

SLOVENSKI STANDARD

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Električna vleka – Rotacijski električni stroji za železniška in cestna vozila – 1. del: Stroji, razen elektronsko napajanih izmeničnih motorjev (IEC 60349-1:1999)

Electric traction - Rotating electrical machines for rail and road vehicles -- Part 1:
Machines other than electronic convertor-fed alternating current motors

Elektrische Zugförderung - Drehende elektrische Maschinen für Bahn- und
Straßenfahrzeuge -- Teil 1: Elektrische Maschinen ausgenommen umrichter gespeiste
Wechselstrommotoren

Traction électrique - Machines électriques tournantes des véhicules ferroviaires et
routiers -- Partie 1: Machines autres que les moteurs à courant alternatif alimentés par
convertisseur électronique

Ta slovenski standard je istoveten z: EN 60349-1:2000

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| 29.280 | Električna vlečna oprema | Electric traction equipment |

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 60349-1

February 2000

ICS 29.280

Supersedes HD 225 S1:1977

English version

**Electric traction - Rotating electrical machines for rail and road vehicles
Part 1: Machines other than electronic convertor-fed
alternating current motors
(IEC 60349-1:1999)**

Traction électrique - Machines
électriques tournantes des véhicules
ferroviaires et routiers
Partie 1: Machines autres que les
moteurs à courant alternatif alimentés
par convertisseur électronique
(CEI 60349-1:1999)

Elektrische Zugförderung
Drehende elektrische Maschinen
für Bahn- und Straßenfahrzeuge
Teil 1: Elektrische Maschinen
ausgenommen umrichter gespeiste
Wechselstrommotoren
(IEC 60349-1:1999)

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This European Standard was approved by CENELEC on 2000-01-01. 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

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

Foreword

The text of document 9/529/FDIS, future edition 1 of IEC 60349-1, prepared by IEC TC 9, Electric railway equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60349-1 on 2000-01-01.

This European Standard supersedes HD 225 S1:1977.

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) 2000-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-01-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, D and ZA are normative and annexes B, C and E are informative.

Annex ZA has been added by CENELEC.

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Endorsement notice
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The text of the International Standard IEC 60349-1:1999 was approved by CENELEC as a European Standard without any modification. 1:2001

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

IEC 61287-1 NOTE: EN 50207 is related to this International Standard.

IEC 61373 NOTE: Harmonized as EN 61373:1999 (not modified).

Annex ZA (normative)

Normative references to international publications
with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places 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 (including amendments).

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 60034-8 | 1972 | Rotating electrical machines Part 8: Terminal markings and direction of rotation of rotating machines | HD 53.8 S5 ¹⁾ | 1998 |
| IEC 60034-14 | 1996 | Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration | EN 60034-14 | 1996 |
| IEC 60050-131 | 1978 | International Electrotechnical Vocabulary (IEV) Chapter 131: Electric and magnetic circuits | - | - |
| IEC 60050-151 | 1978 | Chapter 151: Electrical and magnetic devices | - | - |
| IEC 60050-411 | 1996 | Chapter 411: Rotating machines | - | - |
| IEC 60050-811 | 1991 | Chapter 811: Electric traction | - | - |
| IEC 60085 | 1984 | Thermal evaluation and classification of electrical insulation | HD 566 S1 | 1990 |
| IEC 60411-2 | 1978 | Power converters for electric traction Part 2: Additional technical information | - | - |
| IEC 60638 | 1979 | Criteria for assessing and coding of the commutation of rotating electrical machines for traction | - | - |
| IEC 60850 | 1988 | Supply voltage of traction systems | - | - |
| ISO/IEC Guide 2 | 1996 | Standardization and related activities General vocabulary | EN 45020 | 1998 |

1) HD 53.8 S5 includes A1:1990 + A2:1996 to IEC 60034-8.

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**NORME
INTERNATIONALE
INTERNATIONAL
STANDARD**

**CEI
IEC**

60349-1

Première édition
First edition
1999-11

**Traction électrique – Machines électriques
tournantes des véhicules ferroviaires et routiers –**

**Partie 1:
Machines autres que les moteurs à courant
alternatif alimentés par convertisseur électronique
(standards.iteh.ai)**

SIST EN 60349-1:2001

**Electric traction – Rotating electrical machines for
rail and road vehicles –**

**Part 1:
Machines other than electronic convertor-fed
alternating current motors**

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 1: Machines other than electronic convertor-fed
alternating current motors**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60349-1 has been prepared by IEC technical committee 9: Electric railway equipment. It cancels and replaces IEC 60349 published in 1991 of which it constitutes a technical revision.

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

| | |
|------------|------------------|
| FDIS | Report on voting |
| 9/529/FDIS | 9/547/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 3.

Annexes A and D form an integral part of this standard.

Annexes B, C and E are for information only.

The committee has decided that this publication, remains valid until 2007.

At this date, in accordance with the committee's decision, the publication will be

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

IEC 60349-1 forms part of a series of publications under the general title: *Electric traction – Rotating electrical machines for rail and road vehicles.*

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

Part 1: Machines other than electronic convertor-fed alternating current motors

1 Scope and object

1.1 This part of IEC 60349 is applicable to rotating electrical machines, other than electronic convertor-fed alternating current motors, forming part of the equipment of electrically propelled rail and road vehicles. The vehicles may obtain power either from an external supply or from an internal source.

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

NOTE 1 – This standard also applies to machines installed on trailers hauled by electrically propelled vehicles.

NOTE 2 – The basic requirements of this standard may be applied to rotating electrical machines for special purpose vehicles such as mine locomotives, but it does not cover flameproof or other special features that may be required.

NOTE 3 – It is not intended that this standard should apply to machines on small road vehicles such as battery-fed delivery vehicles, works trucks, etc. Neither does it apply to minor machines such as windscreen wiper motors, etc. that may be used on all types of vehicles.

NOTE 4 – Industrial type machines complying with the IEC 60034 series may be suitable for certain auxiliary applications.

1.2 Electrical inputs or outputs of machines covered by this standard may be as follows:

- a) direct current (including rectified polyphase alternating current);
- b) pulsating current (rectified single-phase alternating current);
- c) unidirectional chopper-controlled current;
- d) single-phase alternating current;
- e) polyphase alternating current (in general three-phase).

1.3 In this standard, the electrical machines concerned are classified as follows.

1.3.1 Traction motors

Motors for propelling rail or road vehicles.

1.3.2 Engine-driven main generators

Generators for supplying power to traction motors on the same vehicle or train.

1.3.3 Main motor-generator sets

Machines obtaining power from a line or battery, and supplying power to traction motors on the same vehicle or train.

1.3.4 Auxiliary motors

Motors for driving compressors, fans, auxiliary generators or other auxiliary machines.

1.3.5 Auxiliary generators

Generators for supplying power for auxiliary services such as air conditioning, heating, lighting, battery charging, etc.

1.3.6 Auxiliary motor-generator sets and auxiliary rotary convertors

Machines which obtain their power from the line or other source to provide an electrical supply for auxiliary services.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60349. 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 60349 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 ISO and IEC maintain registers of currently valid International Standards.

IEC 60034-8, *Rotating electrical machines – Part 8: Terminal markings and direction of rotation of rotating machines*

IEC 60034-14:1996, *Rotating electrical machines – Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of the vibration*

IEC 60050(131), *International Electrotechnical Vocabulary (IEV) – Chapter 131: Electric and magnetic circuits*

IEC 60050(151), *International Electrotechnical Vocabulary (IEV) – Chapter 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, *Thermal evaluation and classification of electrical insulation*

IEC 60411-2, *Power convertors for electric traction – Part 2: Additional technical information*

IEC 60638, *Criteria for assessing and coding of the commutation of rotating electrical machines for traction*

IEC 60850, *Supply voltage of traction systems*

ISO/IEC Guide 2, *Standardization and related activities – General vocabulary*

3 Definitions

3.1 General

For the purpose of this part of IEC 60349, the following definitions apply; for the definitions of general terms used, reference should be made to IEC 60050(131), IEC 60050(151), IEC 60050(411) and IEC 60050(811).

3.2

rating of a machine

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

3.2.1

rated value

numerical value of any quantity included in a rating. For traction machines, certain special quantities are often included such as current ripple factor for a pulsating current motor, excitation condition for a variable field motor, etc.

3.2.2

continuous rating

electrical load the machine can withstand on the test bed for an unlimited period under the conditions specified in 8.1 without exceeding the limits of temperature rise given in table 2, all other appropriate requirements in this standard also being satisfied

continuous ratings of an engine-driven main generator

an engine-driven main generator normally has two continuous ratings which are defined below:

a) continuous rating "at lower voltage"

continuous rating determined by the temperature rise of the windings through which the load current flows (higher value of load current and lower voltage)

b) continuous rating "at higher voltage"

continuous rating determined by the temperature rise of the field windings (lower value of load current and higher voltage)

NOTE 1 – These two continuous ratings correspond to points on the full power regulated characteristic as defined in 3.9.2 or on the inherent characteristic as defined in 3.9.3.

NOTE 2 – Ratings similar to those specified above may, where appropriate, be applied to a main motor-generator set.

3.2.3

short-time (for example, 1 h) rating

electrical load that a machine can withstand 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 8.1 starting with the machine cold (see A.1), all other appropriate requirements in this standard also being satisfied

3.2.4

short-time overload rating

electrical load that a machine can withstand on the test bed for the stated time without exceeding the limits of temperature rise given in table 3 (the test being started and carried out as specified in annex A)

NOTE Short-time overload ratings are of value in determining the suitability of machines for duties which involve relatively long periods of operation below the continuous rating followed by a period above it. These are most likely to occur in locomotive applications. They are not relevant to the repeated short-load cycles of rapid transit and similar duties and should not be specified for such applications.

3.2.5

intermittent duty rating

electrical loads and conditions at which a machine may be operated on a duty cycle without the temperature rises at any point in the cycle exceeding the limits given in table 2

3.2.6

equivalent rating

continuous rating with constant values of voltage, current and speed that, as far as temperature rise is concerned, is equivalent to a long series of the intermittent duty cycles which the machine has to withstand in service. This rating should be agreed between user and manufacturer

3.2.7

guaranteed rating

rating guaranteed by the manufacturer

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3.2.7.1

guaranteed rating of a traction motor

the guaranteed rating is normally a continuous rating, but in special cases the manufacturer and user may agree that it is a short-time or intermittent rating

3.2.7.2

guaranteed ratings of an engine-driven main generator

the guaranteed ratings are normally the two continuous ratings defined in 3.2.2, but in special cases, the manufacturer and user may agree that they are short-time or intermittent ratings

3.2.7.3

guaranteed ratings of a main motor-generator set

the guaranteed ratings are normally the continuous rating, but in special cases, the manufacturer and user may agree that they are short-time or intermittent ratings

3.2.7.4

guaranteed rating of an auxiliary machine

unless otherwise specified, the guaranteed rating is the continuous rating