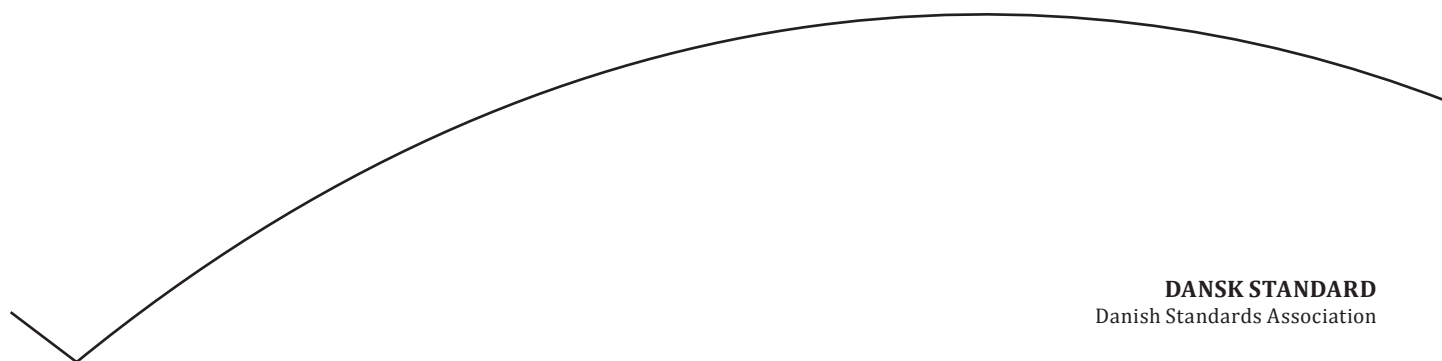


Roterende elektriske maskiner – Del 14: Mekanisk vibration for visse maskiner med drivakselhøjder på 56 mm og højere – Måling, vurdering og grænser ved vibrationssværhedsgrad

Rotating electrical machines – Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity



DANSK STANDARD
Danish Standards Association

Göteborg Plads 1
DK-2150 Nordhavn

Tel: +45 39 96 61 01

Tel: +45 39 96 61 01

dansk.standard@ds.dk

www.ds.dk

DS projekt: M318974

ICS: 29.160.01

Første del af denne publikations betegnelse er:

DS/EN IEC, hvilket betyder, at det er en international standard, der har status som europæisk og dansk standard.

Denne publikations overensstemmelse er:

IDT med: IEC 60034-14:2018

IDT med: EN IEC 60034-14:2018

DS-publikationen er på engelsk.

Denne publikation erstatter: [DS/EN 60034-14:2004](#), [DS/EN 60034-14/A1:2007](#)

DS-publikationstyper

Dansk Standard udgiver forskellige publikationstyper.

Typen på denne publikation fremgår af forsiden.

Der kan være tale om:

Dansk standard

- standard, der er udarbejdet på nationalt niveau, eller som er baseret på et andet lands nationale standard, eller
- standard, der er udarbejdet på internationalt og/eller europæisk niveau, og som har fået status som dansk standard

DS-information

- publikation, der er udarbejdet på nationalt niveau, og som ikke har opnået status som standard, eller
- publikation, der er udarbejdet på internationalt og/eller europæisk niveau, og som ikke har fået status som standard, fx en teknisk rapport, eller
- europæisk præstandard

DS-håndbog

- samling af standarder, eventuelt suppleret med informativt materiale

DS-hæfte

- publikation med informativt materiale

Til disse publikationstyper kan endvidere udgives

- tillæg og rettelsesblade

DS-publikationsform

Publikationstyperne udgives i forskellig form som henholdsvis

- fuldtekstpublikation (publikationen er trykt i sin helhed)
- godkendelsesblad (publikationen leveres i kopi med et trykt DS-omslag)
- elektronisk (publikationen leveres på et elektronisk medie)

DS-betegnelse

Alle DS-publikationers betegnelse begynder med DS efterfulgt af et eller flere præfikser og et nr., fx **DS 383**, **DS/EN 5414** osv. Hvis der efter nr. er angivet et **A** eller **Cor**, betyder det, enten at det er et **tillæg** eller et **rettelsesblad** til hovedstandard, eller at det er indført i hovedstandard.

DS-betegnelse angives på forsiden.

Overensstemmelse med anden publikation:

Overensstemmelse kan enten være IDT, EQV, NEQ eller MOD

- **IDT:** Når publikationen er identisk med en given publikation.
- **EQV:** Når publikationen teknisk er i overensstemmelse med en given publikation, men præsentationen er ændret.
- **NEQ:** Når publikationen teknisk eller præsentationsmæssigt ikke er i overensstemmelse med en given standard, men udarbejdet på baggrund af denne.
- **MOD:** Når publikationen er modificeret i forhold til en given publikation.

This is a preview of "DS/EN IEC 60034-14:2018". Click here to purchase the full version from the ANSI store.

EUROPÄISCHE NORM

October 2018

ICS 29.160.01

Supersedes EN 60034-14:2004

English Version

Rotating electrical machines - Part 14: Mechanical vibration of
certain machines with shaft heights 56 mm and higher -
Measurement, evaluation and limits of vibration severity
(IEC 60034-14:2018)

Machines électriques tournantes - Partie 14: Vibrations
mécaniques de certaines machines de hauteur d'axe
supérieure ou égale à 56 mm - Mesurage, évaluation et
limites de l'intensité vibratoire
(IEC 60034-14:2018)

Drehende elektrische Maschinen - Teil 14: Mechanische
Schwingungen von bestimmten Maschinen mit einer
Achshöhe von 56 mm und höher - Messung, Bewertung
und Grenzwerte der Schwingstärke
(IEC 60034-14:2018)

This European Standard was approved by CENELEC on 2018-09-21. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 2/1906/FDIS, future edition 4 of IEC 60034-14, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60034-14:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-06-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-09-21

This document supersedes EN 60034-14:2004.

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

Endorsement notice

The text of the International Standard IEC 60034-14:2018 was approved by CENELEC as a European Standard without any modification.

This is a preview of "DS/EN IEC 60034-14:2...". Click here to purchase the full version from the ANSI store.

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1	-	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1 ¹	-
IEC 60034-7	-	Rotating electrical machines - Part 7: Classification of types of constructions and mounting arrangements (IM Code)	EN 60034-7	-
ISO 2954	-	Mechanical vibration of rotating and reciprocating machinery; Requirements for instruments for measuring vibration severity	-	-
ISO 10817-1	-	Rotating shaft vibration measuring systems - Part 1: Relative and absolute sensing of radial vibration	-	-
ISO 20816-1	-	Mechanical vibration - Measurement and evaluation of machine vibration - Part 1: General guidelines	-	-
ISO 21940-32	-	Mechanical vibration - Rotor balancing - Part 32: Shaft and fitment key convention	-	-

¹Under preparation. Stage at the time of publication: FprEN 60034-1:2017.

This is a preview of "DS/EN IEC 60034-14:2018". [Click here to purchase the full version from the ANSI store.](#)

This is a preview of "DS/EN IEC 60034-14:2...". Click here to purchase the full version from the ANSI store.



Edition 4.0 2018-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Rotating electrical machines –

Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity

Machines électriques tournantes –

Partie 14: Vibrations mécaniques de certaines machines de hauteur d'axe supérieure ou égale à 56 mm – Mesurage, évaluation et limites de l'intensité vibratoire

This is a preview of "DS/EN IEC 60034-14:2018". Click here to purchase the full version from the ANSI store.



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2018 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 21 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

This is a preview of "DS/EN IEC 60034-14:2...". Click here to purchase the full version from the ANSI store.



Edition 4.0 2018-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Rotating electrical machines –

Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity

Machines électriques tournantes –

Partie 14: Vibrations mécaniques de certaines machines de hauteur d'axe supérieure ou égale à 56 mm – Mesurage, évaluation et limites de l'intensité vibratoire

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.160.01

ISBN 978-2-8322-5902-3

Warning! Make sure that you obtained this publication from an authorized distributor. Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.
--

This is a preview of "DS/EN IEC 60034-14:2...". Click here to purchase the full version from the ANSI store.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	6
4 Measurement quantities.....	7
4.1 General.....	7
4.2 Vibration magnitude	7
4.3 Relative shaft vibration.....	7
5 Measurement equipment.....	7
6 Machine mounting	8
6.1 General.....	8
6.2 Free suspension	8
6.3 Rigid mounting.....	8
6.3.1 Foundation	8
6.3.2 Horizontal machines.....	9
6.3.3 Vertical machines.....	9
6.4 Active environment determination	9
7 Conditions of measurement.....	10
7.1 Key.....	10
7.2 Measurement positions and directions	10
7.2.1 Measurement positions for vibration	10
7.2.2 Measurement positions for relative shaft displacement.....	10
7.3 Test conditions.....	10
7.4 Vibration transducer	10
8 Limits of bearing housing vibration	11
8.1 Limits of vibration magnitude	11
8.2 Limits of vibration velocity with twice-line frequency for a.c. machines.....	12
8.3 Axial vibration	12
9 Limits of relative shaft vibration.....	12
Bibliography	18
Figure 1 – Minimum elastic displacement as a function of rated speed	13
Figure 2 – Preferred positions of measurement applicable to one or both ends of the machine	14
Figure 3 – Measurement positions for those ends of machines where measurements according to Figure 2 are not possible without disassembly of parts.....	14
Figure 4 – Measurement positions for pedestal bearing	15
Figure 5 – Preferred circumferential position of transducers for the measurement of relative shaft displacement.....	15
Figure 6 – Measurement positions for vertical machines (measurements to be made at the bearing housing; when not accessible, then as close as possible)	16
Figure 7 – Vibration limit diagram for shaft heights $H > 132$ mm.....	17
Table 1 – Limits of maximum vibration magnitude in displacement (r.m.s.) and velocity (r.m.s.) for shaft height H	11

This is a preview of "DS/EN IEC 60034-14:2018". Click [here](#) to purchase the full version from the ANSI store.

Table 2 – Limits for the maximum shaft vibration (S_{p-p}) and the maximum run-out.....	13
---	----

This is a preview of "DS/EN IEC 60034-14:2...". Click here to purchase the full version from the ANSI store.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60034-14 has been prepared by IEC technical committee 2: Rotating machinery.

This fourth edition cancels and replaces the third edition, published in 2003, and its amendment 1, published in 2007. It constitutes a technical revision.

The significant technical changes with respect to the previous edition are:

- a) 6.2 is significantly changed to better explain the definition "free suspension".
- b) 6.3: a second method of rigid mount is added since the first method is not always possible on the test floor.
- c) 7.1: an improved option for shaft key is defined.

This is a preview of "DS/EN IEC 60034-14:2...". [Click here to purchase the full version from the ANSI store.](#)

- d) Clause 8: considerable effort to harmonize with NEMA MG 1 and IEEE 841 and API 541, and also establish levels which are achievable and more in line with best practices. Table 1 is reduced to two shaft-height range sections.
- e) 8.2: definition of twice line frequency simplified along with Figure 7 added.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
2/1906/FDIS	2/1914/RVD

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

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

A list of all parts in the IEC 60034 series, published under the general title *Rotating electrical machines*, can be found on the IEC website.

NOTE For A table of cross-references of all IEC TC 2 publications can be found in the IEC TC 2 dashboard on the IEC website.

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

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

This is a preview of "DS/EN IEC 60034-14:2...". [Click here to purchase the full version from the ANSI store.](#)

ROTATING ELECTRICAL MACHINES –

Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity

1 Scope

This part of IEC 60034 specifies the factory acceptance vibration test procedures and vibration limits for certain electrical machines under specified conditions, when uncoupled from any load or prime mover.

It is applicable to DC and three-phase AC machines, with shaft heights 56 mm and higher and a rated output up to 50 MW, at operational speeds from 120 min⁻¹ up to and including 15 000 min⁻¹.

This document is not applicable to machines mounted *in situ* (on site), three-phase commutator motors, single-phase machines, three-phase machines operated on single-phase systems, vertical waterpower generators, turbine generators greater than 20 MW and machines with magnetic bearings or series-wound machines.

NOTE For machines measured *in situ*, refer to applicable parts of ISO 20816, ISO 10816 and ISO 7919.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

IEC 60034-7, *Rotating electrical machines – Part 7: Classification of types of constructions and mounting arrangements (IM Code)*

ISO 2954, *Mechanical vibration of rotating and reciprocating machinery – Requirements for instruments for measuring vibration severity*

ISO 10817-1, *Rotating shaft vibration measuring systems – Part 1: Relative and absolute sensing of radial vibration from rotating shafts*

ISO 20816-1, *Mechanical vibration – Measurement and evaluation of machine vibration – Part 1: General guidelines*

ISO 21940-32, *Mechanical vibration – Rotor balancing – Part 32: Shaft and fitment key convention*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60034-1 apply.