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BSI Standards Publication

Guidelines for the statistical analysis of ageing test data

Part 3: Minimum specimen numbers at different test conditions with given experimental data

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National foreword

This Published Document is the UK implementation of IEC/TR 60493-3:2017.

The UK participation in its preparation was entrusted to Technical Committee GEL/112, Evaluation and qualification of electrical insulating materials and systems.

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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TECHNICAL REPORT

colour inside

Guidelines for the statistical analysis of ageing test data – Part 3: Minimum specimen numbers at different test conditions with given experimental data

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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GUIDELINES FOR THE STATISTICAL ANALYSIS OF AGEING TEST DATA –

Part 3: Minimum specimen numbers at different test conditions with given experimental data

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IEC TR 60493-3, which is a Technical Report, has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
112/384/DTR	112/389/RVDTR

Full information on the voting for the approval of this Technical Report can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 60493 series, published under the general title *Guidelines for the statistical analysis of ageing test data*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The objective of this document is to clarify how a statistical analysis can be done even with a small number of samples.

When the scatter of data is sufficiently small, a statistical analysis should be possible. Generally, a statistical analysis applies to a larger number of samples similar to ordinary cases.

On the other hand, this document may be useful in clarifying how the scatter of a small number of data points can be used to estimate "lifetime" when the number of specimens is limited (e.g. around five) and there are few ageing conditions (e.g. two or three conditions).

Therefore, the aim is to document, for a small group of specimens with limited scatter of data, whether or not it is possible to estimate characteristics such as lifetime within a certain statistical error.

If such a simulation were available, it would be very helpful for users.

Manufacturers, for example, may prefer a new simplified, accelerated test method as an alternative to their current traditional test methods. A new test method would be easier and less expensive, especially if the specimens were small in size (dimension), although it may not be as suitable for large specimen sizes or expensive materials or devices (such as motors).

It would be very welcome if a statistical treatment method of this type, applying to a smaller number of specimens, were defined.

Though inappropriate cases are anticipated, this document deals with cases where such statistical treatment is appropriate.

GUIDELINES FOR THE STATISTICAL ANALYSIS OF AGEING TEST DATA –

Part 3: Minimum specimen numbers at different test conditions with given experimental data

1 Scope

This part of IEC 60493 clarifies how a statistical analysis can be done with a small number of samples.

This document will be useful when the accelerated test method is difficult to carry out, for example in cases where the dimensions of test specimens (including test devices) are very large in scale or the cost of test specimens is high. Testing is facilitated by enabling users to reduce the number of test specimens.

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 60493-1, *Guide for the statistical analysis of ageing test data – Part 1: Methods based on mean values of normally distributed test results*

IEC TR 60493-2, *Guide for the statistical analysis of ageing test data – Part 2: Validation of procedures for statistical analysis of censored normally distributed data*

IEC 62539, *Guide for the statistical analysis of electrical insulation breakdown data*

3 Terms, definitions, symbols and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60493-1, IEC TR 60493-2, and IEC 62539 apply.

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

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

3.2 Symbols

In this document, the following symbols are used.