IEC 61189-2-804

Edition 1.0 2023-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Test methods for electrical materials, printed board and other interconnection structures and assemblies –
Part 2-804: Test methods for time to delamination – T260, T288, T300

Méthodes d'essai pour les matériaux électriques, les cartes imprimées et autres structures d'interconnexion et ensembles –
Partie 2-804: Méthodes d'essai pour le temps de décollement interlaminaire – T260, T288, T300

IEC 61189-2-804:2023-08(en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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CONTENTS

FOREWORD 3
1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 Specimen preparation 5
5 Test specimens 5
6 Test equipment 6
7 Test procedure 6
8 Calculation 6
9 Report 7
Bibliography 8

Figure 1 – A typical plot for an epoxy material at an isothermal temperature of 260 °C 7

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TEST METHODS FOR ELECTRICAL MATERIALS, PRINTED BOARDS AND OTHER INTERCONNECTION STRUCTURES AND ASSEMBLIES –

Part 2-804: Test methods for time to delamination – T260, T288, T300

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IEC 61189-2-804 has been prepared by IEC technical committee TC 91: Electronics assembly technology. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
91/1874/FDIS	91/1894/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 61189 series, published under the general title *Test methods for electrical materials, printed boards and other interconnection structures and assemblies*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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TEST METHODS FOR ELECTRICAL MATERIALS, PRINTED BOARDS AND OTHER INTERCONNECTION STRUCTURES AND ASSEMBLIES –

Part 2-804: Test methods for time to delamination – T260, T288, T300

1 Scope

This part of IEC 61189 specifies a test method to determine the time to delamination of base materials and printed boards using a thermomechanical analyser (TMA). Temperatures used for this evaluation are typically 260 °C, 288 °C and 300 °C, but are not limited to these values.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60194-1, *Printed board design, manufacture and assembly – Vocabulary – Part 1: Common usage in printed board and electronic assembly technologies*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60194-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 Specimen preparation

Unless otherwise specified, a minimum of two specimens shall be tested. These specimens shall be taken from random locations of the material to be evaluated.

The edges of each specimen shall be smooth, this may necessitate sanding after etching.

5 Test specimens

Test specimens shall be unclad laminate material or a printed circuit board. It is acceptable to take specimens from multilayer printed boards with internal conductors present. For determination of a multilayer board's bond integrity, presence of internal conductors is preferred.

All copper shall be etched from the test specimens using standard industry methods.

The specimen shall be taken at a distance ≥ 25 mm from the edge of the material / circuit board being evaluated. The dimensions of the specimens shall be approximately 6,35 mm × 6,35 mm × thickness of the sample.

The specimen shall lie flat on the test surface, so all edges of the specimen shall be sanded, or equivalent, to make them smooth and free of burrs. Care should be taken that this process does not induce mechanical stresses or heat the specimen.

6 Test equipment

a) a Thermal Mechanical Analyser (TMA) with capability to determine a dimensional change within ± 0,001 mm over the defined temperature range;

b) an air circulating drying chamber capable of maintaining 105 °C ± 2 °C;

c) a low humidity drying cabinet or desiccator capable of maintaining an atmosphere less than 30 % RH at 23 °C;

d) a diamond cutting blade or wheel and suitable equipment for sanding the edges of the sample to achieve the smooth edges and desired sample size.

7 Test procedure

a) Calibrate the TMA instrument as per the manufacturer's guidelines.

b) Precondition the specimens for 2 h ± 0,25 h at 105 °C ± 2 °C, then allow to cool to room temperature in a low humidity drying cabinet or desiccator.

c) Once cooled, take the specimen from the low humidity drying cabinet and place it on to the stage of the TMA equipment. Care should be taken that the specimen is resting flat in the centre of the test stage.

d) The TMA probe is to be lowered onto the specimen and a force applied of 49 mN.

e) Lower the furnace around the test stage.

f) Begin the temperature scan; the start temperature is to be no greater than 30 °C.

g) The scan rate shall be maintained at 10 °C/ minute, unless specified otherwise.

h) Once the scan achieves the specified isothermal temperature (often 260 °C, 288 °C, or 300 °C) maintain at that temperature until failure occurs, or 10 minutes has elapsed, whichever occurs first (this will only be possible to detect if the TMA equipment has a real-time data display). If the isothermal temperature has not been specified, it shall be 260 °C.

8 Calculation

The time to delamination is defined as the time from the beginning of the isotherm to failure. Failure is deemed to be any incident or variation on the data plot where the specimen thickness is demonstrated to have altered irreversibly. Some materials will occasionally delaminate prior to the isotherm being reached. In cases of this type, record the temperature at the time failure occurred. Figure 1 shows a typical plot for an epoxy material at an isothermal temperature of 260 °C, including the point the irreversible change occurs.

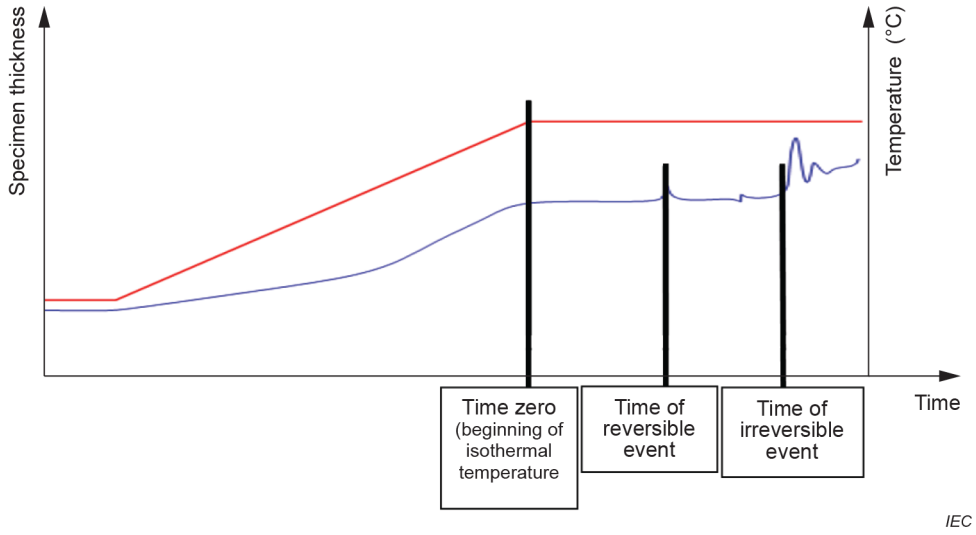

Figure 1 – A typical plot for an epoxy material at an isothermal temperature of 260 °C

9 Report

This report shall include the following information:

a) test method reference number and revision level;
b) name of the person performing the test;
c) date testing was conducted;
d) material tested – designation and description;
e) initial thickness of test specimen;
f) laboratory conditions (room temperature and relative humidity) at time of testing;
g) scan rate used;
h) isothermal temperature used for the test;
i) if a printed board was tested, the configuration of the test specimen;
j) any variations from the defined test method;
k) the time to delamination, as determined by referenced test method, and any important events.

Bibliography

IPC-TM-650 No. 2.4.24.1, *Time to Delamination (TMA Method)*

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