DMMS IEC 60034-30-1:2014 Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code)

Scope

This part of IEC 60034 specifies efficiency classes for single-speed electric motors that are rated according to IEC 60034-1 or IEC 60079-0, are rated for operation on a sinusoidal voltage supply and:

• have a rated power PN from 0,12 kW to 1 000 kW;

• have a rated voltage UN above 50 V up to 1 kV;

• have 2, 4, 6 or 8 poles;

• are capable of continuous operation at their rated power with a temperature rise within the specified insulation temperature class; NOTE 1

Most motors covered by this standard are rated for duty type S1 (continuous duty). However, some motors that are rated for other duty cycles are still capable of continuous operation at their rated power and these motors are also covered.

• are marked with any ambient temperature within the range of –20 °C to + 60 °C;

NOTE 2 The rated efficiency and efficiency classes are based on 25 °C ambient temperature according to

IEC 60034-2-1. NOTE 3 Motors rated for temperatures outside the range – 20 °C and + 60 °C are considered to be of special construction and are consequently excluded from this standard.

NOTE 4 Smoke extraction motors with a temperature class of up to and including 400 °C are covered by this standard.

• are marked with an altitude up to 4 000 m above sea level. NOTE 5 The rated efficiency and efficiency class are based on a rating for altitudes up to 1 000 m above sea level. This standard establishes a set of limit efficiency values based on frequency, number of poles and motor power. No distinction is made between motor technologies, supply voltage or motors with increased insulation designed specifically for converter operation even though these motor technologies may not all be capable of reaching the higher efficiency classes (see Table 1). This makes different motor technologies fully comparable with respect to their energy efficiency potential. NOTE 6 Regulators should consider the above constraints when assigning national minimum energy-efficiency performance standards (MEPS) with respect to any particular type of motor. The efficiency of power-drive systems is not covered by this standard. In particular, motor losses due to harmonic content of the supply voltage, losses in cables, filters and frequency-converters, are not covered. Motors with

flanges, Motors with flanges, feet and/or shafts with mechanical dimensions different from IEC 60072-1 are covered by this standard. Geared motors are covered by this standard including those incorporating non-standard shafts and flanges. Excluded are:

• Single-speed motors with 10 or more poles or multi-speed motors.

Motors with mechanical commutators (such as DC motors).

• Motors completely integrated into a machine (for example pump, fan and compressor) that cannot be practically tested separately from the machine even with provision of a temporary end-shield and drive-end bearing. This means the motor shall: a) share common components (apart from connectors such as bolts) with the driven unit (for example, a shaft or housing) and; b) 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 of the driven unit.

That is, for a motor to be excluded from this standard, the process of separation shall render the motor inoperative. (TEAO, IC418)

Totally enclosed air-over machines, i.e. totally enclosed frame-surface cooled machines intended for exterior cooling by a ventilating means external to the machine, are covered by this standard. Efficiency testing of such motors may be performed with the fan removed and the cooling provided by an external blower with a similar airflow rate as the original fan.

• Motors with integrated frequency-converters (compact drives) when the motor cannot be tested separately from the converter. Energy efficiency classification of compact drives shall be based on the complete product (PDS : Power Drive System) and will be defined in a separate standard.

NOTE 7 A motor is not excluded when the motor and frequency-converter can be separated and the motor can be tested independently of the converter.

• Brake motors when 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 motor efficiency. NOTE 8 Brake motors with a brake coil that is integrated into the flange of the motor are covered as long as it is possible to test motor efficiency without the losses of the brake (for example by dismantling the brake or by energizing the brake coil from a separate power source).

When the manufacturer offers a motor of the same design with and without a brake the test of motor efficiency may be done on a motor without the brake. The determined efficiency may then be used as the rating of both motor and brake motor.

- Submersible motors specifically designed to operate wholly immersed in a liquid.
- Smoke extraction motors with a temperature class above 400 °C.