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**Technical Specification for Electrical Energy Router
(English Translation)**

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1 Scope

This document specifies the terms and definitions, operating conditions, technical requirements, inspection rules, marking, packaging, storage and transportation of electrical energy routers.

This document is applicable to electrical energy routers with system voltages of 35 kV and below.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB/T 311.1 Insulation co-ordination - Part 1. Definitions, principles and rules

GB/T 2423.1 Environmental testing for electric and electronic products - Part 2. Test methods

- Tests A. Cold

GB/T 2423.2 Environmental testing for electric and electronic products - Part 2. Test methods

- Tests B. Dry heat

GB/T 2423.3 Environmental testing - Part 2. Testing method - Test Cab. Damp heat, steady state

GB/T 3859.2 Semiconductor converters - General requirements and line commutated converters - Part 1-2. Application guide

GB 4824-2019 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

GB/T 5226.1 Electrical safety of machinery - Electrical equipment of machines - Part 1. General requirements

GB/T 5465.2 Graphical symbols for use on electrical equipment - Part 2. Graphical symbols

GB/T 12325 Power quality - Deviation of supply voltage

GB/T 12326 Power quality - Voltage fluctuation and flicker

GB/T 13384 General specifications for packing of mechanical and electrical product

GB/T 14549 Quality of electric energy supply - Harmonics in public supply network

GB/T 15543 Power quality - Three-phase voltage unbalance

GB/T 15945 Power quality - Frequency deviation for power system

GB/T 17467 High-voltage/low-voltage prefabricated substation

GB/T 17626.2 Electromagnetic compatibility - Testing and measurement techniques - Electrostatic discharge immunity test

GB/T 17626.3 Electromagnetic compatibility - Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

GB/T 17626.4 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient/burst immunity test

GB/T 17626.5 Electromagnetic compatibility - Testing and measurement techniques - Surge immunity test

GB/T 17626.6 Electromagnetic compatibility - Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields

GB/T 17626.8 Electromagnetic compatibility - Testing and measurement techniques - Power frequency magnetic field immunity test

GB/T 17626.12 Electromagnetic compatibility - Testing and measurement techniques - Ring wave immunity test

GB/T 17626.18 Electromagnetic compatibility - Testing and measurement techniques - Damped oscillatory wave immunity test

GB/T 19964 Technical requirements for connecting photovoltaic power station to power system

DL/T 1216 Technical regulation for distribution static synchronous compensator (DSTATCOM)

NB/T 32004 Technical specification of PV grid-connected inverter

3 Terms and Definitions

The following terms and definitions are applicable to this document.

3.1 Electrical Energy Router

Power electronic equipment integrated from multiple power modules, capable of extensive interconnection between high/low voltage and AC/DC systems, featuring electric energy management functions and enabling multi-directional power transmission.

3.2 Power Module

The power conversion unit - a component device - that implements the power conversion and protection functions of the electrical energy router.

3.3 Conversion Efficiency

The ratio of total output power to total input power under rated operating conditions, calculated according to Formula (1).

Where.

η -- Conversion efficiency of the electrical energy router;

P_{out} -- Total output power of the electrical energy router under rated operating conditions;

P_{in} -- Total input power of the electrical energy router under rated operating conditions;

P_a -- Power of the electrical energy router's auxiliary device.

4.1.1 Ambient temperature

Ambient air temperature range for the electrical energy router. $-5^{\circ}\text{C} \sim 40^{\circ}\text{C}$.

4.1.2 Altitude

The installation site altitude shall not exceed 1 000 m. For altitudes above 1 000 m, derating shall be applied in accordance with GB/T 3859.2.

4.1.3 Humidity

Relative humidity range. $5\% \sim 95\%$, non-condensing.

At a temperature of 40°C , the relative humidity of the air shall not exceed 50%. Higher relative humidity is permissible at lower temperatures; for example, it may reach 100% at 25°C . Special measures shall be taken to address condensation that may occasionally occur due to temperature fluctuations.

4.1.4 Electrical conditions

Unless otherwise specified, an electrical energy router complying with this document shall operate normally under the following power grid conditions.

- a) Harmonic voltage of the AC grid shall not exceed the limits specified in GB/T 14549;
- b) Three-phase voltage unbalance of the AC grid shall not exceed the limits specified in GB/T 15543;
- c) Frequency deviation of the AC grid shall not exceed the limits specified in GB/T 15945;
- d) Voltage fluctuations and flicker of the AC grid shall comply with the provisions of GB/T 12326;