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National foreword

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Guide explicatif et d'application pour les fusibles à haute tension

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

TUTORIAL AND APPLICATION GUIDE FOR HIGH-VOLTAGE FUSES

FOREWORD

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IEC 62655, which is a technical report, has been prepared by subcommittee 32A: High-Voltage Fuses, of IEC technical committee 32: Fuses

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

Enquiry draft	Report on voting
32A/296/DTR	32A/301/RVC

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

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The committee has decided that the contents of this publication will remain unchanged until the stability date indicated 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

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- withdrawn,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

INTRODUCTION

0.1 Aims and objectives of this technical report

a) To help prospective users and protection engineers understand the basics of high-voltage (>1 000 V a.c.) fuse technology and applications involving high-voltage (HV) fuses;

b) to illustrate the particular and unique advantages of fuse protection for most service applications;

c) to minimise possible misapplications of fuses which could lead to problems in the field;

d) to list and describe the many types of fuse in use today, and the international standards that apply to them, including fuse types not specifically included in IEC or other recognized standards.

This technical report gathers information previously published in IEC and other publications, as well as new material. Duplicate information presently in these publications is therefore likely to be eliminated during their future revision.

0.2 How to use this technical report

0.2.1 General

If read from start to finish, this technical report will provide an in-depth study of HV fuses and their applications. It is essentially a tutorial covering all common (and some not so common) types of fuses and most fuse applications. However, it is assumed that few users will read the technical report in this way, but rather read the appropriate sections covering fuses and applications for which they require information. Based on this assumption, there is therefore some inevitable duplication of information. To assist the user in making best use of the document, a description of the content and relevance of each clause follows.

0.2.2 Fuse tutorial

After clauses on scope, references and definitions, Clause 4 contains primarily "tutorial" style information. The clause starts with a simple introduction to fuses, first with an explanation of how fuses work followed by information on basic fuse classifications and common fuse terms. Subclause 4.1.4 continues with lists of advantages gained by using fuses and then 4.1.6 provides a listing of basic fuse types for which application information will be given later. An in-depth look at the most common types of fuses is given in 4.2, current-limiting fuses and 4.3 expulsion fuses. The high level of detail given in 4.2 and 4.3, including information describing construction, operation, classification and published ratings and characteristics, may be necessary in order to understand the application information that follows in Clause 5. For completeness, 4.4 gives an overview of less common types of fuse (or fuse related) devices that may require additional testing to that covered in existing standards, and for which no further application information is provided. Subclause 4.5 covers fuse mountings.

0.2.3 Application information

Application information appears in Clause 5 and Annex A, and is split into four sections.

a) Subclause 5.1: this covers information common to nearly all applications.

b) Subclause 5.2: this contains information on specific applications.

c) Subclause 5.3: this covers installation, operation, maintenance, and replacement of fuses.

d) Annex A: this reproduces the current-limiting fuse temperature de-rating information previously published in IEC 60282-1:2009.

If a knowledgeable user requires application information on a specific subject in 5.2 (e.g. motor circuit fuses), it is possible that only the relevant subclause needs to be read – however in most cases additional information from 5.1 will be required for satisfactory fuse selection. It should be emphasized that the information contained in this report is intended to supplement

information supplied by the manufacturer of a fuse and not replace it. If there is any doubt or conflict of information, the fuse manufacturer should be consulted.

TUTORIAL AND APPLICATION GUIDE FOR HIGH-VOLTAGE FUSES

1 Scope

This technical report provides information for understanding the construction, operation and application of high-voltage fuses in general. Current-limiting, expulsion, electronic, and other, non-current-limiting, fuses rated above 1 kV a.c. are all covered, as are North American, European and other application practices. As a technical report, this document contains no requirement and is informative only.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038, *IEC standard voltages*

IEC 60071-1, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60076-1, *Power transformers – Part 1: General*

IEC 60076-7, *Power transformers – Part 7: Loading guide for oil-immersed power transformers*

IEC 60076-12, *Power transformers – Part 12: Loading guide for dry-type power transformers*

IEC 60282-1:2009, *High-voltage fuses – Part 1: Current-limiting fuses*

IEC 60282-2:2008, *High-voltage fuses – Part 2: Expulsion fuses*

IEC 60549, *High-voltage fuses for the external protection of shunt power capacitors*

IEC 60644, *Specification for high-voltage fuse-links for motor circuit applications*

IEC/TR 60890:1987, *A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear*

IEC 60909-0, *Short-circuit currents in three-phase a.c. systems – Part 0: Calculation of currents*

IEC 62271-100:2012, *High-voltage switchgear and controlgear – Part 100: Alternating current circuit-breakers*

IEC 62271-102, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

IEC 62271-103, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*