

Rotating electrical machines —

Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) — Classification

The European Standard EN 60034-5:2001, incorporating amendment A1:2007, has the status of a British Standard

ICS 29.160.01

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 60034-5:2001, incorporating amendment A1:2007. It is identical with IEC 60034-5:2000, incorporating amendment 1:2006. It supersedes BS 4999-105:1988 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/2, Rotating electrical machinery.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 June 2001

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English version

Rotating electrical machines
Part 5: Degrees of protection provided by the integral design
of rotating electrical machines (IP code) -
Classification
(IEC 60034-5:2000)

Machines électriques tournantes
Partie 5: Degrés de protection procurés
par la conception intégrale des machines
électriques tournantes (code IP) -
Classification
(CEI 60034-5:2000)

Drehende elektrische Maschinen
Teil 5: Schutzarten aufgrund der
Gesamtkonstruktion von drehenden
elektrischen Maschinen (IP-Code) -
Einteilung
(IEC 60034-5:2000)

This European Standard was approved by CENELEC on 2000-12-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 2/1098/FDIS, future edition 4 of IEC 60034-5, prepared by IEC TC 2, Rotating machinery, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60034-5 on 2000-12-01.

This European Standard supersedes EN 60034-5:1986.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2001-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-12-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60034-5:2000 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of document 2/1378/CDV, future amendment 1 to IEC 60034-5:2000, prepared by IEC TC 2, Rotating machinery, was submitted to the IEC-CENELEC parallel Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 60034-5:2001 on 2006-12-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2007-09-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2009-12-01

Endorsement notice

The text of amendment 1:2006 to the International Standard IEC 60034-5:2000 was approved by CENELEC as an amendment to the European Standard without any modification.

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ROTATING ELECTRICAL MACHINES –

Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification

1 Scope and object

This International Standard applies to the classification of degrees of protection provided by enclosures for rotating electrical machines. It defines the requirements for protective enclosures that are in all other respects suitable for their intended use and which, from the point of view of materials and workmanship, ensure that the properties dealt with in this standard are maintained under normal conditions of use.

A1 This standard does not specify:

- degrees of protection against mechanical damage of the machine, or conditions such as moisture (produced for example by condensation), corrosive dust and vapour, fungus or vermin;
- types of protection of machines for use in a potentially explosive (dust, vapour) environment. **A1**

In certain applications (such as agricultural or domestic appliances), more extensive precautions against accidental or deliberate contact may be specified.

This standard gives definitions for standard degrees of protection provided by enclosures applicable to rotating electrical machines as regards the:

- a) protection of persons against contacts with or approach to live parts and against contact with moving parts (other than smooth rotating shafts and the like) inside the enclosure and protection of the machine against ingress of solid foreign objects;
- b) protection of machines against the harmful effects due to ingress of water.

It gives designations for these protective degrees and tests to be performed to check that the machines meet the requirements of this standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60034. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60034 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance**

IEC 60034-6, *Rotating electrical machines – Part 6: Methods of cooling (IC code)*

3 Designation

The designation used for the degree of protection consists of the letters IP followed by two characteristic numerals signifying conformity with the conditions indicated in the tables of clauses 4 and 5 respectively.

3.1 Single characteristic numeral

When it is required to indicate a degree of protection by only one characteristic numeral, the omitted numeral shall be replaced by the letter X, for example IPX5 or IP2X.

3.2 Supplementary letters

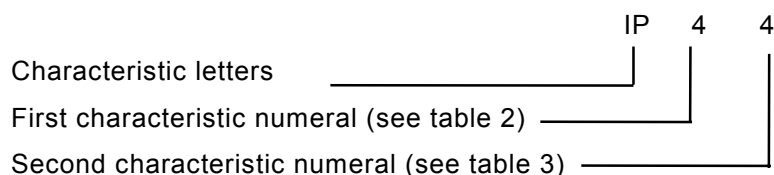
Additional information may be indicated by a supplementary letter following the second characteristic numeral. If more than one letter is used, the alphabetic sequence shall apply.

3.2.1 In special applications (such as machines with open circuit cooling for ship deck installation with air inlet and outlet openings closed during standstill), numerals may be followed by a letter indicating whether the protection against harmful effects due to ingress of water was verified or tested for the machine not running (letter S) or the machine running (letter M). In this case, the degree of protection in either state of the machine shall be indicated, for example IP55S/IP20M.

The absence of the letters S and M shall imply that the intended degree of protection will be provided under all normal conditions of use.

3.2.2 For air-cooled open machines suitable for specific weather conditions and provided with additional protective features or processes (as specified in clause 10), the letter W may be used.

3.3 Example of designation



* A consolidated edition 10.2 (1999) was issued comprising IEC 60034-1 (1996) and its amendments 1 (1997) and 2 (1999).

4 Degrees of protection – First characteristic numeral

4.1 Indication of degree of protection

The first characteristic numeral indicates the degree of protection provided by the enclosure to persons and to the parts of the machine inside the enclosure.

Table 2 gives, in the third column, brief details of objects which will be 'excluded' from the enclosure for each of the degrees of protection represented by the first characteristic numeral.

The term 'excluded' implies that a part of the body, a tool or a wire held by a person, either will not enter the machine or, if it enters, that adequate clearance will be maintained between it and the live parts or dangerous moving parts (smooth rotating shafts and the like are not considered dangerous).

The third column of table 2 also indicates the minimum size of solid foreign objects which will be excluded.

4.2 Compliance to indicated degree of protection

Compliance of an enclosure with an indicated degree of protection implies that the enclosure will also comply with all lower degrees of protection in table 2. In consequence, the tests establishing these lower degrees of protection are not required, except in case of doubt.

4.3 External fans

The blades and spokes of fans external to the enclosure shall be protected against contact by means of guards complying with table 1.

Table 1 – Test requirements for guards

Protection of machine	Test
IP1X	50 mm sphere test
IP2X to IP6X	Finger test

For the test, the rotor shall be slowly rotated, for example by hand when possible.

Smooth rotating shafts and similar parts are not considered dangerous.

4.4 Drain holes

If the machine is provided with drain holes, the following shall apply:

- drain holes intended normally to be open on site shall be kept open during testing;
- drain holes intended normally to be closed on site shall be kept closed during testing;
- if machines with protection IP3X or IP4X are intended to be run with open drain holes, the drain holes may comply with protection IP2X;
- if machines with protection IP5X are intended to be run with open drain holes, the drain holes shall comply with protection IP4X.