 Moisture resistance (damp heat)	8
4.5 Salt mist.....	8
4.6 Cold, low air pressure and damp heat (class 3 only).....	8
5 Test methods (uncured material)	9
5.1 Shelf life.....	9
6 Test methods for electrical properties (coated samples)	9
6.1 Breakdown voltage.....	9
6.2 High frequency dielectric properties (behaviour at resonance).....	9
6.3 Insulation resistance	9
7 Test methods for non-electrical properties (coated samples)	10
7.1 Visual examination	10
7.2 Thickness of coating.....	10
7.3 Fluorescence of coating	11
7.4 Tackiness (cure level of coating)	11
7.5 Flexibility.....	12
7.6 Flammability.....	12
7.7 Mould growth.....	12
7.8 Resistance to organic solvents	13
7.9 Coating removal	13
Annex A (normative) Specimen of coating material	17
Annex ZA (normative) Normative references to international publications with their corresponding European publications	19

INTRODUCTION

This International Standard forms part of a series under the general title *Coatings for loaded printed wire boards (conformal coatings)*.

The series consists of three parts:

Part 1: Definitions, classification and general requirements (IEC 61086-1)

Part 2: Methods of test (IEC 61086-2)

Part 3: Specifications for individual materials (IEC 61086-3)

COATINGS FOR LOADED PRINTED WIRE BOARDS (CONFORMAL COATINGS) –

Part 2: Methods of test

1 Scope

This part of IEC 61086 gives the methods of test for electrical insulating materials suitable for application as coatings for loaded printed wire boards (conformal coatings), both as uncured and after application to specific boards.

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 60068-2-10:1988, *Environmental testing – Part 2-10: Tests – Test J and guidance: Mould growth*

IEC 60068-2-11:1981, *Environmental testing - Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14:1984, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-39:1976, *Environmental testing – Part 2-39: Tests – Test Z/AMD: Combined sequential cold, low air pressure and damp heat test*

IEC 60058-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60243-1:1998, *Electric strength of insulating materials – Test methods – Part 1: Tests at power frequencies*

IEC 60243-2:1998, *Electric strength of insulating materials – Test methods – Part 2: Additional requirements for tests using direct voltage*

IEC 60249-1:1982, *Basic materials for printed circuits – Part 1: Test methods*

IEC 60455-2:1998, *Resin based reactive compounds used for electrical insulation – Part 2: Methods of test*

IEC 60707:1999, *Flammability of solid non-metallic materials when exposed to flame sources – List of test methods*

IEC 61086-1, *Specification for coatings for loaded printed wire boards (conformal coatings) – Part 1: Definitions, classification and general requirements*

IEC 61086-3 (all parts), *Coatings for loaded printed wire boards (conformal coatings) – Part 3: Specifications for individual materials*

IEC 61086-3-1, *Coatings for loaded printed wire boards (conformal coatings) – Part 3: Specifications for individual materials – Sheet 1: Coatings for general purpose (class I) and for high reliability (class II)*

ISO/DIS 1514:1984, *Paints and varnishes – Standard panels for testing*

ISO 1519: 2002, *Paints and varnishes – Bend test (cylindrical mandrel)*

ISO 2808: 1997, *Paints and varnishes – Determination of film thickness*

ISO 5636-3:1992, *Paper and board – Determination of air permeance (medium range) – Part 3: Bendtsen method*

3 Test specimens

3.1 Specimen A

3.1.1 Test panel

The test panel shall be as in Figure 1. It comprises

- a) an electrode comb for measurement of insulation resistance,
- b) a “Y” electrode for measurement of breakdown voltage,
- c) eight pads for measurement of thickness.

The main body of the panel shall be $(100 \pm 0,2)$ mm², with a connection tab $(84,0 \pm 0,2)$ mm x $(12,0 \pm 0,2)$ mm (see Figure 1). The reverse side of the panel shall be fully etched.

3.1.2 Preparation

3.1.2.1 Apparatus made of polyolefine or similar material is preferred for the preparation procedures. Apparatus made of borosilicate glass may also be suitable: it shall be checked by being rinsed in freshly prepared solvent (as in 3.1.2.2) immediately before use. Solvent contained in the apparatus shall not decrease in resistivity by more than 10 % over a period of (15 ± 1) min.

Apparatus used in this test shall be reserved for this use and not used for any other purpose.

3.1.2.2 The panel shall be cleaned in a solvent of 75 % propan-2-ol and 25 % deionized water. Before use, the solvent shall be passed through a mixed bed deionizer column: after this treatment, the conductivity of the solvent at (20 ± 2) °C shall be not more than $5,0 \mu\text{Sm}^{-1}$.

3.1.2.3 After cleaning, the panel shall be extracted with 320 ml of deionized solvent in accordance with 3.1.2.2. The panel shall be placed in a suitable funnel over a vessel of appropriate size and the solvent directed in a fine jet over it, washing both sides. The solvent flow rate shall be such that the extraction takes place over a time of at least 300 s. The conductivity of the extract shall then be measured at (20 ± 2) °C, using a suitable conductance meter with an accuracy of ± 5 % or better.

The conductivity of the extract shall be not greater than $50 \mu\text{Sm}^{-1}$.