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

GB/T 3859.1-2013

**Semiconductor converters -- General requirements and line
commutated Converters -- Part 1-1: Specification of basic
requirements**

(English Translation)

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Foreword

GB/T 3859 Semiconductor Converter can be divided into the following parts.

- Part 1-1.Specification of basic requirements;
- Part 1-2.Application Guide;
- Part 1-3.Transformers and Reactors;
- Part 2.Semiconductor Self-Commutated Converter including Direct DC Converter.

This Part is Part 1-1 of GB/T 3859.

This Part was drafted according to the rules in GB/T 1.1-2009.

This Part replaced GB/T 3859.1-1993 Semiconductor Converters - Specification of

Basic Requirement.

Compared with GB/T 3859.1-1993, the major technical changes of this Part are as follows.

--- Modify the name of the standard;

--- Adjust the text structure; make it consistent with IEC 60146-1-1.2009

Semiconductor Converters - General Requirements and Line Commutated

Converters - Part 1-1. Specification of Basic Requirements as much as possible.

--- Delete "Theme Content"; and modify "Scope of Application" (see Clause 1 of this Edition; Clause 1 of 1993 Edition);

--- Adjust "Normative Reference" (see Clause 2 of this Edition; Clause 2 of 1993 Edition);

--- Adjust and modify "Terms and Symbols" (see Clause 3 of this Edition; Clause 3 of 1993 Edition);

--- Modified the classification method of converters according to "transformation target", "valve device type used in main circuit" and "application field" (see 4.1.2,

4.1.5 and 4.1.6 of this Edition; 4.1.2, 4.1.5 and 4.1.6 of 1993 Edition);

--- Add the "marking" of converter (see 4.2 of this Edition);

--- Modify the "basic parameters" of the converter (see 4.3 of this Edition; 4.2 of

1993 Edition);

--- Add the "basic operation" of converter; and adjust the Figures 1~3 in 1993 Edition to it (see 5.1 of this Edition);

--- Modify "Converter immunity performance and electromagnetic compatibility", "Normal use environmental conditions", "Normal use electrical conditions" and "Load conditions" (see 5.2 and 5.3 of this Edition; 5.7.7 and 5.1~5.3 of 1993 Edition);

--- Modify "Electrical connection" of the converter (see 6.1 of this Edition; 5.5.1 of

1993 Edition);

- Add "Short-circuit calculation" (see 6.2.1.6 of this Edition);
- Modify "General description of loss and efficiency" and "Power factor" (see

6.2.2.1 and 6.2.3 of this Edition; 5.7.1.1 and 5.7.2 of 1993 Edition);

- Add the voltage adjustment values of "12-pulse converter" and "Buck-boost converter (series connection)" (see 6.2.4.5 and 6.2.4.6 of this Edition);
- Modify "Grid-side voltage current harmonics" and "DC-side harmonics" (see 6.3.1 of this Edition; 5.7.4 and 5.7.5 of 1993 Edition);
- Add "Commutation gap" and "Voltage fluctuation" (see 6.3.1 and 6.3.3 of this Edition);
- Modify "Harmonic interference" (see 6.3.4 of this Edition; 5.7.6 of 1993 Edition);
- Add "Immunity" (see 6.3.5 of this Edition);
- Modify "Rated value of converter", "Noise", "Current and voltage balance", and "stability and requirements" (see 6.4~6.5, 6.6.1~6.6.7 of this Edition; 5.6, 5.7.9~5.7.11 of 1993 Edition);
- Add "Safety Requirements" (see 6.6.8 of this Edition);
- Modify the "General", "Inspection rules" and "Test items" of inspection and test (see 7.1 of this Edition; 6.1~6.3 of 1993 Edition);
- Modify "Insulation test", "Light load test", "rated current test", "Overload capability test", "Inherent voltage adjustment rate measurement" and "Ripple measurement" (see 7.2, 7.3.1~7.3.5 of this Edition; 6.4.1~6.4.3, 6.4.10, 6.4.8 and 6.4.17 of 1993 Edition);
- Add "Harmonics current measurement" (see 7.3.6 of this Edition);
- Modify "Temperature-rise test", "Auxiliary device test", "Control equipment performance test", "Protection system test", "Cooling system test", "Immunity test", "Radio frequency interference and conducted noise test", "Audio noise measurement" and "Allowance difference" (see 7.4.2, 7.5~7.7 and 7.8 of this Edition; 6.4.6, 6.4.11~6.4.16, 6.4.19.4 and Clause 7 of 1993 Edition);

- Modify "Marking, Packaging, Transportation, Storage" (see Clause 8 of this Edition; Clause 8 of 1993 Edition);
- Delete "Model", "Components and auxiliary devices" and "Other properties" in the technical performance (4.3, 5.7.12 and 5.7.13 of 1993 Edition);
- Delete "Load test", "Balance measurement", "Stability device performance inspection", "Component inspection", "Cabinet inspection", "Assembly inspection", "Environmental condition test" and "Other tests" (6.4.4, 6.4.9, 6.4.18, 6.4.19.1~6.4.19.3, 6.4.20 and 6.4.21 of this Edition);
- Add Annexes A, B and C.

This Part uses the re-drafting method to modify and adopt IEC 60146-1-1.2009 Semiconductor Converters - General Requirements and Line Commutated Converters - Part 1-1. Specification of Basic Requirements.

Compared with IEC 60146-1-1.2009, this Part add 16 subclauses (4.1.6, 4.2.1~4.2.3, 4.3, 5.3.1.4~5.3.1.5, 6.3.1.5, 6.3.2~6.3.3, 6.3.5.3, 6.6, 7.5.4 and 8.2~8.4 of this Edition), and 1 table (Table 19); adjust 4.2 into 3.12; adjust 4.3.1 into 5.1.1; adjust 4.3.2.1 into 5.1.2; adjust 4.3.2.2 into 5.1.3; adjust 4.3.3.1 into 5.2.1; adjust 4.3.3.2 into 5.2.2 and 5.2.3; adjust 5.1 into 4.2.4; adjust 5.2.1~5.2.3 into 5.3.1.1~5.3.1.3; adjust 5.2.4 into 5.4; adjust 5.3 into 5.3.3; adjust 5.4.1 into 5.3.2.1 and 6.3.5; adjust 5.4.2 into 5.3.2.2; adjust

6.2.1 into 6.1.3 and 6.2.1; adjust 6.3.2 into 6.3.4; and adjust 6.6 into 8.1 in the structure.

Compared with IEC 60146-1-1.2009, this Part has the technical differences and causes as follows.

- According to the actual citation in the standard provisions, add some normative references (see Clause 2 of this Part);
- Add the term "Modular power supply" and its definition (see 3.1.22 of this Part);
- Modify the classification method of converters (see 4.1 of this Part);
- Add "Identification of electrical connection", "Identification of device terminals and conductor terminals", "Conductor colour" and "Main technical parameters"