BS EN IEC 60034-2-3:2020

BSI Standards Publication

Rotating electrical machines

Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors

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National foreword

This British Standard is the UK implementation of EN IEC 60034-2-3:2020. It is identical to IEC 60034-2-3:2020. It supersedes PD IEC/TS 60034-2-3:2013, which is withdrawn.

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.

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Published by BSI Standards Limited 2020

ISBN 978 0 580 95502 0

ICS 29.160.01

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2020.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60034-2-3

May 2020

ICS 29.160.01

English Version

Rotating electrical machines - Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors (IEC 60034-2-3:2020)

Machines électriques tournantes - Partie 2-3: Méthodes d'essai spécifiques pour la détermination des pertes et du rendement des moteurs à courant alternatif alimentés par convertisseur (IEC 60034-2-3:2020)

Drehende elektrische Maschinen - Teil 2-3: Besondere Verfahren zur Bestimmung der Verluste und des Wirkungsgrades von umrichtergespeisten Wechselstrommaschinen (IEC 60034-2-3:2020)

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European foreword

The text of document 2/1974/FDIS, future edition 1 of IEC 60034-2-3, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60034-2-3:2020.

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) 2021-01-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-04-23

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The text of the International Standard IEC 60034-2-3:2020 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/TS 60034-25:2014	NOTE	Harmonized as CLC/TS 60034-25:—[1] (not modified)
IEC 61800-2:2015	NOTE	Harmonized as EN 61800-2:2015 (not modified)
IEC 61800-4:2002	NOTE	Harmonized as EN 61800-4:2003 (not modified)

[1] To be published. Stage at the time of publication: CLC/prTS 60034-25:2017.

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Annex ZA
(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.

Publication	Year	Title	EN/HD	Year
IEC 60034-1	2017	Rotating electrical machines - Part 1: Rating and performance	-	-
IEC 60034-2-1	2014	Rotating electrical machines - Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)	EN 60034-2-1	2014
IEC 61000-2-4	2002	Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances	EN 61000-2-4	2002
IEC 61800-9-2	2017	Adjustable speed electrical power drive systems - Part 9-2: Ecodesign for power drive systems, motor starters, power electronics and their driven applications - Energy efficiency indicators for power drive systems and motor starters	EN 61800-9-2	2017

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors

FOREWORD

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International Standard IEC 60034-2-3 has been prepared by IEC technical committee 2: Rotating machinery.

This first edition cancels and replaces IEC TS 60034-2-3, published in 2013.

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

FDIS	Report on voting
2/1974/FDIS	2/1982/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.

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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.

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.

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INTRODUCTION

The objective of this document is to define test methods for determining total losses including additional high frequency motor losses and efficiency of converter-fed motors. Additional high frequency losses appear in addition to the losses on nominally sinusoidal power supply as determined by the methods of IEC 60034-2-1:2014. Results determined according to this document are intended to allow comparison of losses and efficiency of different motors when fed by converters.

Furthermore, the document gives seven standardized operating points to characterize the development of losses and efficiency across the whole torque/speed range. An interpolation procedure is provided to calculate losses and efficiency at any operating point (torque, speed).

In power-drive systems (PDS), the motor and the frequency converter are often manufactured by different suppliers. Motors of the same design are produced in large quantities. They may be operated from the grid or from frequency converters of many different types, supplied by many different manufacturers. The individual converter properties (switching frequency, DC link voltage level, etc.) will also influence the system efficiency. As it is impractical to determine motor losses for every combination of motor, frequency converter, connection cable, output filter and parameter settings, this document describes a limited number of approaches, depending on the voltage level and the rating of the machine under test.

The losses determined according to this document are not intended to represent the losses in the final application. They provide, however, an objective basis for comparing different motor designs with respect to suitability for converter operation.

In general, when fed from a converter, motor losses are higher than during operation on a nominally sinusoidal system. The additional high frequency losses depend on the harmonic spectrum of the impressed converter output quantity (either current or voltage) which is influenced by its circuitry and control method. For further information, see IEC TS 60034-25:2014.

It is not the purpose of this document to define test procedures either for power drive systems or for frequency converters alone.

Comparable converter

Latest experience and theoretical analysis have shown that the additional high frequency motor losses generally do not increase much with load. The methods in this document are mainly based on supplies from converters with pulse width modulation (PWM).

With respect to these types of converters and the growing need for verification of compliance with national energy efficiency regulations, this document defines a so-called comparable converter for testing of low voltage motors.

In principle, the comparable converter is a voltage source with a typical high frequency harmonic content supplying the machine under test. It is not applicable to medium voltage motors.

Limitations for the application of the comparable converter

It has to be noted that the test method with the comparable converter described herein is a standardized method intended to give comparable efficiency figures for standardized test conditions. A motor ranking with respect to suitability for converter operation may be derived, but it is not equivalent to determining of the actual motor losses for operation with a specific converter which requires a test of the whole power drive system (PDS) with the specific converter used in the final application.

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