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

GB/T 311.3-2017

Replacing GB/T 311.3-2007

**Insulation co-ordination -- Part 3: Procedures for high-voltage
direct current (HVDC) converter stations**

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Foreword

2014 reg number reference table.

2011 instead of IEC /T S60815-1.2008, IEC /T S60815-2.2008, IEC /T S60815-3.2008.

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Foreword

"Insulation coordination" is divided into four parts.

--- Part 1. Definitions, principles and rules;

--- Part 2. Guide to use;

--- Part 3. HVDC converter station insulation coordination procedures;

--- Part 4. Grid insulation coordination and simulation of the calculation guidelines.

This section is "Insulation Coordination," the third part.

This section drafted in accordance with GB/T 1.1-2009 given rules.

This Part replaces GB/T 311.3-2007 "Insulation coordination with Part 3. HVDC converter insulation coordination procedures." versus

GB/T 311.3-2007 compared to editorial changes in addition to the main technical changes are as follows.

--- Added the terms "insulation coordination" "nominal DC voltage" "maximum DC voltage" "creepage distance" "uniform creepage distance" "Paul

Guarding distance "" performance index "(see 3.1, 3.2, 3.3, 3.19, 3.20, 3.21, 3.22);

--- Increased fault events and arrester stress summary (see 8.5);

--- In order to reflect the design and operation experience of +/- 800kVHVDC transmission project over-voltage protection and insulation coordination, refer to Q/GDW

144 "+/- 800kV UHVDC converter station over-voltage protection and insulation coordination guidelines" added double 12-pulse converter lightning protection

Device layout, the parameters of the selection principles and methods related content. Listed out to determine the double 12 converter converter surge arrester protection level, with

Overvoltage forms, causes and calculations of currents and energies. Main factors to be considered (see Chapter 8);

--- Increase the converter station control and protection model to study the factors that need to be considered before the retarding wave (see 10.3.5);

--- Re-integration of the contents of the creepage distance, and added the relevant description (see Chapter 11, the.2007 edition of 7.6,8.1,8.2,8.3)

--- Re-integration of the information on the air gap of the converter station with the addition of the relevant description (see Chapter 12, 7.7, 8.4 of the.2007 edition);

--- Increased DC line and ground line over-voltage protection and insulation coordination (see Chapter 13).

This section uses the redrafted law to amend the use of IEC 60071-5.2014 "insulation coordination with Part 5. HVDC converter insulation with

Combined procedures. "

This part of the structure compared with IEC 60071-5.2014 compared to more adjustment, Appendix A lists this section and IEC 60071-5.

2014 reg number reference table.

This section there are technical differences compared with IEC 60071-5.2014, the provisions of these differences have been passed in the outer margin of its margin

The vertical single line (|) of the position is marked.

This part of IEC 60071-5.2014 technical differences and the reasons are as follows.

--- On the normative references, this section made a technical difference with the adjustment to adapt to China's technical conditions, adjust the situation

Concentration reflected in the second chapter "Normative references", the specific adjustments are as follows.

* increase the reference GB/T 22389, GB /Z 24842-2009, GB/T 25083-2010, GB/T 50064-2014,

DL/T 5224-2014, IEC 60099-9;

* Replacing IEC 60071-1.2006 with GB 311.1-2012 modified to adopt international standards;

- * GB/T 311.2-2013 modified to adopt international standards instead of IEC 60071-2.1996;
- * Replacing IEC 60099-4.2006 with GB 11032-2010 modified to adopt international standards;
- * Equivalent to the international standard GB/T 13498 instead of IEC 60633.1998;
- * Replaced GB/T 16927.1-2011 replacing IEC 60060-1.2010 with international standard;
- * with the amendment to adopt international standards GB/T 26218.1-2010, GB/T 26218.2-2010, GB/T 26218.3-

2011 instead of IEC /T S60815-1.2008, IEC /T S60815-2.2008, IEC /T S60815-3.2008.

- Added the term "performance indicators" (see 3.22).
- Figure 1 single tuned filter configuration does not meet the practical application of the domestic situation, it changed to the actual application of engineering in China single Very double 12-pulse converter unit series structure arrester layout (see Chapter 5 Figure 1).
- Increased AC and DC system resonant overvoltage content (see 7.4.4, 7.4.5).
- Increasing arrester DC reference voltage, charge rate and DC bias voltage selection principles and methods (see 8.2.1, 8.2.2).
- Increasing the double 12 converter converter station smoothing reactor arrester parameters of the layout (see 8.3.7, 8.3.8, 8.3.9).
- Added neutral bus high energy arrester arrangement (see 8.3.11).
- Increase the converter valve side winding SIWV/LIWV ratio (see Chapter 9).
- Increased converter station control and protection model to study the factors that need to be considered before the retarding wave (see Chapter 10).
- Increased DC line and ground line over-voltage protection and insulation coordination (see Chapter 13).

This section made the following editorial changes.

- With our "conventional +/- 800kV HVDC converter station with an example of insulation" instead of "conventional HVDC converter insulation coordination Example "(see Appendix B);
- Added information appendix "back to back DC converter insulation matching example" (see Appendix C).

This part is proposed by China Electrical Equipment Industry Association.

This part of the national high voltage test technology and insulation with the standardization Technical Committee (SAC/TC163) centralized.

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Institute of Science and Technology, Xi'an West Power System Co., Ltd., State Grid Hubei Electric Power Company Electric Power Research Institute, Beijing Huatian Institute of Electrical and have

Limited, Suzhou Huadian Electric Co., Ltd.

1.1 Overview

This part of "Insulation coordination" gives the insulation coordination procedures for high voltage direct current (HVDC) converter stations without standard insulation levels

Guidelines.

This section only applies to high-voltage AC power system in the high-voltage DC part, but not for industrial use commutation equipment. Given

Principles and rules apply only to the purpose of insulation. This section does not involve the requirements of personal safety.

1.2 Background Description

High-voltage DC converter station converter thyristor valve series or parallel composition, and the commutation process using a unique control and protection,

Compared with the AC substation, therefore, the overvoltage protection of the equipment made special requirements. This section gives the withstand voltage, DC

Voltage, harmonic voltage and surge voltage converter station equipment over voltage and insulation with the program. Proposed series or parallel arrester protection water

Flat, optimize the configuration of the arrester program. Examples of insulation coordination for conventional and back-to-back DC converter stations are given (see Appendix B, Appendix C).