Australian Standard®

SEMICONDUCTOR CONVERTORS

Part 3 — SEMICONDUCTOR DIRECT D.C. CONVERTORS (D.C. CHOPPER CONVERTORS)

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Australian Electrical and Electronic Manufacturers Association

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Defence

Electricity Supply Association of Australia

Monash University

Railways of Australia Committee

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PREFACE

This standard was prepared by the Association's Committee on Power Electronics. It is based on IEC 146-3, Semiconductor Convertors, and acknowledgment is made of the assistance received from this source.

IEC 146-3 was examined in terms of Australian practice and amended where necessary. In the main the amendments consist of editorial changes not involving a change in the basic sense of the statement concerned, e.g. renumbering of clauses and some re-arrangement to ensure conformity with the style of Australian standards.

Technical changes are minor, being consistent with the need to comply with other Australian standards which are called up by reference. In general the standard is technically similar with IEC 146-3.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
SEMICONDUCTOR CONVERTORS

PART 3—SEMICONDUCTOR DIRECT D.C. CONVERTORS (D.C. CHOPPER CONVERTORS)

1 SCOPE. This standard specifies requirements for semi-conductor direct d.c. convertors (d.c. chopper convertors) with regard to rated values, testing and performance characteristics.

2 APPLICATION. These requirements apply to all types of semiconductor direct d.c. convertors, i.e. d.c. to d.c. convertors without an a.c. link. The requirements of AS 1955, Parts 1 and 2, shall also apply to semiconductor direct d.c. convertors in so far as they are not in contradiction to the requirements herein.

For some special applications, e.g. electric traction equipment, additional requirements may apply.

NOTE: This standard may also be used for certain d.c. switches in control applications, if applicable.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1852	International Electrotechnical Vocabulary 1852(05) — 1970 Fundamental Definitions 1852(11) — 1970 Static Convertors
AS 1955	Semiconductor Convertors Part 1 — General Part 2 — Semiconductor Self-commutated Convertors
AS 2064	Limits of Electromagnetic Interference Generated by Industrial, Scientific, Medical and Similar Radio-frequency Equipment

4 DEFINITIONS.

4.1 General. For the purpose of this standard the definitions given in Clauses 4.2, 4.3 and 4.4 apply.

NOTE: Some of the following definitions have been taken from or are equivalent to, definitions contained in AS 1852, or are being considered by IEC for inclusion in IEC 50 (AS 1852). A number have been expanded with notes or have been reformulated in order to cover the subject dealt with in this standard more precisely. Definitions pertaining to d.c. convertors have been added.

In the present definitions, adjectives which are implicit by virtue of the subject of this standard are often omitted for brevity and clarity, e.g. semiconductor, electronic, etc.

4.2 Basic Definitions.

4.2.1 *Convertor*—an operative unit for electronic power conversion comprising one or more electronic valve devices, essential switching devices and filters if necessary, and other auxiliaries, if any.

NOTE: The word valve is used throughout this standard in its generally accepted electronic sense which includes semiconductor valves.

4.2.2 *Self-commutated convertor*—a convertor in which the commutating voltages are supplied by components within the convertor.

NOTE: Examples include convertors in which the commutating voltages are built up within the semiconductor devices (as in transistors and thyristors which can be turned off by the gate) or in which they are supplied outside the semiconductor devices by means of capacitors.

Excluded are convertors requiring special characteristics from the load to commutate.

4.2.3 *Direct d.c. convertor*—a self-commutated convertor for conversion from d.c. to d.c. without an a.c. link.

4.2.4 *Non-reversible direct d.c. convertor*—a direct d.c. convertor in which the direction of the power flow is in only one direction.

4.2.5 *Reversible direct d.c. convertor*—a direct d.c. convertor in which the direction of the power flow is reversible.

4.2.6 *Assembly (valve device)*—electrically and mechanically combined assembly of valve device stacks, complete with all its connections and auxiliaries in its own mechanical structure.

4.2.7 *Transfer factor*—the ratio of the voltage on the load side to the voltage on the input side, both voltages being measured in arithmetic mean values.

NOTES:

1. The transfer factor may be modified by variation of the conducting interval of the principal arm or by variation of the elementary frequency.

2. Where the transfer factor is larger than one, the convertor may be called a step-up direct d.c. convertor. Where less than one the convertor may be called a step-down direct d.c. convertor.

4.3 Multiple Direct D.C. Convertor.

4.3.1 *General* A multiple direct d.c. convertor is a combination of more than one direct d.c. convertor related in such a manner that they may not be considered as independent.

NOTE: Combinations of direct d.c. convertors may be divided into—

(a) those being supplied by a common source;

(b) those being supplied by a common source and supplying a common load;

(c) those supplying a common load.

Such combinations are multiple direct d.c. convertors if, for example, they are characterized by control system relationship as being—

(i) operated at the same frequency;

(ii) phase-related;

(iii) frequency-related;

(iv) voltage-related;

(v) current-related.