Irish Standard
I.S. EN 60034-28:2013

Rotating electrical machines -- Part 28: Test methods for determining quantities of equivalent circuit diagrams for three-phase low-voltage cage induction motors (IEC 60034 -28:2012 (EQV))

I.S. EN 60034-28:2013

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SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

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English version

Rotating electrical machines - Part 28: Test methods for determining quantities of equivalent circuit diagrams for three-phase low-voltage cage induction motors

(IEC 60034-28:2012)

Machines électriques tournantes - Partie 28: Méthodes d'essai pour la détermination des grandeurs des schémas d'équivalence des circuits pour moteurs à induction à cage basse tension triphasés
(CEI 60034-28:2012)

Drehende elektrische Maschinen - Teil 28: Prüfverfahren zur Bestimmung der Ersatzschaltbildgrößen dreiphasiger Niederspannungs-Käfigläufer-Asynchronmotoren
(IEC 60034-28:2012)

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

The text of document 2/1685/FDIS, future edition 2 of IEC 60034-28, prepared by IEC/TC 2 "Rotating machinery" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60034-28:2013.

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)	2013-12-14
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-01-17

This document supersedes EN 60034-28:2007.

EN 60034-28:2013 includes the following significant technical changes with respect to EN 60034-28:2007:

a) the formulae are now all given for equivalent star-connection equivalent circuit diagrams. They are applied even in the case of delta connected windings. All formulae for delta connected equivalent circuit diagrams have been moved to notes;

b) procedures for the determination of equivalent circuit parameters from a load curve test as an alternative to the reverse rotation and locked rotor tests have been added.

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

Endorsement notice

The text of the International Standard IEC 60034-28:2012 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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.

Publication	Year	Title	EN/HD	Year
IEC 60034-1 (mod)	2010	Rotating electrical machines - Part 1: Rating and performance	EN 60034-1 + corr. October	2010 2010
IEC 60034-2-1	-	Rotating electrical machines - Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)	EN 60034-2-1	-
IEC 60034-2-2	-	Rotating electrical machines - Part 2-2: Specific methods for determining separate losses of large machines from tests - Supplement to IEC 60034-2-1	EN 60034-2-2	-
IEC/TS 60034-2-3 [1)]	-	Rotating electrical machines - Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors	-	-
IEC/TS 60034-25	-	Rotating electrical machines - Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply	CLC/TS 60034-25	-
IEC 60044	Series	Instrument transformers	EN 60044	Series
IEC 60051-1	-	Direct acting indicating analogue electrical measuring instruments and their accessories - Part 1: Definitions and general requirements common to all parts	EN 60051-1	-
IEC 60072-1	-	Dimensions and output series for rotating electrical machines - Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1 080	-	-

[1)] To be published.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 28: Test methods for determining quantities of equivalent circuit diagrams for three-phase low-voltage cage induction 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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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 60034-28 has been prepared by IEC technical committee 2: Rotating machinery.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition.

a) The formulae are now all given for equivalent star-connection equivalent circuit diagrams. They are applied even in the case of delta connected windings. All formulae for delta-connected equivalent circuit diagrams have been moved to notes.
b) Procedures for the determination of equivalent circuit parameters from a load curve test as an alternative to the reverse rotation and locked rotor tests have been added.

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

FDIS	Report on voting
2/1685/FDIS	2/1688/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.

NOTE 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 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Equivalent circuits are widely used in the control of adjustable speed drives with induction motors supplied by frequency inverters. The motor parameters are required for the realisation of flux oriented control or other model-based control algorithms. Their knowledge is required by suppliers and system engineers, especially when motors and frequency inverters from different suppliers are combined.

This standard provides a standardized test procedure to determine the electric motor parameters. At the same time the draft offers an improved understanding of the equivalent circuit method. The procedures can be carried out in laboratories equipped for standard electric machinery tests.

NOTE This standard's main purpose is for assistance in modelling frequency controlled motors. Due to the simplifications the results cannot be used to determine motor performance or efficiency accurately.

A related technical specification is IEC/TS 60034-25 where required motor parameters are listed, but their definition and methods of determination are not included.

ROTATING ELECTRICAL MACHINES –

Part 28: Test methods for determining quantities of equivalent circuit diagrams for three-phase low-voltage cage induction motors

1 Scope

This part of the IEC 60034 series applies to three-phase low-voltage cage induction motors of frame numbers 56 to 400 as specified in IEC 60072-1.

This standard establishes procedures to obtain values for elements of single phase equivalent circuit diagrams from tests and defines standard elements of these diagrams.

2 Normative references

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

IEC 60034-1:2010, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-2-1, *Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)*

IEC 60034-2-2, *Rotating electrical machines – Part 2-2: Specific methods for determining separate losses of large machines from tests – Supplement to IEC 60034-2-1*

IEC 60034-2-3[1], *Rotating electrical machines – Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors*

IEC/TS 60034-25[2], *Rotating electrical machines – Part 25: A.C. Motors when used in power drive systems - Application guide*

IEC 60044 (all parts), *Instrument transformers*

IEC 60051-1, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 1: Definitions and general requirements common to all parts*

IEC 60072-1, *Dimensions and output series for rotating electrical machines – Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080*

3 Terms, definitions, symbols and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60034-1:2010 apply.

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1 To be published.

2 A revision of this publication is currently under preparation.