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Long-term radiation ageing in polymers –

Part 3: Procedures for in-service monitoring of low-voltage cable materials

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LONG-TERM RADIATION AGEING IN POLYMERS –

Part 3: Procedures for in-service monitoring of low-voltage cable materials

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61244-3, which is a technical specification, was prepared by subcommittee 15E: Methods of test, of IEC technical committee 15: Insulating materials, which has now been merged with IEC technical committee 98: Electrical insulation systems into IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems (provisional title).

This second edition cancels and replaces the first edition, published in 1998, and constitutes a technical revision. The main technical changes with regard to the previous edition are as follows:

a) as there have been technical advances in established test methods and newer methods have become available, several additions have been made to the techniques available in Clause 5;
b) some of the techniques listed in the previous edition were found to be either unsuitable for use as cable monitoring methods in plants, or less sensitive to radiation ageing than other methods; these techniques have now been removed;
c) a list of abbreviations and their meanings has been added.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
15E/252/DTS	15E/258/RVC

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

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

IEC 61244 consists of the following parts, under the general title *Long-term radiation ageing in polymers*:

Part 1 Techniques for monitoring diffusion-limited oxidation

Part 2: Procedures for predicting ageing at low dose rates

Part 3: Procedures for in-service monitoring of low-voltage cable materials

The committee has decided that the contents of this publication will remain unchanged until the maintenance result dateindicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

Polymers are widely used as electric insulating materials (e.g. in cables for control, instrumentation and power) in environments in which they are exposed to radiation. In such applications, these materials may well be required to survive the full working life of the plant, which may be more than 40 years, and possibly accident conditions up to and at the end of their working life. Although considerable data are available on the behaviour of polymeric insulating materials under irradiation, there is still some uncertainty on the effects of long-term, low-dose rate irradiation such as would be experienced by cables. There is, therefore, a requirement for techniques for monitoring the state of degradation of cable materials *in situ* throughout the lifetime of the plant. Suitable cable monitoring techniques would also be important to surveillance programmes in support of plant life extension and licence renewal. Although this technical specification is primarily aimed at cable condition monitoring in radiation environments, it can also be applied to other polymeric components. Many of the techniques are equally applicable to thermal-only ageing of polymeric components.

LONG-TERM RADIATION AGEING IN POLYMERS –

Part 3: Procedures for in-service monitoring of low-voltage cable materials

1 Scope

This part of IEC 61244, which is a technical specification, summarizes the main cable monitoring techniques which are currently being assessed worldwide. These techniques are primarily aimed at monitoring degradation of low-voltage cables. Most of the methods are at the development stage and require more in-plant evaluation before they could be recommended as standard techniques. The advantages and disadvantages of each method, and its current state of development, are outlined in the following clauses.

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 60544-5:2003, *Electrical insulating materials – Determination of the effect of ionizing radiation – Part 5: Procedures for assessment of ageing in service*