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► **B** **COMMISSION REGULATION (EC) No 640/2009**  
**of 22 July 2009**  
**implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to**  
**ecodesign requirements for electric motors**  
(Text with EEA relevance)  
(OJ L 191, 23.7.2009, p. 26)

Amended by:

		Official Journal		
		No	page	date
► <b><u>M1</u></b>	Commission Regulation (EU) No 4/2014 of 6 January 2014	L 2	1	7.1.2014
► <b><u>M2</u></b>	Commission Regulation (EU) 2016/2282 of 30 November 2016	L 346	51	20.12.2016

Corrected by:

► **C1** Corrigendum, OJ L 46, 19.2.2011, p. 63 (640/2009)

**▼B****COMMISSION REGULATION (EC) No 640/2009****of 22 July 2009****implementing Directive 2005/32/EC of the European Parliament  
and of the Council with regard to ecodesign requirements for  
electric motors****(Text with EEA relevance)****▼M1***Article 1***Subject matter and scope**

1. This Regulation establishes ecodesign requirements for the placing on the market and the putting into service of motors, including those integrated in other products.

2. This Regulation shall not apply to:

- (a) motors specified to operate wholly immersed in a liquid;
- (b) motors completely integrated into a product (for example gear, pump, fan or compressor) of which the energy performance cannot be tested independently from the product;
- (c) motors specified to operate exclusively:
  - (i) at altitudes exceeding 4 000 metres above sea-level;
  - (ii) where ambient air temperatures exceed 60 °C;
  - (iii) in maximum operating temperature above 400 °C;
  - (iv) where ambient air temperatures are less than – 30 °C for any motor or less than 0 °C for a motor with water cooling;
  - (v) where the water coolant temperature at the inlet to a product is less than 0 °C or exceeding 32 °C; or
  - (vi) in potentially explosive atmospheres as defined in Directive 94/9/EC of the European Parliament and of the Council <sup>(1)</sup>;
- (d) brake motors,  
  
except as regards the information requirements of Annex I, points 2(3) to (6) and (12).

**▼B***Article 2***Definitions**

In addition to the definitions set out in Directive 2005/32/EC, the following definitions shall apply:

1. ‘Motor’ means an electric single speed, three-phase 50 Hz or 50/60 Hz, squirrel cage induction motor that:
  - has 2 to 6 poles,
  - has a rated voltage of  $U_N$  up to 1 000 V,

<sup>(1)</sup> OJ L 100, 19.4.1994, p. 1.

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- has a rated output  $P_N$  between 0,75 kW and 375 kW,
  - is rated on the basis of continuous duty operation.
2. ‘Variable Speed Drive’ means an electronic power converter that continuously adapts the electrical power supplied to the electric motor in order to control the mechanical power output of the motor according to the torque-speed characteristic of the load (being driven by the motor), by adjusting the three-phase 50 Hz power supply to a variable frequency and voltage supplied to the motor.
  3. ‘Squirrel cage motor’ means an electric motor with no brushes, commutators, slip rings or electrical connections to the rotor.
  4. ‘Phase’ means the type of configuration of the mains electrical supply.
  5. ‘Pole’ means the total number of magnetic north and south poles produced by the rotating magnetic field of the motor. The number of poles determines the base speed of the motor.
  6. ‘Continuous duty operation’ means the capability of an electric motor with an integrated cooling system to operate at nominal load without interruption below its rated maximum temperature rise.
  7. ‘Brake motor’ means a motor equipped with an electro-mechanical brake unit operating directly on the motor shaft without couplings.

*Article 3***Ecodesign requirements**

The ecodesign requirements for motors are set out in Annex I.

Each ecodesign requirement shall apply in accordance with the following timetable:

1. from 16 June 2011, motors shall not be less efficient than the IE2 efficiency level, as defined in Annex I, point 1;
2. from 1 January 2015:
  - (i) motors with a rated output of 7,5-375 kW shall not be less efficient than the IE3 efficiency level, as defined in Annex I, point 1, or meet the IE2 efficiency level, as defined in Annex I, point 1, and be equipped with a variable speed drive.
3. from 1 January 2017:
  - (i) all motors with a rated output of 0,75-375 kW shall not be less efficient than the IE3 efficiency level, as defined in Annex I, point 1, or meet the IE2 efficiency level, as defined in Annex I, point 1, and be equipped with a variable speed drive.

The product information requirements on motors are as set out in Annex I. Compliance with ecodesign requirements shall be measured and calculated in accordance with requirements set out in Annex II.

*Article 4***Conformity assessment**

The conformity assessment procedure referred to in Article 8 of Directive 2005/32/EC shall be the internal design control system set out in Annex IV to that Directive or the management system for assessing conformity set out in Annex V to that Directive.

*Article 5***Verification procedure for market surveillance purposes**

When performing the market surveillance checks referred to in Article 3(2) of Directive 2005/32/EC, the authorities of the Member States shall apply the verification procedure set out in Annex III to this Regulation.

*Article 6***Indicative Benchmarks**

The indicative benchmarks for the best-performing motors currently available on the market are identified in Annex IV.

*Article 7***Revision**

The Commission shall review this Regulation in the light of technological progress on both motors and drives no later than seven years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review will include resource efficiency, re-use and recycling and the level of measurement uncertainty.

*Article 8***Entry into force**

This Regulation shall enter into force on the 20th day following its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.



## ANNEX I

## ECODESIGN REQUIREMENTS FOR MOTORS

## 1. MOTOR EFFICIENCY REQUIREMENTS

The nominal minimum efficiency requirements for motors are set out in Tables 1 and 2.

Table 1

Nominal minimum efficiencies ( $\eta$ ) for IE2 efficiency level (50 Hz)

Rated output power (kW)	Number of poles		
	2	4	6
0,75	77,4	79,6	75,9
1,1	79,6	81,4	78,1
1,5	81,3	82,8	79,8
2,2	83,2	84,3	81,8
3	84,6	85,5	83,3
4	85,8	86,6	84,6
5,5	87,0	87,7	86,0
7,5	88,1	88,7	87,2
11	89,4	89,8	88,7
15	90,3	90,6	89,7
18,5	90,9	91,2	90,4
22	91,3	91,6	90,9
30	92,0	92,3	91,7
37	92,5	92,7	92,2
45	92,9	93,1	92,7
55	93,2	93,5	93,1
75	93,8	94,0	93,7
90	94,1	94,2	94,0
110	94,3	94,5	94,3
132	94,6	94,7	94,6
160	94,8	94,9	94,8
200 up to 375	95,0	95,1	95,0



Table 2

Nominal minimum efficiencies ( $\eta$ ) for IE3 efficiency level (50 Hz)

Rated output power (kW)	Number of poles		
	2	4	6
0,75	80,7	82,5	78,9
1,1	82,7	84,1	81,0
1,5	84,2	85,3	82,5
2,2	85,9	86,7	84,3
3	87,1	87,7	85,6
4	88,1	88,6	86,8
5,5	89,2	89,6	88,0
7,5	90,1	90,4	89,1
11	91,2	91,4	90,3
15	91,9	92,1	91,2
18,5	92,4	92,6	91,7
22	92,7	93,0	92,2
30	93,3	93,6	92,9
37	93,7	93,9	93,3
45	94,0	94,2	93,7
55	94,3	94,6	94,1
75	94,7	95,0	94,6
90	95,0	95,2	94,9
110	95,2	95,4	95,1
132	95,4	95,6	95,4
160	95,6	95,8	95,6
200 up to 375	95,8	96,0	95,8

## 2. PRODUCT INFORMATION REQUIREMENTS ON MOTORS

From 16 June 2011, the information on motors set out in points 1 to 12 shall be visibly displayed on:

- (a) the technical documentation of motors;
- (b) the technical documentation of products in which motors are incorporated;
- (c) free access websites of manufacturers of motors;
- (d) free access websites of manufacturers of products in which motors are incorporated.

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As regards to the technical documentation, the information must be provided in the order as presented in points 1 to 12. The exact wording used in the list does not need to be repeated. It may be displayed using graphs, figures or symbols rather than text.

1. nominal efficiency ( $\eta$ ) at the full, 75 % and 50 % rated load and voltage ( $U_N$ );
2. efficiency level: 'IE2' or 'IE3';
3. the year of manufacture;
4. manufacturer's name or trade mark, commercial registration number and place of manufacturer;
5. product's model number;
6. number of poles of the motor;
7. the rated power output(s) or range of rated power output (kW);
8. the rated input frequency(s) of the motor (Hz);
9. the rated voltage(s) or range of rated voltage (V);
10. the rated speed(s) or range of rated speed (rpm);
11. information relevant for disassembly, recycling or disposal at end-of-life;
12. information on the range of operating conditions for which the motor is specifically designed:
  - (i) altitudes above sea-level;
  - (ii) ambient air temperatures, including for motors with air cooling;
  - (iii) water coolant temperature at the inlet to the product;
  - (iv) maximum operating temperature;
  - (v) potentially explosive atmospheres.

The information referred to in points 1, 2 and 3 shall be durably marked on or near the rating plate of the motor.

**▼ M1**

Where the size of the rating plate makes it impossible to mark all the information referred to in point 1, only the nominal efficiency ( $\eta$ ) at full rated load and voltage ( $U_N$ ) shall be marked.

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The information listed in points 1 to 12 does not need to be published on motor manufacturer's free access website for tailor-made motors with special mechanical and electrical design manufactured on the basis of client request. Information on the mandatory requirement to equip motors, which do not meet the IE3 efficiency level with a variable speed drive, shall be visibly displayed on the rating plate, technical documentation of the motor:

- (a) from 1 January 2015 for motors with a rated output of 7,5-375 kW;
- (b) from 1 January 2017 for motors with a rated output of 0,75-375 kW.

Manufacturers shall provide information in the technical documentation on any specific precautions that must be taken when motors are assembled, installed, maintained or used with variable speed drives, including information on how to minimise electrical and magnetic fields from variable speed drives.

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## 3. DEFINITIONS FOR THE PURPOSES OF ANNEX I

1. 'Nominal minimum efficiency' ( $\eta$ ) means the efficiency at full rated load and voltage without tolerances.
2. 'Tolerance' means the maximum allowable variation in test measurement result of any given motor compared to the declared value on the rating plate or in the technical documentation.



*ANNEX II***MEASUREMENTS AND CALCULATIONS**

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using a reliable, accurate and reproducible method, which takes into account the generally recognised state-of-the-art methods, and whose results are deemed to be of low uncertainty, including methods set out in documents the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*. They shall fulfil all of the following technical parameters.

The energy efficiency is the ratio of mechanical output power to the electrical input power.

The efficiency level of the motor, as specified in Annex I, shall be determined at rated output power ( $P_N$ ), rated voltage ( $U_N$ ), and rated frequency ( $f_N$ ).

The difference between the output mechanical power and the input electrical power is due to losses occurring in the motor.

The determination of total losses shall be carried out by one of the following methods:

- measurement of total losses, or
- determination of separate losses for summation.

▼ M2*ANNEX III***Product compliance verification by market surveillance authorities**

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

- (1) The Member State authorities shall verify one single unit of the model.
- (2) The model shall be considered to comply with the applicable requirements if:
  - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
  - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
  - (c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements), including the total losses (1- $\eta$ ) as decisive criterion for the efficiency, comply with the respective verification tolerances as given in Table 3.
- (3) If the results referred to in point 2(a) or (b) are not achieved, the model shall be considered not to comply with this Regulation.
- (4) If the result referred to in point 2(c) is not achieved:
  - (a) for models that are produced in quantities of less than five per year, the model shall be considered not to comply with this Regulation;
  - (b) for models that are produced in quantities of five or more per year, the Member State authorities shall select three additional units of the same model for testing. The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values, including the total losses (1- $\eta$ ) as decisive criterion for the efficiency, complies with the respective verification tolerances given in Table 3.
- (5) If the result referred to in point 4(b) is not achieved, the model shall be considered not to comply with this Regulation.
- (6) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3, 4(a) and 5.

The Member State authorities shall use the measurement and calculation methods set out in Annex II.

**▼ M2**

The Member State authorities shall only apply the verification tolerances that are set out in Table 3 and shall only use the procedure described in points 1 to 6 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

*Table 3***Verification tolerances**

Parameters	Motors on the power range 0,75-150 kW	Motors in the power range 150-375 kW
Total losses (1- $\eta$ )	Maximum 15 % above the values as derived from declared values according to Annex I	Maximum 10 % above the values as derived from declared values according to Annex I

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*ANNEX IV*

**INDICATIVE BENCHMARKS REFERRED TO IN ARTICLE 6**

At the time of adoption of this Regulation, the best available technology on the market for motors was identified as the IE3 level, or an IE3 motor equipped with a variable speed drive, as defined in Annex I.