

Annex 2

Working document on possible ecodesign requirements for 0,75 – 200 (370) kW electric motors

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Subject matter

This working document pursuant to Directive 2005/32/EC establishes eco-design requirements related to motors. The Lot 11 preparatory study shows that energy in use phase is the only significant environmental aspects. Ecodesign parameters referred to in Annex I, Part 1 of Directive 2005/32/EC, are not considered as significant.

Definitions

Electric motors are considered as EuPs within the meaning of Article 2.1 of Directive 2005/32/EC.

For the purposes of this working document the following definition shall apply:

'Electric motor' means single speed, three-phase 50 Hz or 60 Hz or 50/60 Hz, squirrel cage induction motors in accordance with IEC 60034-1, that:

- have a rated voltage of U_N up to 1000 V;
- have a rated output PN between 0,75 kW and 200 (370) kW;
- have either 2, 4 or 6 poles;
- are rated on the basis of duty type S1 (continuous duty);
- are constructed to degree of protection IP4x or higher according to IEC60034-5.

Eco-design requirements

Products falling under the definitions of paragraph "Definitions" above in this document shall meet the eco-design requirements set out in Annex I.

Measurement method

Efficiency of motors shall be tested in accordance with IEC 60034-2-1. The selected test method shall be of "low uncertainty", and shall be stated in the documentation of the motor. Motors' efficiency shall be classified according to IEC 60034-30.

Information requirements for components and sub-assemblies

No information requirements on manufacturers of components and sub-assemblies of motors are proposed. The preparatory study and the stakeholders identified several system and installation related requirements that could be useful but not possible or efficient to address within an Ecodesign implementing measure.

Conformity Assessment

A conformity assessment shall be carried out according to Article 8(2), and Annex IV (Internal design control) or Annex V (Management system for assessing conformity) of Directive 2005/32/EC.

Market surveillance

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

Benchmarks

The benchmark for best product in terms of energy efficiency is the IE4 efficiency level, when the IE4 efficiency values, as defined in the IEC 60034-30 standard, are published by the IEC (not yet known).

Review

A review of the proposed requirements shall be presented to the Consultation Forum depending on technological progress and not later than 5 years after its entry into force.

Annex I: Ecodesign requirements

Electric motors shall meet the ecodesign requirements set out in this Annex and be classified according to IEC 60034-30.

a) Minimum energy efficiency requirement

January 1, 2011 onwards, the minimum allowable energy performance requirement for electric motors in the power range $\geq 0,75$ -200 (370) kW must meet or exceed the IE2 efficiency level as defined in the IEC 60034-30 standard.

b) Minimum energy efficiency requirement

January 1, 2015 onwards, the minimum allowable energy performance requirement for electric motors in the power range $\geq 7,5$ – 200 (370) kW must meet or exceed the IE3 efficiency level as defined in the IEC 60034-30 standard.

c) Product information requirement

January 1, 2011 onwards, the full load efficiency and IE code shall be marked on or near the rating plate, and reported in the documentation of the product, according to the efficiency classification IEC 60034-30. The efficiency at 50%, 75% and full load shall be reported in product documentation.

Annex II: Measurement procedure for electric motors 0,75 – 200 (370) kW

Energy efficiency levels shall be determined applying the low uncertainty efficiency testing procedures set out in accordance with IEC 60034-2-1, as specified by IEC 60034-30.

Explanatory Notes

This working document is meant to contribute to achieving the requirements of Article 16.2 of Directive 2005/32/EC in relation to electric motors. The proposed ecodesign requirements are set out based on the recommendations of the preparatory study.

Form of the implementing measure

The intention is to give to the implementing measure the form of a directly applicable decision or regulation.

Scope

This working document covers electric single speed motors with three-phase 50 Hz or 60 Hz or 50/60 Hz, squirrel cage induction motors in accordance with IEC 60034-1, that:

- have a rated voltage of U_N up to 1000 V;
- have a rated output P_N between 0,75 kW and 200 (370) kW;
- have either 2, 4 or 6 poles;
- are rated on the basis of duty type S1 (continuous duty);
- are constructed to degree of protection IP4x or higher according to IEC60034-5.

The preparatory study proposes to cover the power range 0,75-200 kW. However, as the efficiency levels in IEC 60034-30 standard are constant up to 370 kW, it is proposed to cover the power range up to that level. This would allow to align with international practice in motor efficiency legislation; e.g. the upgraded efficiency requirements introduced in December 2007 by the US Government, follow the IEC standard in covering the power range up to about 370 kW (500 hp).

On top of the proposed eco-design requirements the Commission recommends complementary measures to be taken at national, regional and local authorities: in their public procurement procedures, Member States would be encouraged to require for motors the minimum energy efficiency values of the second phase of Annex I (IE3 levels) already from the beginning of this measure.

Exclusions

Excluded from the working document are:

- Motors specifically built for operation in explosive atmospheres according to IEC 60079-0 and IEC 61241-1;
- All other non-general-purpose motors (like smoke-extraction motors built for operation in high ambient temperature environments according to EN12101-3 etc.).

Ecodesing requirements and benchmarks

The Lot 11 preparatory study shows that energy consumption in the use-phase completely dominates the life-cycle impact of electric motors. Accordingly, this working document proposes minimum energy efficiency requirements and benchmarks only in relation to energy consumption in the use phase. The minimum energy efficiency requirements will help to put the European market at a comparable efficiency level with other major economies. For example, they will help Europe to align with the minimum energy efficiency requirements in the USA with 12 years of delay for IE2 and three years of delay for IE3 efficiency levels.

The preparatory study has shown that the proposed energy efficiency levels lead to considerable reduction in least life cycle cost to the consumer ranging from ca 2% to 11% depending on the size of the motor and on the number of annual running hours. This does not take into account the related price reduction due to increased demand for higher efficiency motors.

No ecodesing requirements are set on noise levels as electric motors are regulated by the IEC 60034-9 standard, which specifies maximum A-weighted sound power levels (*LWA*) for airborne noise emitted by rotating electrical machines.

The preparatory study shows that installation and maintenance are of major importance for the efficiency of the motor system and must be taken into account when defining and installing the system. The preparatory study refers to appropriate guides and programmes, which helps to installers and repair personnel to optimise the system efficiency. Also, international cooperation under the auspices of the IEA has been started in order to develop an Implementing Agreement on motor systems.

Electric motors are mainly built with materials that are recyclable and that have a very high value (e.g. steel, aluminium, copper). Therefore the majority of motor materials are recycled at the end-of-life.

Energy labelling

The international market has been characterized by the lack of a simple and clear way to indicate comparative energy efficiency levels of motors, although many of the major economies have some kind of voluntary or mandatory comparative energy labelling schemes.

The scope of the Energy Labelling Directive 92/75/EEC does not allow setting labelling schemes on motors. The Directive is under revision and the scope could be broadened to include motors. However, since the motor market is mainly an OEM market, such a labelling scheme would not be very efficient and a delay of several years would have to be accepted.

Since the introduction of the IEC 60034-30 measurement standard, which is in the final stages of approval, the rated efficiency and the efficiency class defined in the standard will overcome the above information barrier. Accordingly, an ecodesing requirement on the labelling of the motor efficiency is set based on the standard, which will also help to harmonise the international labelling practice.

Definitions

For motors covered by this working document, the definitions are restricted to commonly agreed technical parameters, such as power rate, encompassing single speed, three-phase 50 Hz or 60 Hz or 50/60 Hz, squirrel cage induction motors in accordance with IEC 60034-1.

Measurement standard

Efficiency and losses shall be tested in accordance with IEC 60034-2-1, as specified by IEC 60034-30. Efficiency values for IE4 efficiency level are under preparation and will become the benchmark for the best product, when the updated standard is published.

Market structure of the products covered by this working document

The motor market is largely an OEM market (80-90 % of the sales). The large OEM market share, combined with the higher price of an IE2 motor, which typically is 20-30% above an IE1 motors price, has led to low penetration of IE2 motors in Europe. The penetration of IE3 motors is even smaller. OEM manufacturers tend to base their purchases on motor purchase cost, since they will not pay the motor operating costs.

AC motors represent 96% of all motors sold in the EU. The AC market is, in its turn, dominated by three-phase induction motors which represent 87% of AC motors sold (83,5% of total motor markets). Thus, general purpose motors cover more than 4/5 of all AC motors above 0,75 kW sold in Europe.

International dimension

Almost all major economies have some kind of mandatory regulatory scheme regarding motor efficiency. The proposed minimum energy efficiency requirements will help the European markets to align with the international practice, despite of being many years delayed in comparison with the USA, for example.

Impact on other EU legislation

No impact on other EU legislation has been identified.

Voluntary agreements

A voluntary agreement supported by CEMEP and the European Commission was established and signed in 1999 by 36 motor manufacturers, representing 80% of the European production of standard motors. The scheme has essentially reduced the sales of the most inefficient motors.

However, while 70% of motors sold in the North America (Mexico, USA and Canada) correspond to efficiency classes IE2 and IE3, only about 15% of these motors are sold in Europe. The majority of European sales (85%) are still composed of the lowest IE1 efficiency class motors. Thus, with the proposed efficiency levels there would be no more room for a voluntary scheme, as only one (IE3) efficiency level would remain until the definition of the IE4 level in the IEC standard.