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**Low-voltage surge protective devices - Surge
protective devices for specific application including
d.c. - Part 31: Requirements and tests for
SPDs in photovoltaic applications**

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Foreword

The structure and name of the “Low-voltage surge protective devices (SPD)” series of standards are as follows:

- GB 18802.1 Low-voltage surge protective devices - Part 1: Surge protective devices connected to low-voltage power distribution systems - Requirements and tests;
- GB/T 18802.12 Low-voltage surge protective devices - Part 12: Surge protective devices connected to low-voltage power distribution systems - Selection and application principles;
- GB/T 18802.21 Low-voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signaling networks - Performance requirements and testing methods;
- GB/T 18802.22 Low-voltage surge protective devices - Part 22: Surge protective devices connected to telecommunications and signaling networks - Selection and application principles;
- GB/T 18802.31 Low-voltage surge protective devices - Surge protective devices for specific application including d.c. - Part 31: Requirements and tests for SPDs in photovoltaic applications;
- GB/T 18802.311 Components for low-voltage surge protective - Part 311: Specification for gas discharge tubes (GDT);
- GB/T 18802.321 Components for low-voltage surge protective devices - Part 321: Specifications for avalanche breakdown diode (ABD);
- GB/T 18802.331 Components for low-voltage surge protective devices - Part 331: Specification for metal oxide varistors (MOV);
- GB/T 18802.341 Components for low-voltage surge protective devices - Part 341: Specification for thyristor surge suppressors (TSS).

This part was drafted in accordance with the rules given in GB/T 1.1-2009.

This part was proposed by China Electrical Equipment Industry Association.

This part shall under the jurisdiction of the National Lightning Protection Standardization Technical Committee (SAC/TC 81).

Responsible drafting organizations of this part: Shanghai Lightning Protection Center, Xi'an High Voltage Electric Apparatus Research Institute Co., Ltd.

Low-voltage surge protective devices - Surge protective devices for specific application including d.c. - Part 31: Requirements and tests for SPDs in photovoltaic applications

1 Scope

This part specifies the performance requirements and test methods for SPDs installed on the DC side of a photovoltaic system. This type of SPD is used to reduce the impact of lightning induction or direct lightning on the DC side of photovoltaic power generation equipment. These appliances will be connected to the DC power circuit of a photovoltaic power generation equipment which has a rated voltage not exceeding 1500 V.

This part considers the following characteristics of photovoltaic power generation equipment:

- Characteristics similar to current sources;
- The nominal current depends on the light intensity;
- The short-circuit current is almost equal to the nominal current;
- Output various sizes of voltage, current and power in series and / or parallel combination, from several hundred watts (civil facilities) to several megawatts (photovoltaic field).

The very special electrical parameters on the DC side of the photovoltaic equipment place special test requirements on the SPD.

SPD with special series impedance between separate input and output terminals (so-called two-port SPD in EN 61643-11) are not currently fully covered by the performance requirements of this standard, which require additional consideration.

Note: For SPD used in photovoltaic systems, for power efficiency considerations, special series impedances are typically not included between the input and output terminals.

SPD conforming to this standard are only designed to be installed on the DC

side of a photovoltaic generator. Regardless of photovoltaic equipment containing battery packs and other DC equipment, it requires additional requirements and tests for SPDs used in this equipment.

For SPD where the manufacturer states that the overload characteristic is short-circuit mode, special measures must be required to prevent the DC arc that may be generated during the maintenance and replacement of such SPD from jeopardizing the operator.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 2900.83-2008 Electrotechnical terminology - Electrical and magnetic devices (IEC 60050-151:2001, IDT)

HD 588.1 S1:1991 High-voltage test techniques - Part 1: General definitions and test requirements, IEC 60060-1:1989 + corrigendum Mar, IEC 60060-1:1989 + Errata 1990-03

EN 50521 Connectors for photovoltaic systems Safety requirements and tests

EN 60068-2-78 Environmental testing - Part 2-78: Tests Test Cab: Damp heat, steady state, IEC 60068-2-78

EN 60529 Degrees of protection provided by enclosures (IP Code), IEC 60529

EN 60664-1:2007 Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests, IEC 60664-1:2007)

EN 61000-6-1 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards Immunity for residential, commercial and light-industrial environments, IEC 61000-6-1

EN 61000-6-3 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards Emission standard for residential, commercial and light-industrial environments, IEC 61000 -6-3

EN 61180-1 High-voltage test techniques for low-voltage equipment - Part 1: Definitions, test and procedure requirements, IEC 61180-1

EN 61643-11:2012 Low-voltage surge protective devices - Part 11: Surge

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