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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 30553-2023

Replacing GB/T 30553-2014

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

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting:

This document replaces GB/T 30553-2014 "High Voltage DC Transmission Based on Voltage Source Converter" and is consistent with GB/T 30553-2014 in addition to structural adjustments and editorial changes, the main technical changes are as follows:

---Added "modular multi-level converter and cascaded two-level converter" (see Chapter 1);

---Added reference standards IEC 62747 and IEC 62501 (see Chapter 3) for terminology and definition needs;

---Changed the content of "Overview" in Chapter 3 (see 3.1, 3:1 of the:2014 version);

---Deleted the terms "VSC converter station", "connecting transformer", "phase reactor", "AC system side harmonic filter" and "high frequency blocking filter" "Reactor", "Common mode suppression reactor", "DC harmonic filter" and "DC reactor" and "Power

semiconductor" "VSC topology" Terms such as "operating status" and "insulation coordination" (see 3.5:1~3:5:3, 3:5:5, 3:5:7 and 3:5:9~3:5:11 of the:2014 edition) 3:3, 3:4, 3:6 and 3:10);

---Change the term "valve side harmonic filter" to "converter side high frequency filter", and the English equivalent of the term "standby" to "no-loadoperating", "noloadoperating" changed to "idling" (see 3.3:3, 3:4:2 and 3:4:3,:2014 version 3:5:8, 3:11:2 and 3:11:3);

---Added active power and reactive power calculation formulas, changed "The principle of reactive power control is shown in Figure 4" to "When the active power when the rate $P=0$, the principle of reactive power control is shown in Figure 4" (see 4.1:2:2 and 4:1:2:3, 4:1:2:2 and:2014 version 4:1:2:3);

---Changed Figure 7, Figure 8, Figure 9 and Figure 10 (see 4.3:3:3, 4:3:4 and 4:3:5,:2014 version of 4:3:3:3, 4:3:4 and 4:3:5);

---Changed the content of "bipolar wiring method" (see 4.3:4,:2014 version of 4:3:4);

---Changed the content of "Semiconductor Devices for VSC Power Transmission" (see 4.4,:2014 version of 4:4);

---Changed Figure 13 and Figure 15, and changed "The neutral point voltage is the voltage at the midpoint of the DC capacitor" to "The neutral point voltage is the average voltage at the two DC terminals of the converter" (see 5.2:3:1 and 5:2:3:2, 5:2:3:1 and 5:2:3:2 of the:2014 edition);

---Change "Valve voltage is the sum of these VSC valve stage voltages" to "Valve voltage is the capacitor voltage of the active submodule (i.e. the capacitor voltage is applied to the main terminals of the VSC valve stage)", adding a third topology used by the VSC valve stage (See 5.3:1,:2014 version of 5:3:1);

---Changed Figure 18, Figure 19, Figure 20, and the applicable scope of the MMC topology based on the full-bridge VSC valve stage (see 5.3:2 and 5:3:3,:2014 version of 5:3:2 and 5:3:3);

---Added "CTL topology based on half-bridge VSC subunit" and "CTL topology based on full-bridge VSC subunit" Relevant content (see 5.3:4 and 5:3:5);

---Changed the VSC valve rated current, transient current and voltage design points (see 5.4:2 and 5:4:3,:2014 version of 5:4:2 and 5:4:3);

---Changed "switching device" to "switchable semiconductor device" and changed the design of the converter with "controllable voltage source" type VSC valve Key points (see 5.4:5,:2014 version of 5:4:5);

---Added the role and arrangement of subunit DC capacitors and valve reactors (see 5.6:1 and 5:6:7);

---Changed the configuration of the VSC converter station circuit breaker, as well as the design requirements for connecting transformers and phase reactors (see 5.6:3 and 5.6:6, 2014 version 5:6:3 and 5:6:6);

---Changed the content of sub-module capacitor voltage balance control (see 5.6:8:2:5, 2014 version of 5:6:8:2:5);

---Deleted the relevant content of "common mode suppression reactor" (see 5.6:10 of the 2014 version);

---Added "dynamic energy dissipation system" related content (see 5.6:12);

---Change "DC side chopper circuit" to "dynamic energy dissipation system" (see 6.6, 2014 version of 6:6);

---Changed the content related to harmonic performance (see 9.1, 2014 version of 9:1);

---Deleted the description of Figure 29, Figure 30 and its description (see 9.3:1 of the 2014 version);

---The content related to specific harmonic modulation has been changed and moved to Appendix B (see Appendix B, 2014 version 9:3:2):

This document is equivalent to IEC TR62543:2022 "High Voltage DC Transmission Based on Voltage Source Converter": The file type is produced by IEC technology:

The report is adjusted to my country's national standards:

This document has made the following minimal editorial changes:

---For ease of use, a "Note" has been added to the "Scope" chapter (see Chapter 1);

---For ease of use, the indexing number description is added in Figure 4, Figure 26, Figure 27 and Figure 28 (see Figure 4, Figure 26, Figure 27 and Figure 28);

---Correct the text symbol " ϕ " of the angle in Figure 3 to " δ " (see 4.1:2:2);

---Correct the text symbol " U_d " for DC capacitor voltage to " U_{dc} " (see 4.1:3):

Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents:

1 Scope

This document gives general guidelines for voltage source converters (VSC) for HVDC transmission: The converter described in this document is not only an electrical Voltage source type (including capacitive energy storage medium whose DC voltage polarity remains unchanged), and also includes the use of semi-circuit energy storage medium that