

Australian Standard[®]

Rotating electrical machines

Part 12: Starting performance of single-speed three-phase cage induction motors

STANDARDS
Australia



This Australian Standard® was prepared by Committee EL-009, Rotating Electrical Machinery. It was approved on behalf of the Council of Standards Australia on 11 June 2009. This Standard was published on 15 July 2009.

The following are represented on Committee EL-009:

- Airconditioning and Refrigeration Equipment Manufacturers Association of Australia
 - Australian Chamber of Commerce and Industry
 - Australian Electrical and Electronic Manufacturers Association
 - Australian Greenhouse Office, Department of the Environment and Water Resources
 - Australian Industry Group
 - Bureau of Steel Manufacturers of Australia
 - Department of Defence (Australia)
 - Electrical Apparatus Service Association
 - Energy Efficiency and Conservation Authority of New Zealand
 - Engineers Australia
 - Ministry of Economic Development (New Zealand)
 - Registered Master Builders
-

This Standard was issued in draft form for comment on 10 October 2009.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard[®]

Rotating electrical machines

Part 12: Starting performance of single-speed three-phase cage induction motors

Originally as part of AS C34-1927.
Previous edition AS 1359.41—1986.
Redesignated AS 60034.12—2009.

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 9193 X

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-009, Rotating Electrical Machinery to supersede AS 1359.41—1986, *Rotating electrical machines—General requirements—General characteristics* on publication.

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EL-009. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide the rotating electrical machine industry with standard duties, ratings, operating conditions and performance.

This Standard is identical with, and has been reproduced from IEC 60034-12, Part 2 (2002), *Rotating electrical machines—Part 12: Starting performance of single-speed three-phase cage induction motors*, including its Amendment 1:2007.

This Standard is Part 12 of a Series dealing with rotating electrical machines. Additional parts will be added from time to time. This Series when complete will consist of the following parts:

AS

- | | |
|------------|---|
| 1359.102.2 | Rotating electrical machines—Methods for determining losses and efficiency of rotating electrical machinery from tests—Measurement of losses by the calorimetric method |
| 60034 | Rotating electrical machines |
| 60034.1 | Part 1: Rating and performance |
| 60034.2.1 | Part 2.1: Methods for determining losses and efficiency from tests (excluding machines for traction vehicles) |
| 60034.3 | Part 3: Specific requirements for synchronous generators driven by steam turbines or combustion gas turbines |
| 60034.4 | Part 4: Methods for determining synchronous machine quantities from tests |
| 60034.5 | Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code)—Classification |
| 60034.6 | Part 6: Method of cooling (IC code) |
| 60034.7 | Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM code) |
| 60034.8 | Part 8: Terminal markings and direction of rotation |
| 60034.9 | Part 9: Noise limits |
| 60034.11 | Part 11: Thermal protection |
| 60034.12 | Part 12: Starting performance of single-speed three-phase cage induction motors (this Standard) |
| 60034.14 | Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher—Measurement, evaluation and limits of vibration severity |
| 60034.15 | Part 15: Impulse voltage withstand levels of rotating a.c. machines with form-wound stator coils |
| 60034.16 | Part 16: Excitation systems for synchronous machines (all parts) |
| 60034.17 | Part 17: Cage induction motors when fed from converters—Application guide |
| 60034.18 | Part 18: Functional evaluation of insulation systems (all parts) |
| 60034.19 | Part 19: Specific test methods for d.c. machines on conventional and rectifier-fed supplies |
| 60034.20.1 | Part 20.1: Control motors—Stepping motors |
| 60034.22 | Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets |
| 60034.23 | Part 23: Specification for the refurbishing of rotating electrical machines |

AS	
60034.25	Part 25: Guidance for the design and performance of a.c. motors specifically designed for converter supply
60034.26	Part 26: Effects of unbalanced voltages on the performance of three-phase cage induction motors
60034.27	Part 27: Off-line partial discharge measurements on the stator winding insulation of rotating electrical machines
60034.28	Part 28: Test methods for determining quantities of equivalent circuit diagrams for the three-phase low voltage cage induction motors
60034.29	Part 29: Equivalent loading and superposition techniques—Indirect testing to determine temperature rise.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- (b) In the source text 'IEC 60034-12' should read 'AS 60034.12'.
- (c) A full point should be substituted for a comma when referring to a decimal marker.

CONTENTS

	<i>Page</i>
1 Scope	1
2 Normative references	1
3 Definitions	2
4 Symbols	3
5 Designation	3
5.1 General	3
5.2 Design N	3
5.3 Design NY	3
5.4 Design H	3
5.5 Design HY	3
6 Design N requirements	3
6.1 Torque characteristics	3
6.2 Locked rotor apparent power	4
6.3 Starting requirements	4
7 Design NY starting requirements	4
8 Design H requirements	4
8.1 Starting torque	4
8.2 Locked rotor apparent power	4
8.3 Starting requirements	4
9 Design HY starting requirements	5

STANDARDS AUSTRALIA

Australian Standard

Rotating electrical machines

Part 12: Starting performance of single-speed three-phase cage induction motors

1 Scope

This International standard specifies the parameters for four designs of starting performance of single-speed three-phase 50 Hz or 60 Hz cage induction motors in accordance with IEC 60034-1 that:

- have a rated voltage up to 1 000 V;
- are intended for direct-on-line or star-delta starting;
- are rated on the basis of duty type S1;
- are constructed to any degree of protection.

The standard also applies to dual voltage motors provided that the flux saturation level is the same for both voltages and to motors having type of protection 'e – increased safety' with temperature classes T1 to T3 complying with IEC 60079-0 and IEC 60079-7

NOTE 1 It is not expected that all manufacturers will produce machines for all four designs. The selection of any specific design in accordance with this standard will be a matter of agreement between the manufacturer and the purchaser.

NOTE 2 Designs other than the four specified may be necessary for particular applications.

NOTE 3 The values of torque and apparent power given in this standard are limiting values (that is, minimum or maximum without tolerance), but it should be noted that values given in manufacturers' catalogues may include tolerances in accordance with IEC 60034-1.

NOTE 4 The values tabled for locked rotor apparent power are based on r.m.s. symmetrical steady state locked rotor currents; at motor switch on there will be a one-half cycle asymmetrical instantaneous peak current which may range from 1,8 to 2,8 times the steady state value. The current peak and decay time are a function of the motor design and switching angle.

2 Normative references

The following referenced documents are indispensable for the application 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.

References to International standards that are struck through in this clause are replaced by references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

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

AS 60034.1, Rotating electrical machines, Part 1: Rating and performance

~~IEC 60079-0, Electrical apparatus for explosive gas atmospheres – Part 0: General requirements~~

AS/NZS 60079.0, Electrical apparatus for explosive gas atmospheres, Part 0: General requirements (identical to IEC 60079-0)