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

GB/T 20990.1-2020

Replacing GB/T 28563-2012; GB/T 20990.1-2007

**Thyristor valves for high voltage direct current (HVDC) power
transmission - Part 1: Electrical testing**

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Foreword

GB/T 20990 "HVDC Thyristor Valves" plans to publish the following parts:

---Part 1: Electrical test;

---Part 2: Terminology;

---Part 3: Basic ratings (limits) and characteristics:

This part is Part 1 of GB/T 20990:

This section was drafted in accordance with the rules given in GB/T 1:1-2009:

This part replaces GB/T 20990:1-2007 "HVDC Thyristor Valve Part 1: Electrical Test" and

GB/T 28563-2012 "Electrical Test of Thyristor Valves for +/-800kV UHV DC Transmission":

Compared with GB/T 20990:1-2007, the main technical changes in this part are as follows:

---Modified the normative reference documents (see Chapter 2, Chapter 2 of the:2007 edition);

--- Deleted the terms "internal and external insulation", "valve support", "valve structure" and "redundant thyristor level" (see Chapter 3 of the:2007 edition);

--- Amend "dielectric test" to "insulation test" (see 3:3:1, 4:3:1, Chapter 6, Chapter 7, Chapter 8,:2007 edition

3:3:1, 4:3:1, Chapter 6, Chapter 7, Chapter 8);

--- Modify the "test object" to "test product" (see 4:1:2, 6:2, 8:2, 8:4:2, 9:2, 10:2, 11:2, 12:2, 13:2, 14:3,:2007

Version 4:1:2, 6:2, 8:2, 8:4:2, 9:2, 10:2, 11:2, 12:2, 13:2, 14:2);

---The content of the item "pressure" in the "atmospheric correction" has been revised (see 4:2, 4:2 of the:2007 edition);

--- Change the suspension paragraphs in Chapters 4:4, 9:3:1, 9:3:3, 12:3, and Chapter 14 of the:2007 edition to 4:4:1, 9:3:2:1, 9:3:4:1, respectively

12:3:1, 14:1 "General", the number of the following clauses is extended (see 4:4, 9:3:2, 9:3:4, 12:3, Chapter 14,:2007 edition

4:4, 9:3:1, 9:3:3, 12:3, Chapter 14);

---Modified the number of faulty thyristor levels allowed during the type test (see Table 1, Table 1 of the:2007 edition);

---Modified the type test item table (see Table 2, Table 2 of the:2007 edition);

--- Deleted the "Valve support AC current test" in "Before the test, the valve support should be short-circuited to ground for at least 2h" requirements (see:2007

Version 6:3:2);

---Added a "steep wave front impact test of valve bracket" (see 6:3:6);

---Modified the AC voltage test requirements for multiple valve units (see 7:3:2, 7:3:2 of the:2007 edition);

---Added "Multiple Valve (MVU) Steep Wave Front Impact Test" (see 7:3:5);

---Added a "valve wet DC voltage test" (see 8:3:2);

---Modified the valve AC voltage test requirements (see 8:3:3, 8:3:2 of the:2007 edition);

--- Modify "VDSM---rated thyristor forward surge voltage non-repetitive peak value" to

"VDSM---rated thyristor off-state not

Repetitive peak voltage" (see 8:3:4, 8:3:3 of the:2007 edition);

---Added "valve wet operation impact test" (see 8:3:6);

---Modified the expression of withstand voltage in "valve steep wave front impact test" (see 8:3:8, 8:3:6 in:2007 edition);

--- Modify "Uv0max---the highest steady state no-load phase-to-phase voltage on the transformer valve side" to "Uv0max---the highest steady state no-load voltage on the transformer valve side"

Load line voltage" (see 9:3:2:1, 9:3:1 in:2007 edition);

--- Change "alphamax" in the relevant expressions of "Maximum Continuous Trigger Voltage Test", "Maximum Continuous Recovery Voltage Test" and "Hot Running Test"

"Mumax" and "gammamax" are respectively modified to "alpha", " μ " and "gamma" (see 9:3:2:2~9:3:2:4, 9:3:1:1~9:3:1:3 of the:2007 edition);

---Modified the expression of the recovery step voltage in the "Maximum Recovery Voltage Test" (see 9:3:2:3, 9:3:1:2 of the:2007 edition);

---Modified the expression of the recovery step voltage in the "Minimum Turn-Off Angle Test" (see 9:3:4:3, 9:3:3:2 of the:2007 edition);

--- Modify "Uv0max---the highest steady-state no-load phase-to-phase voltage on the transformer valve side" to "Uv0max---the highest stable voltage on the transformer valve side"

State no-load line voltage", modify the "delay angle" to "trigger angle" (see 9:3:3,:2007 edition 9:3:2);

---Respectively modify "nt" and "nv" in the voltage expression of "Minimum AC Voltage Test" to "Ntut", "Nt", "Uv0min---Transformer

The lowest steady-state no-load phase-to-phase voltage on the valve side" is revised to "Uv0min---the lowest steady-state no-load line voltage on the valve side of the transformer" (see 9:3:4:

1, 9:3:3 of the:2007 edition);

--- Modify the "alphamin" in the relevant expressions of the "minimum firing angle test" to "alpha" (see 9:3:4:2, 9:3:3:1 of the:2007 edition);

---Modified the minimum shut-off angle test requirements (see 9:3:4:3, 9:3:3:2 of the:2007 edition);

---Modified the requirements of transient undervoltage test (see 9:3:5, 9:3:4 in:2007