INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDE 111

Second edition
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Electrical high-voltage equipment in high-voltage substations – Common recommendations for product standards

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ELECTRICAL HIGH-VOLTAGE EQUIPMENT IN HIGH-VOLTAGE SUBSTATIONS – COMMON RECOMMENDATIONS FOR PRODUCT STANDARDS

FOREWORD

This second edition of IEC Guide 111 has been prepared in accordance with Annex A of Part 1 of the ISO/IEC Directives by an *ad hoc* group of the Standardization Management Board set up to harmonize characteristics for substation standards.

It constitutes a technical revision of the first edition, published in 1998. This edition has been amended to express more clearly the guidance being provided to product committees and contains corrected and completed technical material and references.

The text of this guide is based on the following documents:

Approval document	Report on voting
C/1325/DV	C/1334/RV

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

INTRODUCTION

This Guide is for use by technical committees (TCs) involved in high-voltage (HV) substation systems, such as:

TC 13, TC 14, TC 17, TC 20, TC 22, TC 28, TC 32, TC 33, TC 36, TC 37, TC 38, TC 57, TC 95, TC 99.

It is of paramount importance that the IEC, through this Guide, finds a way to overcome the lack of consistency and unnecessary discrepancies between standards within one system, even though a few discrepancies might be justified in certain cases according to the specificity of a given product or situation.

Furthermore, the cost of over-standardization of one component when the nearest linked component is under-standardized should be considered. The supplementary cost does not in any way increase the reliability of the system as a whole.

Since the same external stresses (climatic, electrical, mechanical) apply to all the components of the substations, the consistency of their technical features is vital.

Hence, standards will deal more and more with the same essential requirements for safety, environmental impact, end of life, availability and integration of systems. All product standards for a single system have to fulfil these requirements with the same degree of responsibility.

The aim of this Guide is to provide common rules for HV substation equipment.

ELECTRICAL HIGH-VOLTAGE EQUIPMENT IN HIGH-VOLTAGE SUBSTATIONS – COMMON RECOMMENDATIONS FOR PRODUCT STANDARDS

1 Scope

IEC Guide 111 is a horizontal publication which gives guidance for the harmonization of product and system standards within substations where the highest voltage for equipment is higher than 1 kV. It primarily addresses conventional a.c. equipment which is found in high-voltage (HV) substations in most cases.

This Guide contains recommendations for common specifications for all HV substation product standards, each of which is augmented by the technical background specific to each TC, which naturally retains freedom in its technical choices.

Where HV power electronic equipment is part of an HV substation, for example, HVDC or SVC, economics and technology dictate a deviation from common clauses as standardized for a.c. equipment. However, when developing product standards for HV power electronic equipment for use in HV substations, the common recommendations of this Guide should be adopted as far as possible.

Clearly, any specification in this guide which is inapplicable to a certain type of product, because of that product's inherent characteristics, for example, should not be taken into account when writing standards for that type of product.

2 Reference documents

IEC 60027-1, *Letter symbols to be used in electrical technology – Part 1: General*

IEC 60038, *IEC standard voltages*

IEC 60059, *IEC standard current ratings*

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60068 (all parts), *Environmental testing*

IEC 60068-2-18, *Environmental testing – Part 2-18: Tests – Test R and guidance: Water*

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

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

IEC 60071-2, *Insulation co-ordination – Part 2: Application guide*

IEC 60216 (all parts), *Electric insulating materials – Properties of thermal endurance*

IEC 60296, *Specification for unused mineral insulating oils for transformers and switchgear*

IEC 60376, *Specification and acceptance of new sulphur hexafluoride*

IEC 60417 (all parts), *Graphical symbols for use on equipment*

IEC 60480, *Guide to the checking of sulphur hexafluoride (SF_6) taken from electrical equipment*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60694, *Common specifications for high-voltage switchgear and controlgear standards*

IEC 60695, *Fire hazard testing*

IEC 60721 (all parts), *Classification of environmental conditions*

IEC 60721-1, *Classification of environmental conditions – Part 1: Environmental parameters and their severities*

IEC 60721-2-2, *Classification of environmental conditions – Part 2-2: Environmental conditions appearing in nature – Precipitation and wind*

IEC 60721-2-4, *Classification of environmental conditions – Part 2-4: Environmental conditions appearing in nature -- Solar radiation and temperature*

IEC 60721-2-6, *Classification of environmental conditions – Part 2-6: Environmental conditions appearing in nature – Earthquake vibration and shock*

IEC 60826, *Loading and strength of overhead transmission lines*

IEC 60867, *Insulating liquids – Specifications for unused liquids based on synthetic aromatic hydrocarbons*

IEC 60943, *Guidance concerning the permissible temperature rise for parts of electrical equipment, in particular for terminals*

IEC 61000-6-5, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards – Immunity for power station and substation environments*

IEC 61180-1, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 62155: *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltage greater than 1 000 V*

CISPR 11, *Industrial scientific and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*

CISPR 18-2, *Radio interference characteristics of overhead power lines on high-voltage equipment – Part 2: Methods of measurement and procedure for determining limits*

IEC Guide 109, *Environmental aspects – Inclusion in electrotechnical standards*

ISO 1996-1, *Acoustics – Description and measurement of environmental noise – Part 1: Basic quantities and procedures*