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TECHNICAL SPECIFICATION

Selection and dimensioning of high-voltage insulators intended for use in polluted conditions –
Part 1: Definitions, information and general principles

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

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

IEC/TS 60815-1, which is a technical specification, has been prepared by IEC technical committee 36: Insulators.

This first edition of IEC/TS 60815-1 cancels and replaces IEC/TR 60815, which was issued as a technical report in 1986. It constitutes a technical revision and now has the status of a technical specification.

The following major changes have been made with respect to IEC/TR 60815:

- Encouragement of the use of site pollution severity measurements, preferably over at least a year, in order to classify a site instead of the previous qualitative assessment (see below).
- Recognition that “solid” pollution on insulators has two components, one soluble quantified by ESDD, the other insoluble quantified by NSDD.
- Recognition that in some cases measurement of layer conductivity should be used for SPS determination.
- Use of the results of natural and artificial pollution tests to help with dimensioning and to gain more experience in order to promote future studies to establish a correlation between site and laboratory severities.
- Recognition that creepage length is not always the sole determining parameter.
- Recognition of the influence other geometry parameters and of the varying importance of parameters according to the size, type and material of insulators.
- Recognition of the varying importance of parameters according to the type of pollution.
- The adoption of correction factors to attempt to take into account the influence of the above pollution and insulator parameters.

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

Enquiry draft	Report on voting
36/264/DTS	36/270/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.

A list of all the parts in the future IEC 60815 series, under the general title *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

- 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.

SELECTION AND DIMENSIONING OF HIGH-VOLTAGE INSULATORS INTENDED FOR USE IN POLLUTED CONDITIONS –

Part 1: Definitions, information and general principles

1 Scope and object

IEC/TS 60815-1, which is a technical specification, is applicable to the selection of insulators, and the determination of their relevant dimensions, to be used in high-voltage systems with respect to pollution. For the purposes of this technical specification, the insulators are divided into the following broad categories, each dealt with in a specific part as follows:

– IEC/TS 60815-2 – Ceramic and glass insulators for a.c. systems;

– IEC/TS 60815-3 – Polymeric insulators for a.c. systems;

– IEC/TS 60815-4 – *equivalent to 60815-2 for d.c. systems*[1];

– IEC/TS 60815-5 – *equivalent to 60815-3 for d.c. systems*[1].

This part of IEC 60815 gives general definitions, methods for the evaluation of pollution site severity (SPS) and outlines the principles to arrive at an informed judgement on the probable behaviour of a given insulator in certain pollution environments.

This technical specification is generally applicable to all types of external insulation, including insulation forming part of other apparatus. The term “insulator” is used hereafter to refer to any type of insulator.

CIGRE C4 documents [1], [2], [3][2], form a useful complement to this technical specification for those wishing to study in greater depth the performance of insulators under pollution.

This technical specification does not deal with the effects of snow, ice or altitude on polluted insulators. Although this subject is dealt with by CIGRE [1], [4], current knowledge is very limited and practice is too diverse.

The object of this technical specification is to

- understand and identify parameters of the system, application, equipment and site influencing the pollution behaviour of insulators,
- understand and choose the appropriate approach to the design and selection of the insulator solution, based on available data, time and resources,
- characterize the type of pollution at a site and determine the site pollution severity (SPS),
- determine the reference unified specific creepage distance (USCD) from the SPS,
- determine the corrections to the “reference” USCD to take into account the specific properties (notably insulator profile) of the "candidate" insulators for the site, application and system type,
- determine the relative advantages and disadvantages of the possible solutions,
- assess the need and merits of "hybrid" solutions or palliative measures,
- if required, determine the appropriate test methods and parameters to verify the performance of the selected insulators.

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1 At the time of writing these projects have yet to be initiated.

2 References in square brackets refer to the bibliography.

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 60038, *IEC standard voltages*

IEC 60050-471, *International Electrotechnical Vocabulary – Part 471:Insulators*

IEC 60305, *Insulators for overhead lines with a nominal voltage above 1 000 V – Ceramic or glass insulator units for a.c. systems – Characteristics of insulator units of the cap and pin type*

IEC 60433, *Insulators for overhead lines with a nominal voltage above 1 000 V – Ceramic insulators for a.c. systems – Characteristics of insulator units of the long rod type*

IEC 60507:1991, *Artificial pollution tests on high-voltage insulators to be used on a.c. systems*

IEC/TR 61245, *Artificial pollution tests on high-voltage insulators to be used on d.c. systems*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms, definitions and abbreviations apply. The definitions given below are those which either do not appear in IEC 60050-471 or differ from those given in IEC 60050-471.

3.1.1
reference cap and pin insulator
U120B or U160B cap and pin insulator (according to IEC 60305) normally used in strings of 7 to 9 units to measure site pollution severity

3.1.2
reference long rod insulator
L100 long rod insulator (according to IEC 60433) with plain sheds without ribs used to measure site pollution severity having a top angle of the shed between 14° and 24° and a bottom angle between 8° and 16° and at least 14 sheds

3.1.3
insulator trunk
central insulating part of an insulator from which the sheds project

NOTE Also known as shank on smaller diameter insulators.

3.1.4
shed
projection from the trunk of an insulator intended to increase the creepage distance

NOTE Some typical shed profiles are illustrated in 9.3.

3.1.5
creepage distance
shortest distance, or the sum of the shortest distances, along the insulating parts of the insulator between those parts which normally have the operating voltage between them