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**COMMISSION REGULATION (EU) .../...**

**of XXX**

**implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors and variable speed drives**

**repealing Commission Regulation (EC) No 640/2009 with regard to ecodesign requirements for electric motors**

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# COMMISSION REGULATION (EU) .../...

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**implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for electric motors and variable speed drives**

**repealing Commission Regulation (EC) No 640/2009 with regard to ecodesign requirements for electric motors**

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to Article 114 of the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products<sup>1</sup>, and in particular Article 15(1) thereof,

After consulting the Consultation Forum referred to in Article 18 of Directive 2009/125/EC,

Whereas:

- (1) Directive 2009/125/EC requires the Commission to set ecodesign requirements for energy-related products representing **significant volumes of sales and trade**, having a significant environmental impact and presenting significant potential for improvement through design in terms of their environmental impact, without entailing excessive costs.
- (2) Article 16(2)(a) of Directive 2009/125/EC provides that the Commission should, where appropriate, introduce implementing measures for products which offer significant potential for reducing greenhouse gas emissions in a cost-effective way, such as the electric motors and variable speed drives in the scope of this regulation. These implementing measures should be introduced in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15(2) of the same Directive.
- (3) The Commission established ecodesign requirements for electric motors in Commission Regulation (EC) No 640/2009  mplementing Directive 2009/125/EC<sup>2</sup>. Article 7 of this Regulation requires the Commission to review it in light of technological progress.
- (4) The Commission has reviewed Commission Regulation (EC) No 640/2009 and analysed the technical, environmental and economic aspects of electric motors as well as real-life user behaviour. The review was undertaken in close cooperation with stakeholders and interested parties from the Union and third countries. The results of the review were made public and presented to the Consultation Forum established by Article 18 of Directive 2009/125/EC.

<sup>1</sup> OJ L 285, 31.10.2009, p. 10.

<sup>2</sup> OJ L 191, 23.7.2009, p. 26–34

- (5) The review shows that electric motor systems consume about half of the electricity produced in the Union. It is estimated that electric motors converted 1 425 TWh of electricity into mechanical energy in 2015; this corresponds to 560 Mt of CO<sub>2</sub> equivalent emissions. This value is expected to increase to around 1 470 TWh in 2020 and 1 500 TWh in 2030.
- (6) The review also shows that variable speed drives are placed on the Union's market in large quantities, with their use-phase energy consumption being the most significant environmental aspect of all life cycle phases. Variable speed drives converted in 2015 about 265 TWh of electricity from the grid into electricity with a frequency suited for the driven application ; this corresponds to 105 Mt of CO<sub>2</sub> emissions. This value is expected to increase to around 380 TWh by 2020 and 570 TWh in 2030.
- (7) Commission Regulation (EC) No 640/2009 was estimated to save 57 TWh per year by 2020 and 102 TWh per year in 2030. As the provisions set out in that Regulation are maintained, these savings are also maintained.
- (8) There is a significant additional potential for cost-effective improvement of the energy efficiency of these motor systems, in particular by enhancing the energy efficiency of motors, covering motors not included in the scope of Commission Regulation (EC) No 640/2009, and by using energy-efficient variable speed drives. Consequently, ecodesign requirements for electric motors should be adapted and ecodesign requirements for variable speed drives should be set, in order to capture the cost-effective energy efficiency potential.
- (9) Ecodesign requirements should also include product information requirements that will help potential buyers to make the most appropriate decision, and facilitate market surveillance by Member States.
- (10) Many motors are integrated in other products. To achieve the full cost-efficient energy saving potential, motors integrated in other products where the efficiency can be tested separately should be subject to the provisions of this Regulation.
- (11) Electric motors are used in many different types of products such as pumps, fans or machine tools, and in many different operating conditions. The ~~energy efficiency~~ of motor driven systems can be improved if motors in variable speed and load applications are equipped with variable speed drives, but also if these variable speed drives have their own minimum energy efficiency requirements. In constant load applications a variable speed drive induces additional costs and energy losses. **Therefore this Regulation should not make the use variable speed drive mandatory.**
- (12) Improvements in the electricity consumption of electric motors and variable speed drives should be achieved by applying existing, non-proprietary and cost-effective technologies that can reduce the total combined costs of purchasing and operating them.
- (13) Ecodesign requirements should harmonise energy efficiency requirements for electric motors and variable speed drives throughout the Union, thus contributing to the functioning of the internal market and to the improvement of the environmental performance of these products.
- (14) Manufacturers should have sufficient time to redesign or /adapt their products where needed. The timing should be such that negative impacts on the functionalities of electric motors or variable speed drives are minimised, and cost impacts for manufacturers, in particular small and medium-sized enterprises, are taken into account, while ensuring timely achievement of the objectives of this Regulation.

- (15) The inclusion of motors not covered in Commission Regulation (EC) No 640/2009, notably smaller and larger motors, in conjunction with updated minimum energy efficiency requirements in line with international standards and technological progress, as well as the inclusion of variable speed drives, should increase the market penetration of electric motors and variable speed drives with an improved life-cycle environmental impact, leading to an additional estimated life-cycle net electricity savings of **10 TWh** per year and net greenhouse gas emission abatement of 3 Mt CO<sub>2</sub> equivalent per year in 2030, compared to the situation where no additional measures are taken.
- (16) Although the environmental impacts of medium voltage motors are relevant, for the time being no classification exists regarding the energy efficiency of electric motors with a rated voltage above 1 000 V. Once such a classification is developed, the possibility of setting minimum requirements for medium voltage motors should be reassessed.
- (17) Although the environmental impacts of submersible motors are relevant, for the time being no test standard defining energy efficiency classes for these motors exists. Once such a test standard and classification is developed, **the possibility of setting minimum requirements for submersible motors should be reassessed.** 
- (18) The Commission Communications on circular economy<sup>3</sup> and on the Ecodesign 2016-2019 working plan<sup>4</sup> underline the importance of using the ecodesign framework to support the move towards a more resource efficient and circular economy. The WEEE Directive 2012/19/EU<sup>5</sup> refers to Directive 2009/125/EC, indicating that ecodesign requirements should facilitate the re-use, dismantling and recovery of WEEE by tackling the issues upstream. Therefore this Regulation should lay down appropriate requirements contributing to circular economy objectives, including through the provision of information on disassembly, recycling or disposal at end-of-life.
- (19) In order to reduce repair costs of products containing motors placed on the market before the entry into force of the Regulation, or to avoid their early scrapping if they cannot be repaired, an exemption for motors supplied as spare parts should be provided for a certain period of time, to deal with the situation where a compliant motor cannot replace a non-compliant motor without disproportionate costs for the end-user.
- (20) In specific situations e.g. those where safety, functionality or **disproportionate costs** are at stake, certain motors or VSDs should be exempted from efficiency requirements. It is however relevant to keep the products in question in the scope of the regulation for product information requirements, such as information relevant for disassembly, recycling or disposal at end-of-life, or other information useful for market surveillance purposes.
- (21) Measurements of the relevant product parameters should be performed through reliable, accurate and reproducible measurement methods, which take into account the recognised state of the art measurement methods including, where available, harmonised standards adopted by the European standardisation organisations, as listed in Annex I to Regulation (EU) No 1025/2012<sup>6</sup>. 
- (22) In accordance with Article 8(2) of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.

<sup>3</sup> COM/2015/0614 final of 02.12/2015

<sup>4</sup> COM(2016) 773 final of 30.11.2016

<sup>5</sup> OJ L 197, 24.7.2012, p. 38

<sup>6</sup> OJ L 316, 14.11.2012, p. 12.

- (23) To facilitate compliance checks, manufacturers should provide the information in the technical documentation referred to in Annexes IV and V to Directive 2009/125/EC, insofar that information relates to the requirements laid down in this Regulation.
- (24) To ensure the effectiveness and credibility of the Regulation, products that automatically alter their performance in test conditions to improve the declared parameters should be prohibited. 
- (25) In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to make information on the life-cycle environmental performance of products subject to this Regulation widely available and easily accessible, in accordance with Directive 2009/125/EC, Annex 1, part 3(2).
- (26) Commission Regulation (EC) No 640/2009  should be repealed, and the relevant requirements should be incorporated in this Regulation, to ensure clarity and transparency regarding the applicable requirements for different electric motors and variable speed drives.
- (27) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC.

HAS ADOPTED THIS REGULATION:

#### *Article 1*

#### **Subject matter**

This Regulation establishes ecodesign requirements for the placing on the market and/or putting into service of electric motors and variable speed drives, including when integrated in other products.

#### *Article 2*

#### **Scope**

This Regulation applies to the following products:

- (a) Induction electric motors without brushes, commutators, slip rings or electrical connections to the rotor, rated for operation on a 50 or 50/60 Hz sinusoidal voltage, that:
- (i) have 2, 4 or 6 or 8 poles;
  - (ii) have a rated voltage  $U_N$  above 50 V and up to and including 1 000 V;
  - (iii) have a rated output  $P_N$  from 0,12 kW up to and including 1 000 kW; and
  - (iv) are rated on the basis of continuous duty operation.
- (b) Variable speed drives rated for operating with motors specified in (a), within the 0,75 kW - 1 000 kW rated output range.

#### *Article 3*

#### **Definitions**

In addition to the definitions set out in Directive 2009/125/EC, the following definitions shall apply for the purposes of this Regulation:

- (1) 'electric motor' or 'motor' means a device that converts electrical input power into mechanical output power in the form of a rotation with a certain speed and torque that depends amongst others on the frequency of the supply voltage and number of poles of the motor.
- (2) 'variable speed drive' or 'VSD' means an electronic power converter that continuously adapts the electrical power supplied to the 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 power supply to a variable frequency and voltage supplied to the motor.
- (3) 'phase' means the type of configuration of the mains electrical supply.
- (4) 'pole' means a north and south pole produced by the rotating magnetic field of the motor, the total number of poles of which determines the base speed of the motor.
- (5) 'continuous duty operation' means capable of continuous operation at their rated power with a temperature rise within the specified insulation temperature class.
- (6) 'increased safety motor' means a motor intended for use in explosive atmospheres and qualified 'Ex-e' as defined in standard IEC EN 60079-7.
- (7) 'motor with mechanical commutators' means a motor where the direction of the current is reversed by means of a mechanical device.
- (8) 'brake motor' means a motor equipped with an electromechanical brake unit operating directly on the motor shaft without couplings.
- (9) 'equivalent model' means a model which has the same technical characteristics as set out in annex 1, and is placed on the market by the same supplier but with a different model number.
- (10) 'totally enclosed non-ventilated (TENV) motor' means a motor designed and specified to operate without a fan and predominantly dissipating heat by radiation.
- (11) 'totally enclosed air over (TEAO) motor' means a motor designed and specified to be cooled by the specific air stream of the driven equipment.

#### Article 4

#### Ecodesign requirements

1. The ecodesign requirements for motors and variable speed drives within the scope of this Regulation are set out in Annex I.
2. The following motors are exempt from the efficiency requirements specified in Annex I.1, but shall fulfill the product information requirements specified in Annex I.2, points (3), (4), (10), (11) and (13):
  - (a) motors completely integrated into a product (for example into a gear, pump, fan or compressor) of which the energy performance cannot be tested independently from the product even with the provision of a temporary end-shield and drive-end bearing; the motor must share common components (apart from connectors such as bolts) with the driven unit (for example, a shaft or housing) and not be designed in such a way as to enable the motor to be separated from the driven unit as an entire motor that can operate independently. For a motor to be exempt from performance requirements, the process of separation must render the motor inoperative;

- (b) motors with an integrated variable speed drive (**compact drives**) of which the energy performance cannot be tested independently from the variable speed drive; 
- (c) motors with an integrated brake where the brake is an integral part of the inner motor construction and can neither be removed nor supplied by a separate power source during the testing of the motor efficiency;
- (d) 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 –20 °C;
  - (v) **where the water coolant temperature at the inlet to a product is less than 0 °C or exceeds 32 °C**;
  - (vi) when wholly immersed in a liquid. 
- (e) motors specifically qualified for the safety of nuclear installations, as defined in article 3 of Directive 2009/71/EURATOM;
- (f) motors in cordless or battery-operated equipment;
- (g) motors in hand-held equipment whose weight is supported by hand during operation;
- (h) motors in hand-guided mobile equipment moved while in operation;
- (i) motors with mechanical commutators;
- (j) **Totally Enclosed Non-Ventilated (TENV) motors**;
- (k) **Totally Enclosed Air Over (TEAO) motors**;
- (l) motors placed on the market not later than 1 January 2029 as replacement for identical motors integrated in products and placed on the market no later than 1 January 2022;
- (m) multi-speed motors, i.e. motors with multiple windings or with a switchable winding providing a different number of poles and speeds;
- (n) Motors specifically designed for electric vehicles.

3. The following VSDs are exempt from the efficiency requirements specified in Annex I.3, but shall fulfil the product information requirements specified in Annex I.4, points (1), (2), (8) and (9):

- (a) VSDs integrated into a product of which the energy performance cannot be tested independently from the product; 
- (b) VSDs specifically qualified for the safety of nuclear installations, as defined in article 3 of Directive 2009/71/EURATOM;
- (c) VSDs placed on the market not later than 1 January 2029 as replacement for identical VSDs integrated in products and placed on the market no later than 1 January 2022.

*Article 5*  
**Conformity assessment**

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV of that Directive or the management system for assessing conformity set out in Annex V of that Directive.
2. Where the information included in the technical documentation for a particular model has been **obtained by calculations**  the basis of design, or extrapolation from another model, or both, the documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by manufacturers to verify the accuracy of such calculations and extrapolations.

*Article 6*  
**Verification procedure for market surveillance purposes**

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the verification procedure set out in Annex III in accordance with the measurement methods set out in Annex II to this Regulation.

*Article 7*  
**Circumvention**

The manufacturer or importer shall not place on the market products that have been designed so that their performance **is automatically altered in test conditions**  the objective of reaching a more favourable level for any of the parameters declared by the manufacturer in the technical documentation or included in any of the documentation provided with the product.

*Article 8*  
**Indicative benchmarks**

The indicative benchmarks for the best-performing motors and variable speed drives available at the time of adopting this Regulation are set out in Annex IV.

*Article 9*  
**Evaluation**

The Commission shall assess this Regulation and shall present the results of this assessment, including, if appropriate, a draft revision proposal, to the Ecodesign and Energy Labelling Consultation Forum no later than five years after its entry into force. This assessment shall address in particular:

- (1) further resource efficiency, re-use and recycling opportunities;
- (2) the appropriateness of the level of verification tolerances;
- (3) the possibility of setting stricter requirements for motors and variable speed drives;
- (4) the possibility of setting minimum energy efficiency requirements for motors with a rated voltage above 1000 V, **as well as for submersible motors**; 

- (5) the possibility to set requirements for combinations of motors and VSDs placed on the market together; as well as integrated variable speed motors (compact drives); 
- (6) the relevance of the exemptions set out in articles 4(2) and 4(3).

#### *Article 10*

##### **Repeal**

Commission Regulation (EC) No 640/2009 is repealed from 29 June 2020. 

#### *Article 11*

##### **Entry into force and application**

This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

The Regulation shall apply from 30 June 2020.

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

Done at Brussels,

*For the Commission*  
Jean-Claude JUNCKER  
*The President*