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

GB/T 20996.3-2020

Replacing GB/Z 20996.3-2007

**Performance of high-voltage direct current (HVDC) systems
with line-commutated converters - Part 3: Dynamic conditions**

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Table of Contents

1 Scope	1
2 Normative references	1
3 Summary of HVDC Dynamic Performance Specifications	2
3:1 Dynamic performance specification	2
3:2 General description	2
4 AC system power flow and frequency control	3
4:1 Overview	3
4:2 Power flow control	3
4:3 Frequency control	5
5 AC dynamic voltage control and interaction with reactive power source	6
5:1 Overview	6
5:2 Voltage and reactive power characteristics of HVDC converter stations and other reactive power sources	6
5:3 Bus voltage deviation of HVDC converter station	10
5:4 Interaction of voltage and reactive power between converter station and other reactive power sources	11
6 Transient and steady-state stability of AC systems	12
6:1 Overview	12
6:2 Features of active power and reactive power modulation	13
6:3 Network status classification	17
6:4 Parallel connection of AC grid and HVDC system	17
6:5 Improvement of stability in the connected AC grid	18
6:6 Determination of damping control characteristics	18
6:7 Implementation of the damping controller and communication requirements	19
7 Dynamic performance of HVDC systems at higher frequencies	19
7:1 Overview	19
7:2 Types of instability	20
7:3 Information required for design	21
7:4 Effective measures to restrain instability	21
7:5 Damping low-order harmonics through control	22
7:6 Verification of meeting higher frequency performance requirements	22
8 synchronous resonance	22
8:1 Overview	22

8:2 Sub-synchronous vibration criteria related to HVDC systems	23
8:3 Screening criteria for determining the sensitivity of generating sets to torsional vibration	23
8:4 Performance requirements for using a sub-synchronous damping controller (SSDC)	24
8:5 Performance test	24
8:6 Protection of turbine generators	24
9 Interaction with power plants	25
9:1 Overview	25
9:2 Special effects	25
9:3 Special considerations for nuclear power plants	27
Reference	28

Foreword

GB/T 20996 "Performance of HVDC System Using Grid Commutation Converter" is divided into 3 parts:

---Part 1: Steady state;

---Part 2: Failure and operation;

---Part 3: Dynamics:

This part is Part 3 of GB/T 20996:

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

This part replaces GB /Z 20996:3-2007 "Performance of High-Voltage DC System Part 3: Dynamics", and is in line with GB /Z 20996:3-2007

Compared with:2007, the main technical changes except for editorial changes are as follows:

---Modified the scope (see Chapter 1, Chapter 1 of the:2007 edition);

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

---The provision of "frequency control with zero power setting" has been added (see 4:3);

---Modified the expression of "commutation impedance" in the active power/reactive power related factors of HVDC converter (see 5:2:2,:2007

Year 5:2:1);

---Added the requirement to install equipment to meet the reactive power demand under steady-state conditions (see 5:2:5);

--- Added "Voltage Characteristics of Static Synchronous Compensation Device (STATCOM)" and related content (see 5:2:7);

---Added the expression of static synchronous compensation device suppressing transient voltage changes (see 5:4:2);

---Added the description of the shortcomings of the synchronized camera (see 5:4:3);

---Added "HV DC converter, reactive power source that can be switched on and off and static synchronous compensation device" and related content (see 5:4:4);

---Added the relevant regulations for limiting power reversal of the high-voltage DC system at both ends of the power cable (see 6:2:2);

---Added the expression of real-time simulation device for control system verification (see 6:6);

---The external conditions for the dynamic performance design of high-voltage DC systems at higher frequencies need to be considered "impedance frequency characteristics, including parallel power

The change in the number of containers and the possibility of islands formed by near-zone generators (isolated from the AC main network): "(See 7:3);

---Added the importance of real-time simulation device and test requirements (see 7:6);

---Modified the natural frequency of torsional vibration (see 8:1, 8:1 in:2007 edition);

---Added the expression of subsynchronous torsional vibration (see 8:1);

--- "SSR" is changed to "SSTI" (see 8:2, 8:2 in:2007 edition);

---Added the content that needs further research when UIF is greater than 0:1 (see 8:3);

---Modified the expression of the interaction coefficient of the generator set (see 8:3, 8:3 in the:2007 edition);

--- Deleted "Therefore, for each turbine generator set with potential torsional vibration instability, there should be sub-synchronous resonance (SSR) protection

Relay: "(See 8:4 in:2007 edition);

---Added the relevant regulations for the control and protection of turbine generators in the HVDC transmission system with subsynchronous damping controllers (see 8:6);

---Added the description of the DC restart sequence (see 9:2:6);

---The "DC reactor" in the full text is modified to "smoothing reactor":

The translation method used in this part is equivalent to the IEC TR60919-3:2016
"Performance of HVDC System Using Grid Commutation Converter"

Performance Part 3: Dynamics:

The Chinese documents that have a consistent correspondence with the international documents cited in this section are as follows:

---GB/T 3859:1-2013 General requirements for semiconductor converters and power grid commutated converters Part 1-1: Basic requirements

Fan (IEC 60146-1-1:2009, MOD);

---GB/T 3859:2-2013 General requirements for semiconductor converters and power grid commutated converters Part 1-2: Application guidelines

(IEC /T R60146-1-2:2011,MOD);

---GB/T 3859:3-2013 General requirements for semiconductor converters and power grid commutated converters Part 1-3: Transformers and electricity

Reactor (IEC 60146-1-3:1991, MOD);

---GB/T 20996:1-2020 Performance of HVDC systems using grid-commutated converters Part 1: Steady state

(IEC TR60919-1:2020, IDT);

---GB/T 20996:2-2020 Performance of HVDC systems using grid-commutated converters Part 2: Faults and operations

(IEC TR60919-2:2020, IDT):

This section also made the following editorial changes:

---According to IEC TR60919-1:2010, the "Figure 16" in the text is revised to "Figure 18" (see 5:2:2);

---Added the description of the text symbol of the rated power of the i-th generator set in the generator set interaction coefficient expression

(See 8:3):

This part was proposed by China Electrical Equipment Industry Association:

This part is under the jurisdiction of the National Power Electronic System and Equipment Standardization Technical Committee (SAC/TC60):

Drafting organizations of this section: China Electric Power Research Institute Co., Ltd., China Southern Power Grid Research Institute Co., Ltd., Xi'an High Voltage