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Irish Standard
I.S. EN 60349-2:2010

Electric traction - Rotating electrical machines for rail and road vehicles -- Part 2: Electronic converter-fed alternating current motors (IEC 60349-2:2010 (EQV))

I.S. EN 60349-2:2010

Incorporating amendments/corrigenda issued since publication:

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NSAI 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	Sales: T +353 1 857 6730 F +353 1 857 6729 W standards.ie
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EUROPEAN STANDARD
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EUROPÄISCHE NORM

EN 60349-2

December 2010

ICS 45.060

Supersedes EN 60349-2:2001

English version

**Electric traction -
Rotating electrical machines for rail and road vehicles -
Part 2: Electronic converter-fed alternating current motors
(IEC 60349-2:2010)**

Traction électrique -
Machines électriques tournantes des
véhicules ferroviaires et routiers -
Partie 2: Moteurs à courant alternatif
alimentés par convertisseurs
électroniques
(CEI 60349-2:2010)

Elektrische Zugförderung -
Drehende elektrische Maschinen für
Bahn- und Straßenfahrzeuge -
Teil 2: Umrichter gespeiste
Wechselstrommotoren
(IEC 60349-2:2010)

This European Standard was approved by CENELEC on 2010-12-01. 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.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 9/1416/FDIS, future edition 3 of IEC 60349-2, prepared by IEC TC 9, Electrical equipment and systems for railways, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60349-2 on 2010-12-01.

This European Standard supersedes EN 60349-2:2001.

The main technical changes with regard to EN 60349-2:2001 are as follows:

- As the limits of vibration velocities have been changed in EN 60034-14, the limits valid for traction motors are now directly stated in this standard.
- In addition to the existing method for measuring and calculating the sound power level, the methods described in EN ISO 3741, EN ISO 3743 (series), EN ISO 3744, ISO 3745, EN ISO 9614 (series) are also allowed. However the maximum sound power levels and the correction for pure tones remain unchanged in C.7 and C.8.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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) | 2011-09-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2013-12-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60349-2:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034-1	NOTE	Harmonized as EN 60034-1.
IEC 60034-2-1	NOTE	Harmonized as EN 60034-2-1.
IEC 60034-5	NOTE	Harmonized as EN 60034-5.
IEC 60034-14	NOTE	Harmonized as EN 60034-14.
IEC 61260	NOTE	Harmonized as EN 61260.
IEC 61287 series	NOTE	Part 1 harmonized as EN 61287-1.
IEC 61373	NOTE	Harmonized as EN 61373.
IEC 61377-1	NOTE	Harmonized as EN 61377-1.
IEC 61377-3	NOTE	Harmonized as EN 61377-3.
ISO 3741	NOTE	Harmonized as EN ISO 3741.
ISO 3743-1	NOTE	Harmonized as EN ISO 3743-1.

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ISO 3743-2	NOTE Harmonized as EN ISO 3743-2.
ISO 3744	NOTE Harmonized as EN ISO 3744.
ISO 3746	NOTE Harmonized as EN ISO 3746.
ISO 9614-1	NOTE Harmonized as EN ISO 9614-1.
ISO 9614-2	NOTE Harmonized as EN ISO 9614-2.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1 (mod)	-	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1	-
IEC 60034-8	-	Rotating electrical machines - Part 8: Terminal markings and direction of rotation	EN 60034-8	-
IEC 60034-9 (mod)	-	Rotating electrical machines - Part 9: Noise limits	EN 60034-9	-
IEC 60034-17 ¹⁾	-	Rotating electrical machines - Part 17: Cage induction motors when fed from converters - Application guide	-	-
IEC 60050-131	-	International Electrotechnical Vocabulary (IEV) - Part 131: Circuit theory	-	-
IEC 60050-151	-	International Electrotechnical Vocabulary (IEV) - Part 151: Electrical and magnetic devices	-	-
IEC 60050-411	-	International Electrotechnical Vocabulary (IEV) - Chapter 411: Rotating machinery	-	-
IEC 60050-811	-	International electrotechnical vocabulary (IEV) - Chapter 811: Electric traction	-	-
IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 61672	Series	Electroacoustics - Sound level meters	EN 61672	Series
IEC 62498-1	-	Railway applications - Environmental conditions for equipment - Part 1: Equipment on board rolling stock	-	-

¹⁾ IEC 60034-17 is superseded by IEC/TS 60034-17:2002, which is harmonized as CLC/TS 60034-17:2004.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC TRACTION – ROTATING ELECTRICAL MACHINES FOR RAIL AND ROAD VEHICLES –

Part 2: Electronic converter-fed alternating current motors

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60349-2 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This third edition cancels and replaces the second edition published in 2002. It constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- As the limits of vibration velocities have been changed in IEC 60034-14, the limits valid for traction motors are now directly stated in this standard.
- In addition to the existing method for measuring and calculating the sound power level, the methods described in ISO 3741, ISO 3743, ISO 3744, ISO 3745, ISO 9614 are also allowed. However the maximum sound power levels and the correction for pure tones remain unchanged in Clauses C.7 and C.8.

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The text of this standard is based on the following documents:

FDIS	Report on voting
9/1416/FDIS	9/1466/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The list of all parts of IEC 60349 series, published under the general title, *Electric traction – Rotating electrical machines for rail and road vehicles*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

ELECTRIC TRACTION – ROTATING ELECTRICAL MACHINES FOR RAIL AND ROAD VEHICLES –

Part 2: Electronic converter-fed alternating current motors

1 Scope and object

This part of IEC 60349 applies to converter-fed alternating current motors forming part of the equipment of electrically propelled rail and road vehicles.

The object of this part is to enable the performance of a motor to be confirmed by tests and to provide a basis for assessment of its suitability for a specified duty and for comparison with other motors.

Where further testing is to be undertaken in accordance with IEC 61377-1 and IEC 61377-3, it may be preferable, to avoid duplication, that some type and investigation tests be carried out on the combined test bed.

Particular attention is drawn to the need for collaboration between the designers of the motor and its associated converter as detailed in 5.1.

NOTE 1 This part also applies to motors installed on trailers hauled by powered vehicles.

NOTE 2 The basic requirements of this part may be applied to motors for special purpose vehicles such as mine locomotives but this part does not cover flameproof or other special features that may be required.

NOTE 3 It is not intended that this part should apply to motors on small road vehicles, such as battery-fed delivery vehicles, factory trucks, etc. This part also does not apply to minor machines such as windscreen wiper motors, etc. that may be used on all types of vehicles.

NOTE 4 Industrial type motors complying with IEC 60034 may be suitable for some auxiliary drives, providing that it is demonstrated that operation on a converter supply will meet the requirements of the particular application.

The rating of traction motors fed in parallel by a common converter has to take into account the effect on load-sharing of differences of wheel diameter and of motor characteristics as well as weight transfer when operating at high coefficients of adhesion. The user is to be informed of the maximum permissible difference in wheel diameter for the particular application.

The electrical input to motors covered by this part comes from an electronic converter.

NOTE 5 At the time of drafting, only the following combinations of motors and converters had been used for traction applications, but it may also apply to other combinations which may be used in the future:

- asynchronous motors fed by voltage source converters;
- asynchronous motors fed by current source converters;
- synchronous motors fed by current source converters.

The motors covered by this part are classified as follows:

- a) Traction motors – Motors for propelling rail or road vehicles.
- b) Auxiliary motors not covered by IEC 60034 – Motors for driving compressors, fans, auxiliary generators or other auxiliary machines.

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