

## **NZ Guidance Document**

### *Voluntary Pre-Registration of electric motors*

This is a guidance document only and if you have any questions, please contact EECA:  
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#### **Purpose**

The Energy Efficiency (Energy Using Products) Regulations 2002 permits EECA to set mandatory minimum efficiency requirements (MEPS), to drive greater energy efficiency. EECA are in the process of introducing regulation to update MEPS and product performance testing requirements for three-phase cage induction electric motors. This update will replace regulation introduced in 2004.

NZ requirements will mirror changes in Australia to maintain alignment under both the E3 programme and TTMRA.

#### **Background**

The largest proportion of motors' electricity consumption in Australia and New Zealand is attributable to mid-size three-phase motors with an output power of 0.75 - 375 kilowatts (kW). These motors are predominantly used in industry and can be an integral part of a piece of equipment, but are frequently sold as a separate item.

A review of the existing MEPS requirements identified a number of problems:

- The current regulatory arrangements in Australia and New Zealand permit the use of two locally developed test methods for the registration of electric motors. These unique domestic requirements represent burdensome administrative and time costs for registrants.
- The current practice of specifying Australian and New Zealand test requirements for globally-traded motors is outdated because international agreement has generally been reached on three preferred test procedures. Using global test procedures ensures reproducibility of test results and gives suppliers confidence that their efficiency claims can be reproduced and verified.
- Existing MEPS levels are set incorrectly for the trans-Tasman market and are no longer driving improved efficiency.
- The complex and ambiguous nature of existing regulatory requirements means that compliance rates are not as high as they should be.

#### **Consultation**

The Australian and NZ Governments have worked extensively with industry and other stakeholders on the development of the new requirements for mid-size three-phase electric motors. Due to the highly technical nature of this product, an industry based Technical Working Group was formed and consulted with to establish a consensus view.

The Motors Product Profile process was conducted in 2013 and reviewed with members of the Motors Technical Working Group in 2017. Stakeholders have generally supported the proposed changes.

## **Details of the updated Regulation**

### **Introduction**

It is anticipated that the amended regulations will be approved and come into force in late 2020. An exact date cannot be provided at this time as the process of amending the regulations is dependent on a number of regulatory and administrative requirements, but in the interim, regulated parties can choose to either meet the current requirements or the new requirements. A minimum of 6 months' notice will be provided before the amended regulations come into force. Voluntary pre-registration to the new requirements is permitted from 1 September 2019.

### **Standards**

The updated regulation references standards published by the International Electrotechnical Commission (IEC) and the Institute of Electrical and Electronic Engineers (IEEE) which is consistent with NZ Government policy of harmonisation with international standards where appropriate.

The test standards referenced in the updated regulation are:

*IEC 60034-1 means International Standard IEC 60034-1 Ed. 13.0 (Bilingual 2017) Rotating electrical machines – Part 1: Rating and Performance.*

*IEC 60034-2-1 Ed. 2.0 means International Standard 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).*

*IEC 60034-30-1 Ed. 1.0 means International Standard IEC 60034-30-1 Ed. 1.0 (Bilingual 2014) Rotating electrical machines – Part 30-1: Efficiency classes of line operated AC motors (IE code).*

*IEC 60050-411 means International Standard IEC 60050-411 Ed. 2.0 (Bilingual 1996) International Electrotechnical Vocabulary – Chapter 411: Rotating machinery.*

*IEEE 112:2004 (USA) means IEEE Standard IEEE 112:2004 Test Procedure for Polyphase Induction Motors and Generators.*

*IEEE 112:2017 (USA) means IEEE Standard IEEE 112:2017 Test Procedure for Polyphase Induction Motors and Generators.*

### **Scope**

The scope of the regulations has been changed to clearly specify that it only covers

- 50 Hz and 60 Hz motors in 2, 4, 6, or 8 pole configurations,
- which have a rated voltage up to 1100 V AC,
- and a power rating of 0.73 kW or greater, but less than 185 kW

### **Classes of products not covered by regulation**

- 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 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. Examples include motors used for vehicle hoists, roller doors and cranes;
- e) A rewind motor that has had its insulated winding or windings replaced;
- 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".

### **Families of model**

The updated regulation specifies the circumstances in which two or more models in that product class are in the same family of models. Typically, for two or more models to be in the same family of models they must be in the same product class, have the same energy performance and relevant physical characteristics (e.g. brand, frame size, number of poles, and rated output power), and rely on a common test report. A family must contain no more than ten models.

### **Test Requirements**

Three phase electric motors must be tested in accordance with:

- IEC 60034-2-1 Ed. 2.0 (Method 2-1-1B – Summation of losses, additional load losses according to the method of residual loss), or
- IEEE 112:2004 Method B (Test Procedure for Polyphase Induction Motors and Generators), or
- IEEE 112:2017 Method B (Test Procedure for Polyphase Induction Motors and Generators)

### **Registration**

To minimise disruption to the NZ market and contain compliance costs, EECA are using a version of the Australian registration system to pre-register three-phase electric motor models to the updated regulation requirements. All accepted pre-registrations models will retain validity when the new regulations come into force.

## MEPS Requirements

The MEPS level requirements are minimum load efficiencies aligned with IE2 levels. High efficiency motors must meet IE3 levels.

### MEPS requirements

Rated output power (kW)	50 Hz motors Minimum efficiency (%)				60 Hz motors Minimum efficiency (%)			
	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole
0.73	77.4	79.6	75.9	66.2	75.5	78.0	73.0	66.0
0.75	77.4	79.6	75.9	66.2	75.5	78.0	73.0	66.0
1.1	79.6	81.4	78.1	70.8	82.5	84.0	85.5	75.5
1.5	81.3	82.8	79.8	74.1	84.0	84.0	86.5	82.5
2.2	83.2	84.3	81.8	77.6	85.5	87.5	87.5	84.0
3	84.6	85.5	83.3	80.0	87.5	87.5	87.5	85.5
4	85.8	86.6	84.6	81.9	87.5	87.5	87.5	85.5
5.5	87.0	87.7	86.0	83.8	88.5	89.5	89.5	85.5
7.5	88.1	88.7	87.2	85.3	89.5	89.5	89.5	88.5
11	89.4	89.8	88.7	86.9	90.2	91.0	90.2	88.5
15	90.3	90.6	89.7	88.0	90.2	91.0	90.2	89.5
18.5	90.9	91.2	90.4	88.6	91.0	92.4	91.7	89.5
22	91.3	91.6	90.9	89.1	91.0	92.4	91.7	91.0
30	92.0	92.3	91.7	89.8	91.7	93.0	93.0	91.0
37	92.5	92.7	92.2	90.3	92.4	93.0	93.0	91.7
45	92.9	93.1	92.7	90.7	93.0	93.6	93.6	91.7
55	93.2	93.5	93.1	91.0	93.0	94.1	93.6	93.0
75	93.8	94.0	93.7	91.6	93.6	94.5	94.1	93.0
90	94.1	94.2	94.0	91.9	94.5	94.5	94.1	93.6
110	94.3	94.5	94.3	92.3	94.5	95.0	95.0	93.6
132	94.6	94.7	94.6	92.6	95.0	95.0	95.0	93.6
160	94.8	94.9	94.8	93.0	95.0	95.0	95.0	93.6
185	95.0	95.1	94.9	93.3	95.4	95.0	95.0	93.6

### High efficiency requirements

Rated output power (kW)	50 Hz motors Minimum efficiency (%)				60 Hz motors Minimum efficiency (%)			
	2-pole	4-pole	6-pole	8-pole	2-pole	4-pole	6-pole	8-pole
0.73	80.7	82.5	78.9	75.0	77.0	83.5	82.5	75.5
0.75	80.7	82.5	78.9	75.0	77.0	83.5	82.5	75.5
1.1	82.7	84.1	81.0	77.7	84.0	86.5	87.5	78.5
1.5	84.2	85.3	82.5	79.7	85.5	86.5	88.5	84.0
2.2	85.9	86.7	84.3	81.9	86.5	89.5	89.5	85.5
3	87.1	87.7	85.6	83.5	88.5	89.5	89.5	86.5
4	88.1	88.6	86.8	84.8	88.5	89.5	89.5	86.5
5.5	89.2	89.6	88.0	86.2	89.5	91.7	91.0	86.5
7.5	90.1	90.4	89.1	87.3	90.2	91.7	91.0	89.5
11	91.2	91.4	90.3	88.6	91.0	92.4	91.7	89.5
15	91.9	92.1	91.2	89.6	91.0	93.0	91.7	90.2
18.5	92.4	92.6	91.7	90.1	91.7	93.6	93.0	90.2
22	92.7	93.0	92.2	90.6	91.7	93.6	93.0	91.7
30	93.3	93.6	92.9	91.3	92.4	94.1	94.1	91.7
37	93.7	93.9	93.3	91.8	93.0	94.5	94.1	92.4
45	94.0	94.2	93.7	92.2	93.6	95.0	94.5	92.4
55	94.3	94.6	94.1	92.5	93.6	95.4	94.5	93.6
75	94.7	95.0	94.6	93.1	94.1	95.4	95.0	93.6
90	95.0	95.2	94.9	93.4	95.0	95.4	95.0	94.1
110	95.2	95.4	95.1	93.7	95.0	95.8	95.8	94.1
132	95.4	95.6	95.4	94.0	95.4	96.2	95.8	94.5
160	95.6	95.8	95.6	94.3	95.4	96.2	95.8	94.5
185	95.7	95.9	95.7	94.5	95.8	96.2	95.8	95.0