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TECHNICAL REPORT

Planning of HVDC systems

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FOREWORD

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IEC TR 63179 has been prepared by IEC technical committee 115: High Voltage Direct Current (HVDC) transmission for DC voltages above 100 kV. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
115/418/DTR	115/427/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This document provides technical information for planning high-voltage direct current (HVDC) systems with line-commutated converters (LCC), voltage sourced converters (VSC), or both. It provides general principles for deciding between HVDC and AC transmission systems, as well as processes and methods for preliminarily defining the HVDC transmission scheme, including selection of converter type and key parameters, grid stability analysis, and technical-economic comparison among various solutions. In addition, this document gives the objectives to be achieved in the planning phase.

This document is applicable for planning a point-to-point or a back-to-back HVDC system.

This document can also be used for DC grid systems (including multi-terminal HVDC systems) as a reference.

This document is not exhaustive. It is possible that there are other specific aspects, that are particularly important for a specific HVDC project.

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 60633, *High-voltage direct current (HVDC) transmission - Vocabulary*

IEC 62747, *Terminology for voltage-sourced converters (VSC) for high-voltage direct current (HVDC) systems*

Bibliography

IEC 60050-601, *International Electrotechnical Vocabulary (IEV) - Part 601: Generation, transmission and distribution of electricity - General*

IEC TR 60919-1, *Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 1: Steady-state conditions*

IEC TR 62001 (all parts), *High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters*

IEC TS 62344, *Design of earth electrode stations for high-voltage direct current (HVDC) links - General guidelines*

IEC TR 62672, *Reliability and availability evaluation of HVDC systems*

IEC TR 62681, *Electromagnetic performance of high voltage direct current (HVDC) overhead transmission lines*

IEC TR 63127, *Guideline for the system design of HVDC converter stations with line-commutated converters*

IEC TS 63471, *DC voltages for HVDC grids*

CIGRE Technical Brochure No. 068, *Guide for planning DC links terminating at AC locations having low short-circuit capacities. Part 1. AC/DC interaction phenomena*

CIGRE Technical Brochure No. 115, Gu*ide for planning DC links terminating at AC system locations having low short-circuit capacities. Part II: Planning guidelines*

CIGRE Technical Brochure No. 186, *Economic assessment of HVDC links*

CIGRE Technical Brochure No. 269*, VSC Transmission*

CIGRE Technical Brochure No. 352, *Capacitor commutated converted (CCC) HVDC interconnections - Digital modeling and benchmark circuit*

CIGRE Technical Brochure No. 364, *Systems with multiple DC infeed*

CIGRE Technical Brochure No. 388, *Impacts of HVDC lines on the economics of HVDC projects*

CIGRE Technical Brochure No. 417, *Technological assessment of 800kV HVDC applications*

CIGRE Technical Brochure No. 492, *Voltage source converter* (*VSC) HVDC for power transmission – Economic aspects and comparison with other AC and DC technologies*

CIGRE Technical Brochure No. 508, *HVDC environmental planning guidelines*

CIGRE Technical Brochure No. 950, *Hybrid LCC/VSC HVDC systems*

EPRI Report*, HVDC system control for damping of subsynchronous oscillations, EPRI EL-2708, Final Report, October 1982*

IEEE Std 1204-1997, *IEEE guide for planning DC links terminating at AC locations having low short-circuit capacities*

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