



TECHNICAL REPORT



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

GUIDELINES FOR THE STATISTICAL ANALYSIS OF AGEING TEST DATA –

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

FOREWORD

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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- withdrawn,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.

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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*