

**Railway applications - Rotating electrical machines for
rail and road vehicles -- Part 2: Electronic converter-fed
alternating current motors**

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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60349-2:2002 sisaldab Euroopa standardi EN 60349-2:2001 ingliskeelset teksti.

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English version

**Railway applications -
Rotating electrical machines for rail and road vehicles
Part 2: Electronic converter-fed alternating current motors
(IEC 60349-2:1993, modified)**

Traction électrique -
Machines électriques tournantes des
véhicules ferroviaires et routiers
Partie 2: Moteurs à courant alternatif
alimentés par convertisseur électronique
(CEI 60349-2:1993, modifiée)

Bahnanwendungen -
Drehende elektrische Maschinen für
Bahn- und Straßenfahrzeuge
Teil 2: Umrichter gespeiste
Wechselstrommotoren
(IEC 60349-2:1993, modifiziert)

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60349-2:1999, prepared by IEC TC 9, Electric traction equipment, together with the common modifications prepared by SC 9XB, Electromechanical material on board rolling stock, of the Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60349-2 on 2000-08-01.

This European Standard supersedes ENV 60439-2:1993.

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2002-04-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-08-01

In this European Standard the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.

Annexes designated „normative“ are part of the body of the standard.

Annexes designated „informative“ are given for information only.

In this standard, Annexes A, B, D and E are normative and Annex C is informative.

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Introduction

This document supplements or modifies IEC 60349 Part 2. The changes are considered necessary to make it acceptable as a European Standard following the issue of EN 61377 "Combined testing of inverter-fed alternating current motors and their control", and re-issue of EN 60349 Part 1 "Rotating electrical machines for rail and road vehicles – Machines other than electronic converter-fed alternating current motors".

The main changes are summarised below.

- EN 61377 and IEC 60349 Part 2 both call up type tests for motors on converter supplies. The modifications endeavour to rationalise the interface between these two documents so as to avoid the duplication of tests unless specifically required. A new thermal test on a sinusoidal supply has been introduced to remove the need of using a converter for repeat type tests.

The re-issue of EN 60349 Part 1 modifies the requirements to provide a test specification and a test report including a quantitative vibration test (type test).

1 General

1.1 Scope and object

1.1.1 This European Standard applies to convertor-fed alternating current motors forming part of the equipment of electrically propelled rail and road vehicles.

The object of this part 2 of EN 60349 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 to EN 61377 "Combined testing of inverter-fed alternating current motors and their control", 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 convertor as detailed in clause 3.1.

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 EN 60034 may be suitable for some auxiliary drives, providing that it is demonstrated that operation on a convertor supply will meet the requirements of the particular application.

1.1.2 The rating of traction motors fed in parallel by a common convertor has to take account of the effect on load-sharing of differences of wheel diameter and of motor characteristics and also of 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.

1.1.3 The electrical input to motors covered by this part has to be from an electronic convertor.

NOTE At the time of drafting this part only the following combinations of motors and convertors 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 convertors;
- asynchronous motors fed by current source convertors;
- synchronous motors fed by current source convertors.

The motors covered by this part are classified as follows:

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

1.2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 50163	Railway applications - Supply voltages of traction systems
EN 50207	Railway applications - Electronic power convertors for rolling stock
EN 60034-2	Rotating electrical machines - Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles) (IEC 60034-2 + IEC 60034-2A)
EN 60034-9	Rotating electrical machines - Part 9 - Noise limits (IEC 60034-9)
EN 60034-14	Rotating electrical machines - Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of the vibration severity (IEC 60034-14)
EN 60651	Sound level meters (IEC 60651)
EN 61260	Electroacoustics - Octave-band and fractional-octave-band filters (IEC 61260)
EN 61373	Railway applications - Rolling stock equipment - Shock and vibration tests (IEC 61373)
EN 61377	Electric traction - Rolling stock - Combined testing of inverter-fed alternating current motors and their control (IEC 61377)
HD 53.8	Rotating electrical machines - Part 8: Terminal markings and direction of rotation of rotating machines (IEC 60034-8 + A1 + A2)
HD 566 S1	Thermal evaluation and classification of electrical insulation (IEC 60085)
IEC 60050-131	International Electrotechnical Vocabulary - Chapter 131: Electric and magnetic circuits
IEC 60050-151	International Electrotechnical Vocabulary - Chapter 151: Electrical and magnetic devices

IEC 60050-411 International Electrotechnical Vocabulary – Chapter 411: Rotating machines

IEC 60050-811 International Electrotechnical Vocabulary – Chapter 811: Electric traction

1.3 Environmental conditions

Unless otherwise specified by the user, the following environmental conditions are assumed:

- a) Altitude
Height above sea level not exceeding 1 200 m.
- b) Temperature
Air temperature in the shade not exceeding 40 °C.

Whenever motors are intended to operate where one or both of these limits will be exceeded, special requirements may be agreed between user and manufacturer.

Furthermore, the user shall inform the manufacturer of any particularly severe environmental condition such as dust, humidity, temperature, snow, dynamic effects, etc. to which the motors will be subjected.

2 Definitions

2.1 General

For definition of general terms used in this part reference should be made to IEC 60050-131, IEC 60050-151, IEC 60050-411 and IEC 60050-811.

For the purpose of this part of EN 60349, the following definitions apply:

2.2

rating of a motor

combination of simultaneous values of electrical and mechanical quantities, with their duration and sequence, assigned to the motor by the manufacturer

2.2.1

rated value

numerical value of any quantity included in a rating

2.2.2

continuous rating

mechanical output that the motor can deliver on the test bed for an unlimited time under the conditions specified in clause 6.1 without exceeding the limits of temperature rise given in table 2, all other appropriate requirements in this part also being satisfied

NOTE Several continuous ratings may be specified.

2.2.3

short-time rating (for example, one hour)

mechanical output that the motor can deliver on the test bed for the stated time without exceeding the limits of temperature rise given in table 2, the test being carried out as specified in 6.1 starting with the motor cold, all other appropriate requirements in this part being also satisfied