



Minimum Energy Performance Standard

European Union¹



Valid till 06/2021

Regulation EC Regulation 640/2009

Standards IEC 60034-2-12007 - Classifying efficiencies and IE classes

IEC 60034-30-12014 - Classifying efficiencies and IE classes

3 phase AC squirrel cage motors

Voltage range > 50 - ≤ 1000 V

Altitude ≤ 4000 m

Frequency 50Hz, 50Hz/60Hz

Ambient temperature -30°C - +60°C

Operation mode S1

Area	Operation	Power range	Pole numbers	Minimum efficiency
Safe area²	DOL	≥ 0.75 - ≤ 375 kW	2, 4, 6	IE3
	VSD	≥ 0.75 - ≤ 375 kW	2, 4, 6	IE2

Major exceptions from the regulation

1. Motors designed to operate wholly immersed in a liquid
2. 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
3. Motors specifically designed to operate:
 - a. at altitudes exceeding 4000 meters above sea-level
 - b. where ambient air temperatures exceed 60 °C
 - c. in maximum operating temperature above 400 °C
 - d. where ambient air temperatures are less than -30 °C for any motor or less than 0 °C for a motor with air cooling
 - e. where the water coolant temperature at the inlet to a product is less than 0 °C or exceeding 32 °C
 - f. in potentially explosive atmospheres as defined in Directive 94/9/EC of the European Parliament and of the Council
4. Brake motors

Regulation EU Regulation 2019/1781

Standards

IEC 60034-2-1 2007 - Classifying efficiencies and IE classes
IEC 60034-30-1 2014 - Classifying efficiencies and IE classes
IEC 61800-9-2

3 phase AC squirrel cage motors

rated for direct on-line operation

Voltage range > 50 - ≤ 1000 V

Altitude ≤ 4000 m

Frequency 50Hz, 60Hz, 50Hz/60Hz

Ambient temperature -30°C - +60°C

Operation DOL/ VSD+Drive

Operation mode S1, S3 ≥ 80%; S6 ≥ 80%

Area	Power range	Pole numbers	Minimum efficiency
Safe area²	≥ 0.12 - ≤ 0.75 kW	2, 4, 6, 8	IE2
Safe area², Ex db, Ex ec, Ex tb, Ex tc	≥ 0.75 - ≤ 1000 kW	2, 4, 6, 8	IE3

Major exceptions from the regulation

1. Motors for increased safety Ex eb
2. Motors specifically designed and specified to operate wholly immersed in a liquid
3. Motors completely integrated into a product (for example into a gear, pump, fan or compressor) and whose energy performance cannot be tested independently from the product
4. Motors with an integrated variable speed drive (compact drives) whose energy performance cannot be tested independently from the variable speed drive
5. Motors with an integrated brake which forms an integral part of the inner motor construction and can neither be removed nor powered by a separate power source during the testing of the motor efficiency
6. Motors specifically designed and specified to operate exclusively:
 - a. at altitudes exceeding 4 000 metres above sea-level
 - b. where ambient air temperatures exceed 60 °C
 - c. in maximum operating temperature above 400 °C
 - d. where ambient air temperatures are less than – 30 °C
 - e. where the water coolant temperature at the inlet to a product is below 0 °C or above 32 °C
 - f. explosion-protected motors specifically designed and certified for mining, as defined in Annex I, point 1 of Directive 2014/34/EU of the European Parliament and of the Council
7. Motors in cordless or battery-operated equipment
8. Motors with mechanical commutators
9. Totally Enclosed Non-Ventilated (TENV) motors
10. Multi-speed motors, i.e. motors with multiple windings or with a switchable winding, providing a different number of poles and speeds
11. Motors designed specifically for the traction of electric vehicles

3 phase AC Drives

Voltage range > 100 - ≤ 1000 V

Frequency 50Hz – 60Hz

Area	Design	Power range	Minimum efficiency
Safe area ²	AC / AC	≥ 0.12 - ≤ 1000 kW	IE2

Major exceptions from the regulation

1. VSDs integrated into a product and whose energy performance cannot be tested independently from the product, that is to say that an attempt to do so would render the VSD or the product inoperative
2. VSDs qualified specifically for the safety of nuclear installations, as defined Article 3 of Directive 2009/71/ Euratom
3. Regenerative drives
4. Drives with sinusoidal input current.

Valid from 07/2023

Regulation EU Regulation 2019/1781

Standards

IEC 60034-2-1	2007 - Classifying efficiencies and IE classes
IEC 60034-2-3	2019 (methods to define losses and efficiencies - VSD driven)
IEC 60034-30-1	2014 - Classifying efficiencies and IE classes
IEC 61800-9-2	

3 phase AC squirrel cage motors rated for direct on-line operation

Voltage range > 50 - ≤ 1000 V

Altitude ≤ 4000 m

Frequency 50Hz, 60Hz, 50Hz/60Hz

Ambient temperature -30°C - +60°C

Operation DOL/ VSD+Drive

Operation mode S1, S3 ≥ 80%; S6 ≥ 80%

Area	Power range	Pole numbers	Minimum efficiency
Safe area ² , Ex db, Ex ec, Ex tb, Ex tc	≥ 0.12 - ≤ 0.75 kW	2, 4, 6, 8	IE2
	≥ 0.75 - ≤ 75 kW	2, 4, 6, 8	IE3
	≥ 75 - ≤ 200 kW	2, 4, 6	IE4 (Safe area only !)
	≥ 75 - ≤ 200 kW	8	IE3
	≥ 200 - ≤ 1000 kW	2, 4, 6, 8	IE2
Ex eb	≥ 0.12 - ≤ 1000 kW	2, 4, 6, 8	IE2

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2. Motors completely integrated into a product (for example into a gear, pump, fan or compressor) and whose energy performance cannot be tested independently from the product
3. Motors with an integrated variable speed drive (compact drives) whose energy performance cannot be tested independently from the variable speed drive
4. Motors with an integrated brake which forms an integral part of the inner motor construction and can neither be removed nor powered by a separate power source during the testing of the motor efficiency
5. Motors specifically designed and specified to operate exclusively:
 - a. at altitudes exceeding 4 000 metres above sea-level
 - b. where ambient air temperatures exceed 60 °C
 - c. in maximum operating temperature above 400 °C
 - d. where ambient air temperatures are less than – 30 °C
 - e. where the water coolant temperature at the inlet to a product is below 0 °C or above 32 °C
 - f. explosion-protected motors specifically designed and certified for mining, as defined in Annex I, point 1 of Directive 2014/34/EU of the European Parliament and of the Council
6. Motors in cordless or battery-operated equipment
7. Motors with mechanical commutators
8. Totally Enclosed Non-Ventilated (TENV) motors
9. Multi-speed motors, i.e. motors with multiple windings or with a switchable winding, providing a different number of poles and speeds
10. Motors designed specifically for the traction of electric vehicles

1 phase AC squirrel cage motors

Voltage range > 50 - ≤ 1000 V

Altitude ≤ 4000 m

Frequency 50Hz, 60Hz, 50Hz/60Hz

Ambient temperature -30°C - +60°C

Operation DOL/ VSD+Drive

Operation mode S1, S3 ≥ 80%; S6 ≥ 80%

Area	Power range	Pole numbers	Minimum efficiency
Safe area ²	≥ 0.12 - ≤ 1000 kW	2, 4, 6, 8	IE2

Major exceptions from the regulation

1. Motors specifically designed and specified to operate wholly immersed in a liquid
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6. Motors in cordless or battery-operated equipment
7. Motors with mechanical commutators
8. Totally Enclosed Non-Ventilated (TENV) motors
9. Multi-speed motors, i.e. motors with multiple windings or with a switchable winding, providing a different number of poles and speeds
10. Motors designed specifically for the traction of electric vehicles

3 phase AC Drives

Voltage range 100 - 1000 V

Altitude \leq 4000 m

Frequency 50Hz – 60Hz

Ambient temperature -30 °C - +60 °C

Area	Design	Power range	Minimum efficiency
Safe area ²	AC / AC	$\geq 0.12 - \leq 1000$ kW	IE2

Major exceptions from the regulation

1. VSDs integrated into a product and whose energy performance cannot be tested independently from the product, that is to say that an attempt to do so would render the VSD or the product inoperative
2. VSDs qualified specifically for the safety of nuclear installations, as defined Article 3 of Directive 2009/71/ Euratom
3. Regenerative drives
4. Drives with sinusoidal input current.

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²(non Explosion proof)