## Eco-design requirements for motors

The EU intends to save energy. This is regulated by the overall "Ecodesign directive" (or "ErP" [Energy-related Products]) Directive 2009/125/EC of the European Parliament. (Replaces the old "Ecodesign directive 2005/32/EC", which was also called EuP Directive [Energy-using Products]. Implemented in Germany by the „Gesetz über eine umweltgerechte Gestaltung energiebetriebener Produkte" Energiebetriebene-Produkte-Gesetz – EBPG).

For single-speed three-phase induction motors this Ecodesign directive is implemented by Regulation (EC) No. 640/2009.

This regulation takes most of the technical information from the EN 60034-30:2009, based on IEC 60034-30:2008 "Rotating electrical machines - Efficiency classes of single-speed, three-phase, cage-induction motors"

The directive regulates requirements for electric motors in terms of the marketing and start-up, even if the motors are integrated into other products.

## Definition

"Motor" means

- a single-speed three-phase 50-Hz or -50/60-Hz-squirrel cage induction motor
- 2 to 6-poles
- rated voltage up to 1000 V
- rated power from 0.75 kW to 375 kW
- designed for continuous operation

## Exceptions

The Regulation 640/2009 does not apply to motors

- which are fully submerged into liquid
- which are integrated completely into a product so that energy efficiency can only be determined for the total product
- over 1000 m above sea level
- for ambient temperatures above 40°C
- for maximum operating temperatures above 400°C
- for ambient temperatures below -15°C (any type of motor) or below 0°C (water-cooled motor only)
- cooling temperature at the inlet of a product below 5°C or above 25°C
- in hazardous areas according to Directive 94/9/EC (ATEX)
- for brake motors.

## Requirements

- From the 16.06.2011 motors must have at least efficiency class IE2.
- From the 01.01.2015 motors from 7.5 to 375 kW must have
    - at least efficiency class IE3
    - or efficiency class IE2 in combination with a speed control
- From the 01.01.2017 motors from 0.75 to 375 kW must have
    - at least efficiency class IE3
    - or efficiency class IE2 in combination with a speed control.

## Efficiency classes

| Klasse | Beschreibung | Ursprung |
|---|---|---|
| IE1 | Standard | 50Hz: old EFF2 class as CEMEP-EU<br>60Hz: identical as Brazilian standards |
| IE2 | High | old EFF1 class as CEMEP-EU<br>60Hz: same as U.S. American EPACT |
| IE3 | Premium | 15% -20% reduction in losses compared with IE2<br>60Hz: same as U.S. American EPACT |
| IE4 | Super-Premium | for future highly-efficient motors |
| IE… | … | |

## General remarks

- Most of the motors supplied worldwide are in between 0.75 kW and 375kW – this is the reason why especially for this rage minimum efficiency classes have been defined.
- Only 2-, 4 - and 6-pole motors were defined as 8-pole motors disappear because of increasing use of frequency converters. For the US-American market there are efficiency requirements for 8-pole motors.
- 50Hz and 60Hz motors have different minimum efficiency levels, as for 60Hz always slightly higher efficiencies can be achieved (0.5% to 2.5% higher). Only large 2-pole motors have lower efficiencies at 60Hz than identical large motors at 50Hz.