**IS 16539****(Part 1/ Sec 1) : 2024**

***भारतीय मानक***

***Indian Standard***

 **IEC 60146-1-1: 2024**

***सेमीकंडक्टर कन्वर्टर***

***भाग 1 सामान्य अपेक्षाएँ और लाइन कम्यूटेटिड कन्वर्टर***

***अनुभाग* 1 *आधारभूत अपेक्षाओं की विशिष्टि***

***(***पहला पुनरीक्षण )

 **Semiconductor Converters**

**Part 1 General Requirements and Line Commutated Converters**

 **Section 1 Specification of Basic Requirements**

( *First Revision )*

ICS 29.200, 29.045

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**December 2024 Price Group X**

Power Electronics Sectional Committee, ETD 31

NATIONAL FOREWORD

This Indian Standard (Part 1/Sec 1) (First Revision) which is identical with IEC 60146-1-1: 2024 ‘Semiconductor converters – General requirements and line commutated converters – Part 1-1: Specification of basic requirements’ issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Power Electronics Sectional Committee and approval of the Electrotechnical Division Council.

This standard was originally published in 2017. The first revision of this standard has been undertaken to align it with the latest version of IEC 60146-1-1: 2024.

The text of the IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

1. Wherever the words ‘International Standard’ appears referring to this standard, they should be read as ‘Indian Standard’.
2. Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this revision, scope has been further clarified and additional definitions for terms relevant for the topic have been added. Figure for types of commutation has also been updated. Additional figure for repetitive and non-repetitive transients has been added. Updated values for various calculation factors have been included as well. Clauses related to duty classes, insulation tests, and methods of measurement have been updated.

In this adopted standard, reference appears to International Standards for which Indian Standards also exists. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

|  |  |  |
| --- | --- | --- |
| *International Standard* | *Corresponding Indian Standard* | *Degree of Equivalence* |
| IEC 60050-551:1998, International Electrotechnical Vocabulary (IEV) – Part 551: Power electronics | IS 1885 (Part 27) : 2008/ IEC 60050-551: 1998 Electrotechnical vocabulary Part 27 Power electronics (*third revision*) | Identical |
| IEC 60664-1:2020, Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests | IS 15382 (Part 1) : 2022/ IEC 60664-1: 2020 Insulation coordination for equipment within Low-Voltage systems Part 1 Principles requirements and tests | Identical |
| IEC 61000-3-2: 2018, Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase) | IS 14700 (Part 3/Sec 2) : 2020/ IEC 61000-3-2 : 2018 Electromagnetic Compatibility (EMC) Part 3 Limits Section 2 Limits for harmonic current emissions (equipment input current ? 16 A per phase) *( third revision )* | Identical |
| IEC 61000-4-7:2002, Electromagnetic compatibility (EMC) – Part 4-7: Testing and measurement techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto | IS 14700 (Part 4/Sec 7) : 2017/ IEC 61000-4-7 : 2009 Electromagnetic compatibility (EMC) Part 4 Testing and measurement techniques Section 7 General guide on harmonic and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto *(first revision)* | Identical |
| IEC 61000-6-1:2016, Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments | IS 14700 (Part 6/Sec 1) : 2019/ IEC 61000-6-1 : 2016 Electromagnetic compatibility ( EMC ) Part 6 Generic standards Section 1 Immunity standard for residential, commercial and light-industrial environments ( *first revision* ) | Identical |
| IEC 61000-6-2:2016, Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments | IS 14700 (Part 6/Sec 2) : 2019/ IEC 61000-6-2 : 2016 Electromagnetic compatibility (EMC) Part 6 Generic standards Section 2 Immunity standard for industrial environments (*first revision*) | Identical |

The technical committee has reviewed the provision of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

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| *International Standard* | *Title* |
| IEC 60050-551-20:2001 | International Electrotechnical Vocabulary (IEV) – Part 551-20: Power electronics – Harmonic analysis |
| IEC 61000-2-4:2002 | Electromagnetic compatibility (EMC) – Part 2-4: Environment – Compatibility levels in industrial plants for low-frequency conducted disturbances |
| IEC 61000-3-12:2011 | Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current ≤16 A and ≤ 75 A per phase |
| IEC 61000-6-4:2018 | Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments |
| IEC 61378-1:2011 | Converter transformers – Part 1: Transformers for industrial applications |
| IEC 62477-1:2022 | Safety requirements for power electronic converter systems and equipment – Part 1: General |
| IEC 62477-2:2018 | Safety requirements for power electronic converter systems and equipment – Part 2: Power electronic converters from 1 000 V AC or 1 500 V DC up to 36 kV AC or 54 kV DC |

Only English language text has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the International Standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2: 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.