AS/NZS 1359.5:2004

Australian/New Zealand Standard™

Rotating electrical machines—General requirements

Part 5: Three-phase cage induction motors—High efficiency and minimum energy performance standards requirements

STANDARDS AUSTRALIA

STANDARDS NEW ZEALAND
Paerewa Aotearoa

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-046, Rotating Electrical Machinery—Efficiency. It was approved on behalf of the Council of Standards Australia on 7 July 2004 and on behalf of the Council of Standards New Zealand on 23 July 2004.
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The following are represented on Committee EL-046:

Airconditioning and Refrigeration Equipment Manufacturers Association of Australia
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Australian Greenhouse Office
Bureau of Steel Manufacturers of Australia
Electricity Supply Association of Australia
Energy Efficiency and Conservation Authority of New Zealand
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-046, Rotating Electrical Machinery—Efficiency to supersede AS/NZS 1359.5:2000 on publication. AS/NZS 1359.5:2000 will remain an available superseded Standard.

The objective of this part of the Standard is to specify the minimum energy performance standards (MEPS) requirements for electric motors commonly used in the industry. This Standard also specifies the performance levels required for high efficiency motors. The MEPS levels in this Standard are intended to eliminate the low efficiency motors from the Australian and New Zealand markets.

This Standard has seamless interface with AS/NZS 1359.102.3, *Rotating electrical machines—General requirements—Methods for determining losses and efficiency—Three phase cage induction motors* and the equivalent IEC Standard 61972, *Method for determining losses and efficiency of three-phase cage induction motors*.

EL-046 is reviewing IEC 61972 for adoption as a Joint AS/NZS Standard to replace AS/NZS 1359.102.3.

This part of the Standard is a mandatory reference document for manufacturers and importers of commonly used three-phase case induction motors and is published with the approval of the regulatory authorities. In Australia, it is structured for reference in MEPS regulation, under the effective joint control of the State and Territory energy regulators. Regulatory authorities will enforce MEPS and high efficiency levels specified in this Standard. This Standard includes the revised efficiency requirements which commence from 1 April 2006 for minimum efficiency (MEPS) and 1 April 2005 for high efficiency. Please contact the equipment energy efficiency regulator in your jurisdiction to ascertain the status of MEPS transition arrangements specified in this Standard. Contact details for these regulatory bodies together with information on making a MEPS application are available from http://www.energyrating.gov.au

In New Zealand, Energy Efficiency (Energy Using Products) Regulations 2002 had a commencement date of 1 July 2002 for MEPS for three-phase electric motors. The introductory date for the revised efficiency requirement will be addressed by an amendment to this Standard and a subsequent gazette notice.

In the earlier edition of this Standard—

(a) the efficiency levels were finalized based on the analysis of the Australian market in 1997 and subsequent negotiations with the industry;

(b) the MEPS levels (named as Level 2 in this Standard) coincide with the European efficiency Level 2 for 2-pole and 4-pole configurations where values existed;

(c) the high efficiency levels (named as Level 1 in this Standard) coincide with European efficiency Level 1, where values existed for 2 pole and 4 pole configurations. These were similar to United States/Canadian MEPS levels introduced in 1997; and

(d) the high efficiency levels for 6-pole configurations were somewhat less stringent than United States/Canadian MEPS levels, introduced in 1997.

In this Standard—

(i) the revised MEPS levels for motors of all pole configurations is set at the high efficiency levels (Level 1) of the previous edition of this Standard; and

(ii) the high efficiency levels (named as Heff) are set, based on a 15% reduction of losses from the levels stated in the previous edition.

The MEPS relevant parts of the AS/NZS Standards for motors will be reviewed in the next phase in line with the development of publications from EL-009 and/or the IEC Committee TC 2. The MEPS levels in the next phase will not however commence earlier than 2010.

The terms ‘normative’ and ‘informative’ are used to define the application of the appendix to which they apply. A normative appendix is an integral part of a standard, whereas an informative appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

CONTENTS

Page

FOREWORD

This Standard features two test methods for determination of losses.

Method A: This method is identical to Method 1 of IEC 61972. It is also technically equivalent to the method specified in IEEE 112-B(USA). This method requires direct measurement of additional load losses and differs from Method B described below.

Method B: This method is drawn from AS 1359.102.1, which is based on IEC 60034-2, including Amendment 1:1995 and Amendment 2:1996. In this method, an allowance of 0.5% fixed stray (additional load) loss is assumed for all the motors.

Previous surveys of the efficiency of machines on the Australian market used figures based on Method B.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard applies to three-phase cage induction motors with ratings from 0.73 kW and up to but not including 185 kW. The scope covers motors of rated voltages up to 1100 V a.c.

NOTE: This range includes motors with ratings of 1 hp and 1 CV/PS (French/German or metric horsepower).

This Standard specifies the minimum efficiency values that a motor shall meet, and also the minimum efficiency values that a motor shall meet in order to be designated 'high efficiency'. Two methods of measurement are prescribed (Method A and Method B) for determination of efficiency. See Sections 2 and 3 for details. Only one method need be applied.

NOTES:

1 Minimum efficiency and high efficiency values covered by this Standard are categorized based on the regulatory dates.

2 In New Zealand, the MEPS covered by this Standard will be addressed by an amendment to this Standard and a subsequent gazette notice.

1.2 EXCLUSIONS

The MEPS requirements of this Standard do not apply to the following:

(a) Submersible (sealed) motors specifically designed to operate wholly immersed in a liquid.

NOTE: This exclusion does not apply to motors that normally operate with a surrounding medium of air but that may withstand inundation.

(b) Motors that are integral with, and not separable from, a driven unit.

NOTE: An example is a motor constructed on the same shaft as a compressor for an air-conditioning unit.

(c) Multi-speed motors.

(d) Motors that have been granted exemption by the relevant Australian or New Zealand regulatory authority due to their application placing restraints on the motor dimensions or other key design aspects.

(e) Motors for use only for short-time duty cycle applications (e.g. those used for hoists, roller doors and cranes) which have a duty type rating of S2 under IEC 60034-12.

NOTE: Exclusion from MEPS for these types of motors is based on their low projected usage and hence low total energy consumption.

This Standard does not apply to a rewound motor except where a supplier claims the rewound motor meets the efficiency requirement of one of the levels defined in this Standard.