

## **EXPLANATORY STATEMENT**

Issued by the authority of the Minister for Energy and Emissions Reduction

*Greenhouse and Energy Minimum Standards Act 2012*

*Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors)  
Determination 2019*

### **Purpose and Operation**

The *Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2019* (the Determination) establishes minimum energy efficiency requirements, and associated requirements for conducting tests, for three phase cage induction motors.

This Determination revokes and replaces the *Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2018* (revoked Determination).

This Determination reinstates Method B of the *Institute of Electrical & Electronics Engineers (IEEE) 112:2004 Test Procedure for Polyphase Induction Motors and Generators* test standard contained in the *Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2012* (2012 Determination) as an alternative test method to that prescribed in the *International Electrotechnical Commission (IEC) 60034-2-1 Ed. 2.0 (Bilingual 2014) Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)* test standard (IEC 60034-2-1). It also includes the latest edition of IEEE 112:2004 test standard, IEEE 112:2017. In this Explanatory Statement, these IEEE test standards are collectively known as IEEE 112.

During consultation on the exposure draft of the revoked Determination, there was agreement by stakeholders to remove all test standards prescribed in the 2012 Determination, other than IEC 60034-2-1. Consequently, under the revoked Determination, any applications to renew existing registrations, as well as new registrations, would need to be accompanied with a test report undertaken in accordance with IEC 60034-2-1.

After the revoked Determination was registered, however, some motors suppliers requested the reinstatement of Method B of IEEE 112 to facilitate the renewal of existing registrations of 60 Hz motors, as well as to facilitate the testing of 60 Hz motors for future registrations. These motors suppliers, while aware that the revoked Determination would only allow tests to IEC 60034-2-1 to be used, they found subsequently that use of IEC 60034-2-1 would increase the difficulty of testing 60 Hz motors, which had previously been tested to IEEE 112.

Independent expert advice indicated that testing motors to IEEE 112 would give results that are technically equivalent to the results obtained by testing to IEC 60034-2-1. Reinstating this alternative test method in this Determination will prevent suppliers having to retest certain 60Hz motors to a different test standard.

## **Background**

The *Greenhouse and Energy Minimum Standards Act 2012* (the Act) established a national framework for regulating the energy efficiency of products supplied or used within Australia, implementing the Council of Australian Governments' (COAG) commitment to establish national legislation to regulate energy efficiency and labelling standards for appliances and other products. The Act permits the Australian Government to set mandatory minimum efficiency requirements, to drive greater energy efficiency for products that are regulated. The Act also allows the Australian Government to set nationally-consistent labelling requirements, to increase Australians' awareness of options to improve energy efficiency and reduce energy consumption, costs and greenhouse gas emissions. The national framework harmonises the regulation of equipment energy efficiency by replacing seven individual state and territory legislative frameworks.

The minimum efficiency levels, or energy use requirements, relate to requirements for the minimum allowable energy efficiency of a product. These are referred in the Determination as greenhouse and energy minimum standards (GEMS) level requirements and are generally known as minimum energy performance standards (MEPS). They provide an energy efficiency 'floor' for that product type, below which individual models of that product type cannot be sold. The level of the floor can be raised over time, providing a means of raising the average energy efficiency of the product type.

Other regulatory requirements possible under the Act include requirements relating to energy labelling, high efficiency levels, product performance, and the impact of the product on the environment or the health of human beings. High efficiency levels and energy labelling requirements are set in this Determination. High efficiency level requirements allow suppliers or manufacturers to differentiate more efficient products in the market where the product does not carry an energy rating label, provided they meet a specified efficiency benchmark over and above the nominated GEMS level requirements. For three phase cage induction motors, specific information must be marked on the motor to ensure that consumers can easily identify a product's specifications.

## **Authority**

Under subsection 23(1) of the Act, the Minister may, by legislative instrument, make a determination (a GEMS determination) that specifies one or more classes of products if the products in those classes use energy or affect the amount of energy used by other products. A GEMS determination is the vehicle by which energy efficiency requirements (GEMS level requirements), energy labelling requirements (GEMS labelling requirements), and other requirements for a product class are established.

Section 35 of the Act allows a Minister to make replacement determinations through revoking the previous determination and making a new determination to replace the

revoked determination. The new determination can specify the new requirements and retain any relevant existing requirements from the revoked determination. The revoked determination ceases to be in force immediately before the replacement determination comes into force.

Under section 36 of the Act, a replacement determination must specify whether it affects the registration of models of GEMS products. Under subsection 36(2) of the Act, if a replacement determination does not specify that it affects a model's registration, the model is taken to be registered against the replacement determination. If a replacement determination specifies that it affects a model's registration, then under paragraph 48(2)(c) of the Act, the model's registration ceases to be in force from the time the replacement determination comes into force (or the beginning of the day a registration of the model against the replacement determination comes into force, whichever is the earlier).

Under section 25 of the Act, the GEMS level requirements specified in a GEMS determination may be:

- requirements relating to one or more of the following:
  - the amount of energy used in operating products in the relevant product classes;
  - the amount of greenhouse gases resulting from operating products in the relevant product class;
  - the effect of those products on the amount of energy used by operating other products; and
- requirements for conducting tests in relation to products in the relevant product class in order to determine whether the products meet the specified requirements.

Under section 26 of the Act, the GEMS labelling requirements for a product class specified in a GEMS determination are:

- requirements relating to the information that must be communicated in connection with supplying or offering to supply products in the relevant product class;
- requirements relating to the manner in which that information must be communicated; and
- requirements for conducting tests in relation to products in the relevant product class in order to determine whether the products meet the specified requirements.

Under section 27 of the Act, other requirements that may be specified in a GEMS determination are:

- requirements for products in the relevant product class to meet a specified level (the high efficiency level) at a particular time;
- requirements relating to the performance of products in the relevant product class;

- requirements relating to the impact of products in that product class on the environment or on the health of human beings;
- requirements for conducting tests in relation to products in the relevant product class in order to determine whether the products meet the specified requirements; and
- requirements of a kind specified in the regulations for the purposes of that paragraph.

### **Incorporated material and copyright**

The Determination references IEC and IEEE standards. The use of these international standards is consistent with the Australian Government’s policy of harmonisation with international standards where appropriate. The Determination includes definitions and text extracted from the relevant IEC standards. This makes it possible to determine if a product is covered by (or excluded from) the Determination and the minimum efficiency levels without having to refer to the standards. The IEEE test standards referenced in the Determination are identified as alternatives to reduce costs for members of the regulated community who already have access to these standards.

Commercial users who have ascertained that they are likely to be covered by the Determination (which is possible from reading the Determination in isolation) would be expected to purchase the relevant referenced standards in order to comply with the Determination. The referenced standards can be purchased from Standards Australia through its current licensee, SAI Global.

Options for accessing the referenced standards without purchasing them are limited, as the standards subscriptions of the National Library and other libraries does not generally cover international standards. While this is currently the case, the COAG Industry Skills Council Standards Accessibility Working Group continues to work on solutions to ensure greater access to standards.

Standards Australia is also working towards improving value and access to Australian Standards. SAI Global has had an exclusive distribution arrangement with Standards Australia since 2003. In February 2019, Standards Australia announced that it will look to improve access to standards and any future distribution agreement with SAI Global will be non-exclusive. Standards Australia intend to commence a consultation process with stakeholders to “understand how the current and future distribution models can deliver easier access for those who use Standards Australia’s content”.

This Determination contains a copyright notice that acknowledges the inclusion of material that is copyright IEC. The copyright notice clarifies the permitted use of the Determination by those seeking to comply with their obligations under it.

### **Consultation**

The Australian Government has consulted with industry stakeholders and the New Zealand Energy Efficiency and Conservation Authority. In 2012, a stakeholder consultation process commenced that examined the energy efficiency regulatory arrangements applicable to three phase cage induction motors. In 2013, a motors

product profile document was published and industry consultations were undertaken. Stakeholders called for the:

- adoption of a single internationally-recognised test standard;
- alignment of Australia’s minimum efficiency levels with recognised international efficiency levels;
- adoption of an appropriate test standard for totally enclosed air over motors; and
- adoption of the ‘family of models’ registration facility.

To address these issues, a draft Determination was developed with input from stakeholders including key industry representatives. In March 2018, the Australian Government released an exposure draft of the Determination and invited comments. No submissions were received by the closing date.

The revoked Determination adopted these changes. However, shortly following the making and registration of the revoked Determination, some industry stakeholders identified the removal of the test standard IEEE 112:2004 as problematic. They realised that this change would require them to retest motors that had previously been only tested to IEEE 112 but not to IEC 60034-2-1. After receiving this feedback, in early 2019 the Australian Government initiated a consultation process to ascertain the broader industry view. It also separately sought technical advice on whether testing conducted to IEEE 112 would yield technically equivalent results to those from testing conducted to IEC 60034-2-1.

The industry submissions received supported accepting the results of testing conducted to IEEE 112, on the basis that this would reduce costs and regulatory burden for the regulated community. In addition, the technical advice provided to the Australian Government indicated that testing conducted to IEEE 112 and IEC 60034-2-1 produced technically equivalent results. As a result, this Determination specifies IEEE 112 as an acceptable alternative test standard to IEC 60034-2-1.

## **Regulatory Impact**

The Office of Best Practice Regulation (OBPR) was consulted regarding the proposed changes made by the revoked Determination and advised that ‘... the relatively limited impact of this proposal on industry means that it falls below the threshold required for the preparation of a regulation impact statement (RIS). As such, the OBPR advises that it would be consistent with the COAG RIS requirements if a RIS were not prepared for this matter’ (OBPR Ref. No. 18024). As this Determination reverses a change that was made in the revoked Determination, the OBPR advice continues to be applicable.

Details of the Determination are set out at Attachment A and a statement of compatibility with human rights for the purposes of Part 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011* is set out at Attachment B.

## **Details of the Determination**

### **PART 1—PRELIMINARY**

#### **Section 1 – Name**

This section sets out the title of the Determination.

#### **Section 2 – Commencement, revocation and replacement**

This section provides that the Determination commences and comes into force the day after it is registered.

It also provides that the Determination revokes and replaces the revoked Determination, being the *Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2018*.

#### **Section 3 – Authority**

This section identifies the sections of the Act which authorise the Minister to make the Determination.

#### **Section 4 – Definitions—standards referred to in this Determination**

Section 4 lists the standards referred to in the Determination. While the revoked Determination only allowed the IEC 60034-2-1 test standard, the Determination now also references the IEEE 112 test standards as alternatives to IEC 60034-2-1. The IEEE standards and several other IEC standards that support the test standard are also referenced. They are:

- IEC 60034-1 Ed. 13.0, which specifies the rating and performance characteristics of motors.
- IEC 60034-30-1 Ed. 1.0, which specifies the efficiency classes and levels for motors.
- IEC 60050-411 Ed. 2.0, which defines the vocabulary used in the above standards.
- IEEE 112:2004 (USA), which is specified as an acceptable alternative test method to IEC 60034-2-1.
- IEEE 112:2017 (USA), which is specified as an acceptable alternative test method to IEC 60034-2-1.

#### **Section 5 – Definitions—other expressions used in this Determination**

This section sets out definitions for key terms, including technical terms, used in the Determination. The definitions provided include:

- “cage induction motor” which means an induction motor with secondary cage (squirrel cage) winding(s) that consist of a number of conducting bars that have their extremities connected by conducting rings or plates at each end;

- “rated” quantity or value which means a quantity or value assigned, generally by a manufacturer, for a specified operating condition of a machine; and
- “S2 – short-time duty” which means operation at constant load for a given time, less than that required to reach thermal equilibrium, followed by a time de-energised and at rest of sufficient duration to re-establish machine temperatures within 2 Kelvin of the coolant temperature.

## **Section 6 – Applicable definitions and applicable versions of standards and documents incorporated into standards**

Section 6 provides guidance for interpreting certain aspects of the Determination.

### Subsection 6(1)

This subsection sets out the order in which priority should be taken in the interpretation of relevant provisions if there are any inconsistencies between the Act, this Determination and the standards.

### Subsection 6(2)

The purpose of this subsection is to make clear that the applicable version of any relevant standard, or other relevant document that is referred to in a standard, is the version that is current on the date that the Determination was made.

## **Section 7 – Families of models**

Section 28 of the Act provides that a GEMS determination must specify, for each product class covered by the determination, the circumstances in which two or more models in that product class are in the same family of models.

This Determination sets out the circumstances in which two or more models in a product class may be a family of models.

### Subsection 7(1)

This subsection specifies that the circumstances in which two or more models of motors covered by this Determination may be in the same family of models are when they are members of a family declared to the GEMS Regulator and the requirements set out in subsections (2) to (4) are satisfied.

### Subsection 7(2)

This subsection specifies the characteristics of motors that must be the same in order for them to be in the same family of models (including, for example: brand, frame size, number of poles, and rated output power).

### Subsection 7(3)

The purpose of this subsection is to ensure that each model in a family of models has an equivalent electrical design, by requiring that the product of each motor's rated voltage and rated current must be the same.

### Subsection 7(4)

This subsection limits the size of a family to no more than 10 models.

## **Section 8 – Product category**

Section 29 of the Act requires that a GEMS determination specify whether the products it covers are category A or category B products. Category B products are subject to higher penalties than category A products for certain offences under the Act, on the basis that category B products have a high impact on energy use or greenhouse gas production.

This section specifies that motors covered by the Determination are only category A products. This remains unchanged from the revoked Determination.

## **Section 9 – Registrations affected by this Determination**

Section 36 of the Act requires that a GEMS replacement determination must specify whether it affects the registration of: all models, specified models, or no models, of GEMS products that were covered by the revoked Determination.

This section provides that no registrations of models made under the revoked Determination are affected.

## **PART 2 – PRODUCTS COVERED BY DETERMINATION**

### **Section 10 – Purpose of Part**

This section notes that for subsections 23(1) and (2) of the Act, Part 2 of the Determination specifies which classes of motors are covered by the Determination and which classes of motors are not covered by the Determination.

### **Section 11 – Classes of products that are covered by this Determination**

#### Subsection 11(1)

This subsection sets out the scope of the Determination with respect to the class of products that it covers. It provides that the Determination covers three phase cage induction motors with: an output power rating from 0.73 kilowatts to less than 185 kilowatts, with either 2-pole, 4-pole, 6-pole or 8-pole configurations, and with a rated voltage of up to 1100 volts alternating current.

The scope of this Determination is unchanged from the revoked Determination.



## Subsection 11(2)

This subsection specifies that the three phase cage induction motors covered by the Determination form a single product class.

## **Section 12 – Classes of products that are not covered by this Determination**

This section sets out product classes that are not covered by the Determination. They are the same product classes that were excluded in the revoked Determination. They are:

- a) a submersible (sealed) motor specifically designed to operate wholly immersed in a liquid. This exclusion does not cover motors that may be designed to only withstand temporary inundation;
- b) a motor that shares common components (apart from connectors) with the driven unit and cannot operate as a motor if separated from the driven unit, even if a temporary end shield or a drive-end bearing is fitted. An example of such a motor could be a motor constructed on the same shaft as a compressor for an air-conditioning unit;
- c) a motor that can run at two or more discrete speeds by using switchgear to reconfigure the connection of the motor's winding or windings to the supply, also known as a "multi-speed motor". This exclusion does not cover motors that run at different speeds by means of a variable voltage or variable frequency controller;
- d) a motor that is only used for short-time duty cycle applications which have a duty type rating of S2 – short-time duty. Examples include motors used for vehicle hoists, roller doors and cranes;
- e) a rewind motor that has had its insulated winding or windings replaced and the supplier has not made any claim that the rewind motor meets a GEMS level requirement;
- f) a motor that is supplied exclusively to third parties who will incorporate the motors into equipment that will be exported to a country other than Australia or New Zealand;
- g) a high slip motor designed primarily to provide torque, often at or near 100 per cent slip. Such a motor is known as a "torque motor".

## **PART 3 – GEMS LEVEL REQUIREMENTS**

### **Section 13 – Purpose of Part**

Section 13 notes that Part 3 of the Determination specifies GEMS level requirements for energy use and greenhouse gas production for motors covered by the Determination, including requirements for conducting tests in order to demonstrate compliance with the energy use requirements under section 25 of the Act.

## **Section 14 – GEMS level requirements**

### Subsection 14(1)

This subsection provides that the efficiency of a motor covered by this Determination must not be less than the relevant value set out in Table 1 of Schedule 1 to this Determination. Methods are also specified for working out the relevant value if the rated output power of the motor falls between the rated output power values identified in Table 1.

### Subsection 14(2)

This subsection specifies that the requirements specified in subsection (1) are set in relation to 50 Hz and 60 Hz motors in 2-pole, 4-pole, 6-pole, or 8-pole configurations.

## **Section 15 – Conducting tests**

### Subsection 15(1)

This subsection specifies that the general requirements for conducting tests are the requirements mentioned in subclause 6.1.3 of IEC 60034-2-1 Ed. 2.0 (Method 2-1-1B – Summation of losses, additional load losses according to the method of residual loss).

### Subsection 15(2)

This subsection reintroduces the capacity to specify alternatives to the test method specified in subsection (1), which was removed by the revoked determination. Acceptable alternatives are specified in Schedule 2.

### Subsection 15(3)

This subsection specifies special test conditions, in addition to the general testing requirements specified in subsection (1), for testing totally enclosed air over motors defined at subsection (4). This provision addresses stakeholder concerns that this type of motor was tested under conditions that did not replicate real-world applications and therefore penalised their energy efficiency performance. The effect of this provision is that these types of motors are now tested in an appropriate manner.

### Subsection 15(4)

This subsection details the specific measurement requirements for tests conducted according to subsection (3).

### Subsection 15(5)

This subsection defines a “totally enclosed air over motor” as a frame surface cooled machine, the exterior of which is cooled by a ventilating means external to the motor, for example by a fan.

## **PART 4 – GEMS LABELLING REQUIREMENTS**

### **Section 16 – Purpose of Part**

Section 16 notes that Part 4 of the Determination specifies GEMS labelling requirements for motors covered by the Determination in accordance with section 26 of the Act.

### **Section 17 – GEMS labelling requirements**

Section 17 specifies that labelling and communication requirements are the requirements mentioned in clause 10 of IEC 60034-1 (Rating plates). These requirements concern information that must be marked on the rating plate of the product. This information is relevant to both users of motors, enabling the selection of more efficient motors, and for the GEMS Regulator when undertaking compliance activities.

The minimum requirements for items on the rating plate include the:

- a) manufacturer's name or mark;
- b) manufacturer's serial number, or identification mark;
- c) rated output(s) or range of rated output;
- d) class(es) of rating of the machine if designed for other than rating for continuous running duty S1;
- e) rated frequency or range of rated frequencies; and
- f) the efficiency class (IE code) and the rated efficiency

### **Section 18 – Conducting tests**

This section specifies that the requirements for conducting tests for the purposes of the information that must be conveyed on a product's rating plate are the same as those set out in section 15 of the Determination in relation to the GEMS level requirements.

### **Section 19 – Impact of replacement determination**

Section 19 provides a mechanism, in the event that this Determination is replaced in the future, to allow a transitional labelling provision to be specified in that replacement Determination (the new Determination) with the effect that complying with its requirements will be taken to be compliance with the labelling requirements of this Determination. This is to prevent the situation arising, in circumstances where a registrant chooses to register to the new Determination between the time it is made and when it comes into force (as allowed by section 44 of the Act), of a product needing to comply with the labelling requirements of both Determinations.

## **PART 5 – OTHER REQUIREMENTS**

### **Section 20 – Purpose of Part**

Section 20 notes that Part 5 of the Determination specifies other requirements for motors covered by the Determination in accordance with section 27 of the Act.

These other requirements are in relation to the high efficiency level for motors covered by the Determination, including requirements for conducting tests in order to demonstrate compliance with high efficiency level requirements.

The “high efficiency” designation can be used for the most efficient product models, assisting businesses to promote, and consumers to select, highly efficient products. Products do not need to meet the high efficiency level but those which do are entitled to promote the product as a high efficiency motor.

### **Section 21 – High efficiency level**

#### Subsection 21(1)

This subsection provides that a motor covered by this Determination meets the high efficiency level if its efficiency is not less than the value relevant to its rated output power set out in Table 2 of Schedule 1 to this Determination. Methods are also specified for working out the relevant value if the rated output power of the motor falls between the rated output power values identified in Table 2.

#### Subsection 21(2)

Subsection 21(2) specifies that a motor may be designated as “high efficiency” only if it meets the high efficiency level.

#### Subsection 21(3)

This subsection specifies that the requirements specified in subsection (1) are set in relation to 50 Hz and 60 Hz motors in 2-pole, 4-pole, 6-pole or 8-pole configurations.

### **Section 22 – Conducting tests**

This subsection specifies that the requirements for conducting tests for the purposes of the high efficiency levels are the same as those set out in section 15 of the Determination in relation to the GEMS level requirements.

### **Schedule 1—Minimum efficiency levels**

This Schedule provides tables that specify the minimum efficiency levels that types of motors need to meet to satisfy the relevant requirements. Table 1 specifies GEMS level requirements and Table 2 specifies high efficiency level requirements.

The tables provide minimum efficiency values for both 50 Hz motors and 60 Hz motors. The specified minimum efficiency values are the same as those specified in Schedule 2 of the revoked Determination.

### **Schedule 2—Alternative test methods**

This Schedule provides a table which specifies the acceptable alternatives to the test method specified in subsection 15(1). Alternative test methods are specified – Method B from the US test standards IEEE 112:2004 and IEEE 112:2017.

## **Statement of Compatibility with Human Rights**

*Prepared in accordance with Part 3 of the Human Rights (Parliamentary Scrutiny) Act 2011*

*Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2019*

This Legislative Instrument is compatible with the human rights and freedoms recognised or declared in the international instruments listed in section 3 of the *Human Rights (Parliamentary Scrutiny) Act 2011*.

### **Overview of the Legislative Instrument**

The *Greenhouse and Energy Minimum Standards (Three Phase Cage Induction Motors) Determination 2019* prescribes matters relating to minimum energy efficiency and energy labelling requirements for three phase cage induction motors under the *Greenhouse and Energy Minimum Standards Act 2012*. The Determination establishes requirements for energy use, energy labelling and high efficiency levels, including requirements for conducting tests in order to demonstrate compliance with those requirements. The Determination also sets out the circumstances in which two or more models in a product class may be a family of models, and establishes the applicable product category for the purposes of calculating certain penalties under the Act.

### **Human rights implications**

This Legislative Instrument does not engage any of the applicable rights or freedoms.

### **Conclusion**

This Legislative Instrument is compatible with human rights as it does not raise any human rights issues.

**The Hon Angus Taylor MP**  
**Minister for Energy and Emissions Reduction**