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Unified power flow controller (UPFC) installations - System tests

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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UNIFIED POWER FLOW CONTROLLER (UPFC) INSTALLATIONS – SYSTEM TESTS

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IEC TR 63500 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 a Technical Report.

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

Draft	Report on voting
22F/781/DTR	22F/795/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.

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

- reconfirmed,
- withdrawn, or
- revised.

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INTRODUCTION

IEC TR 63262:2019 introduces the importance of the system tests of unified power flow controller (UPFC) installations and gives the test items of the system tests. However, the details of the system tests of UPFC installations, including test methods and test procedures, are not given. For the commercial use of UPFC installations, this document provides the details of the system tests of UPFC installations for reference. The system tests are to verify the quality of UPFC after on-site installation and integration, the coordination between a UPFC installation and the grid, the fault ride-through performance of the UPFC installation and so on, which make the commercial operation of the UPFC installation more efficient and safer.

This document summarizes the system test experience of the existing UPFC projects, and the content has been verified by several years of stable operation of the UPFC projects.

UNIFIED POWER FLOW CONTROLLER (UPFC) INSTALLATIONS – SYSTEM TESTS

1 Scope

This document provides the general information, items, conditions, and evaluation of test results for on-site system tests of unified power flow controller (UPFC) installations based on modular multi-level converter (MMC) technology. For special functions or performances that are claimed by specific projects, some extra test items not included in this document can be added according to the technical specification.

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 TR 63262:2019, *Performance of unified power flow controller (UPFC) in electric power systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TR 63262 and the following apply.

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
unified power flow controller
UPFC
equipment which has two (or more) voltage sourced converters (VSCs) sharing common DC bus connected to the transmission system in parallel and in series, and can control the line impedance, voltage amplitude and phase angle at the same time

[SOURCE: IEC TR 63262:2019, 3.1.1]

3.2
system test
test verifying functions and performances of UPFC installations as a whole as well as the interaction with adjacent AC systems

[SOURCE: IEC 61975:2010 and IEC 61975:2010/AMD1:2016, 3.1.2, modified – The words "HVDC system" have been changed to "UPFC installations".]

3.3
converter unit test
test verifying functions and performances of converter units, including the shunt unit and series unit