

INTERNATIONAL STANDARD



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



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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VALVES FOR HIGH-VOLTAGE DIRECT CURRENT (HVDC)
POWER TRANSMISSION – ELECTRICAL TESTING****FOREWORD**

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This commented version (CMV) of the official standard IEC 62501:2024 edition 2.0 allows the user to identify the changes made to the previous IEC 62501:2009+AMD1:2014+AMD2:2017 CSV edition 1.2. Furthermore, comments from IEC SC 22F experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

IEC 62501 has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2009, Amendment 1:2014 and Amendment 2:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Conditions for use of evidence in lieu are inserted as a new Table 1;
- b) Test parameters for valve support DC voltage test, 7.3.2, and MVU DC voltage test, 8.4.1, updated;
- c) AC-DC voltage test between valve terminals, Clause 9, is restructured and alternative tests, by individual AC and DC voltage tests, added in 9.4.2;
- d) Partial discharge test in routine test program is removed;
- e) More information on valve component fault tolerance, Annex B, is added;
- f) Valve losses determination is added as Annex C.

The text of this International Standard is based on the following documents:

Draft	Report on voting
22F/731/CDV	22F/748A/RVC

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 International Standard 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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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VOLTAGE SOURCED CONVERTER (VSC) VALVES FOR HIGH-VOLTAGE DIRECT CURRENT (HVDC) POWER TRANSMISSION – ELECTRICAL TESTING

1 Scope

This International Standard applies to self-commutated converter valves, for use in a three-phase bridge voltage sourced converter (VSC) for high voltage DC power transmission or as part of a back-to-back link, and to dynamic braking valves. It is restricted to electrical type and production tests.

~~The scope of this standard includes the electrical type and production tests of dynamic braking valves which may be used in some HVDC schemes for d.c. overvoltage limitation.~~

This document can be used as a guide for testing of high-voltage VSC valves used in energy storage systems (ESS). **1**

The tests specified in this document are based on air insulated valves. ~~For other types of valves, The test requirements and acceptance criteria should be agreed between the purchaser and the supplier.~~ The test requirements and acceptance criteria can be used for guidance to specify the electrical type and production tests of other types of valves.

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 60060 (all parts), *High-voltage test techniques*

IEC 60071 (all parts), *Insulation co-ordination*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60700-1:2015, *Thyristor valves for high voltage direct current (HVDC) power transmission – Part 1: Electrical testing*
IEC 60700-1:2015/AMD1:2021

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

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses: