# IEC 61975

Edition 1.2 2022-10
CONSOLIDATED VERSION

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## High-voltage direct current (HVDC) installations – System tests

## Installations en courant continu à haute tension (CCHT) – Essais systèmes

IEC 61975:2010-07+AMD1:2016-09+AMD2:2022-10 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# HIGH-VOLTAGE DIRECT CURRENT (HVDC) INSTALLATIONS – SYSTEM TESTS

## FOREWORD

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**IEC 61975 edition 1.2 contains the first edition (2010-07) [documents 22F/221/FDIS and 22F/227/RVD], its amendment 1 (2016-09) [documents 22F/375/CDV and 22F/394A/RVC] and its amendment 2 (2022-10) [documents 22F/670/CDV and 22F/691/RVC].**

**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.**

International Standard IEC 61975 has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

This version constitutes a technical revision incorporating engineering experience.

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

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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# INTRODUCTION

The standard is structured in eight clauses:

~~a)~~ Clause 1 – Scope

~~b)~~ Clause 2 – Normative references

~~c)~~ Clause 3 – Terms and definitions

~~d)~~ Clause 4 – ~~General~~ Objectives of system tests

~~e)~~ This clause addresses the purpose of this standard, the HVDC system structure, the control and protection structure, the logical steps of commissioning, the structure of the system test and that of the system commissioning standard.

~~f)~~ Clause 5 – Converter station test

~~g)~~ This clause addresses the commissioning of converter units and verifies the steady state performance of units as well as switching tests.

~~h)~~ Clause 6 – ~~Power~~ Transmission tests

~~i)~~ This clause concerns the commissioning of the transmission system, and verifies station coordination, steady-state and dynamic performance, interference, as well as interaction between the ~~d.c.~~ DC and ~~a.c.~~ AC systems.

~~j)~~ Clause 7 – Trial operation

~~k)~~ After completion of the system test, the period of trial operation is normally specified to verify the normal transmission.

~~l)~~ Clause 8 – System test plan and documentation

Clauses 5 to 7 comprise individual sections providing an introduction and covering ~~objects~~ objectives, preconditions and procedures and general acceptance criteria as well as detailed descriptions of the individual tests.

# HIGH-VOLTAGE DIRECT CURRENT (HVDC) INSTALLATIONS – SYSTEM TESTS

## 1 Scope

This International Standard applies to system tests for high-voltage direct current (HVDC) installations which consist of a sending terminal and a receiving terminal, each connected to an ~~a.c.~~ AC system.

The tests specified in this standard are based on bidirectional monopolar and bipolar high-voltage direct current (HVDC) installations which consist of a sending terminal and a receiving terminal, each connected to an ~~a.c.~~ AC system. The test requirements and acceptance criteria should be agreed for back-to-back installations, while multi-terminal systems and voltage sourced converters are not included in this standard. For monopolar HVDC installations, the standard applies except for bipolar tests.

For the special functions or performances that are claimed by specific projects, ~~some~~ extra test items not included in this standard should be added according to the technical specification requirements.

This standard only serves as a guideline to system tests for high-voltage direct current (HVDC) installations. The standard gives potential users guidance, regarding how to plan commissioning activities. The tests described in the guide may not be applicable to all projects, but represent a range of possible tests which should be considered.

Therefore, it is preferable that the project organization establishes the individual test program based on this standard and in advance assigns responsibilities for various tasks/tests between involved organisations (e.g. user, supplier, manufacturer, operator, purchaser etc.) for each specific project.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For ~~updated~~ undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60633:~~1998~~2019, ~~*Terminology for*~~ *High-voltage direct current (HVDC)* ~~*power*~~ *transmission – Vocabulary*

IEC/TR 60919-2:2008, *Performance of high-voltage direct current (HVDC) systems with line commutated converters – Part 2: Faults and switching*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60633 as well as the following terms and definitions apply.

### 3.1 Test classifications terms

**3.1.1**
**converter station tests**
converter station system test including items which verify the function of individual equipment of the converter staton in energized state