

CONSOLIDATED VERSION



High-voltage direct current (HVDC) power transmission using voltage sourced converters (VSC)



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HIGH-VOLTAGE DIRECT CURRENT (HVDC) POWER TRANSMISSION USING VOLTAGE SOURCED CONVERTERS (VSC)

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In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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

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HIGH-VOLTAGE DIRECT CURRENT (HVDC) POWER TRANSMISSION USING VOLTAGE SOURCED CONVERTERS (VSC)

1 Scope

This technical report gives general guidance on the subject of voltage-sourced converters used for transmission of power by high voltage direct current (HVDC). It describes converters that are not only voltage-sourced (containing a capacitive energy storage medium and where the polarity of d.c. voltage remains fixed) but also self-commutated, using semiconductor devices which can both be turned on and turned off by control action. The scope includes 2-level and 3-level converters with pulse-width modulation (PWM), along with multi-level converters, *modular multi-level converters and cascaded two-level converters*, but excludes 2-level and 3-level converters operated without PWM, in square-wave output mode.

HVDC power transmission using voltage sourced converters is known as “VSC transmission”.

The various types of circuit that can be used for VSC transmission are described in the report, along with their principal operational characteristics and typical applications. The overall aim is to provide a guide for purchasers to assist with the task of specifying a VSC transmission scheme.

Line-commutated and current-sourced converters are specifically excluded from this report.

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 60633, Terminology for high-voltage direct current (HVDC) transmission~~

IEC 61975, *High-voltage direct current (HVDC) installations – System tests*

IEC 62501, *Voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) power transmission – Electrical testing*

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

IEC 62751 (all parts), *Power losses in voltage sourced converter (VSC) valves for high voltage direct current (HVDC) systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62747, IEC 62501 and the following apply.

3.1 General

Basic terms and definitions for voltage sourced converters used for HVDC transmission are given in IEC 62747. Terminology on electrical testing of VSC valves for HVDC transmission is given in IEC 62501.