



Keeping Industry Turning

Ecodesign requirements AC induction motors

Ecodesign regulation [EU] 2019/1781
and amending regulation [EU] 2021/341

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Ecodesign regulation [EU] 2019/1781

Former regulation (EC) 640/2009

Regulation (EC) 640/2009 which was replaced on the **30th June 2021**, stipulated that induction motors (single speed, 3-phase 50Hz or 50/60Hz squirrel cage induction motor for continuous duty) meet IE3 efficiency values or IE2 efficiency values when used with a variable speed drive, for outputs from 0.75kW to 375kW, in 2, 4 or 6 poles.

The exemptions to this were: ATEX motors meeting Directive 2014/34/EU (for explosive atmospheres), Brake motors and submersible motors.

See chart 1.

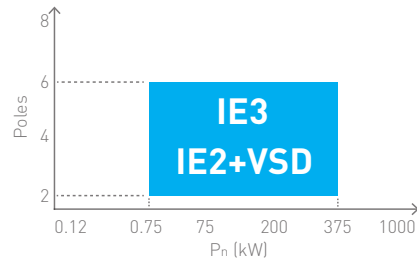


Chart 1:
Introduction of IE2 + VSD from 0.75 to 375kW,
IE3 from 0.75kW to 375kW

Ecodesign regulation (EU) 2019/1781

Ecodesign regulation [EU] 2019/1781, is introduced in two stages, stage one came into effect on the 1st July 2021, the second stage two years later 1st July 2023.

Stage one:

Stage one from the **1st July 2021**.

This stage introduces efficiency requirements for motors 0.12 to 0.74kW, which must now meet IE2 efficiency levels. Previously the IE3 efficiency requirement stopped at 375kW, this has now been increased to 1000kW.

In addition to the efficiency level changes above, the following motor types are to be introduced in stage one:

8 pole speeds, Brake motors, Hazardous area motors: Ex ec, Ex tb, Ex tc & Ex db. Totally Enclosed Air Over motors (IC418) and motors with duty cycles: S1, S3 ≥ 80%, S6 ≥ 80%.

Please note: IE2 +VSD is no longer applicable.

Motors exempt from the new regulation:
High voltage motors, Mining motors and Totally Enclosed Non-Ventilated (IC410) motors.

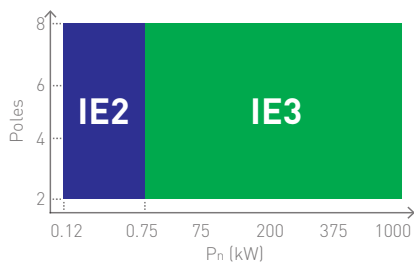


Chart 2:
Introduction of IE2 0.12 to 0.74kW,
IE3 from 0.75kW to 1000kW
1st July 2021

Stage two:

Stage two from the **1st July 2023**.

IE4 is introduced, this will be **mandatory** for motor outputs 75kW to 200kW in 2, 4 & 6 poles, but excludes ATEX motors according to 2014/34/EU and brake motors..

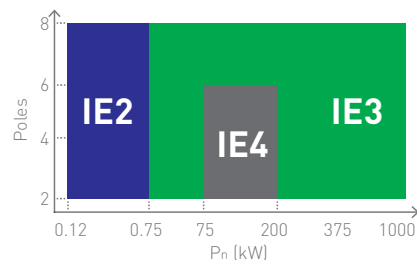


Chart 3:
Introduction of IE4 75kW to 200kW
1st July 2023

Stage two also introduces a minimum efficiency value of IE2 for single phase motors and Ex eb (increased safety) motors.

As in stage one, the following motors are exempt:
High voltage motors, Mining motors and Totally Enclosed Non-Ventilated (IC410) motors.

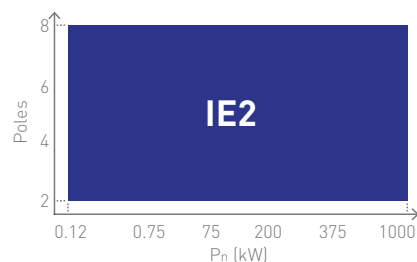


Chart 4:
Introduction of Single phase &
Ex eb 0.12kW to 1000kW
1st July 2023

Ecodesign requirements AC induction motors
Ecodesign regulation [EU] 2019/1781

Time lines

Ecodesign		Year and minimum efficiency requirements (2016 onward)		
		Until 30 th June 2021 ¹	From 1 st July 2021 ²	From 1 st July 2023 ²
Induction motor ≥ 50V to ≤ 1000V				
≥ 0.12kW to < 0.75kW	3 phase - 2/4/6 pole	-	IE2	
	3 phase - 8 pole	-	IE2	
≥ 0.75kW to < 75kW	3 phase - 2/4/6 pole	IE2 + VSD or IE3	IE3	
	3 phase - 8 pole	-	IE3	
≥ 75kW to ≤ 200kW	3 phase - 2/4/6 pole	IE2 + VSD or IE3	IE3	IE4 ¹
	3 phase - 8 pole	-	IE3	
> 200kW to ≤ 375kW	3 phase - 2/4/6 pole	IE2 + VSD or IE3	IE3	
	3 phase - 8 pole	-	IE3	
> 375kW to ≤ 1000kW	3 phase - 2/4/6/8 pole	-	IE3	
≥ 0.12kW to ≤ 1000kW	3 phase - 2/4/6/8 pole Ex eb (Increased safety)	-	IE2	
≥ 0.12kW to ≤ 1000kW	1 phase - 2/4/6/8 pole	-	IE2	
Excluded: High voltage motors, DC motors, mining motors & multi-speed motors.				
Included: Brake motors, motors for explosive atmospheres Ex ec, Ex tb, Ex tc, Ex db. Motors rated for duty class S1, S3 > 80%, S6 > 80% and Totally Enclosed Air Over (IC418) motors.				
¹ Exempt: ATEX motors according to 2014/34/EU and brake motors				
² Exempt: Totally Enclosed Non Ventilated (IC410) motors.				

See page 4 for minimum efficiency values

Questions

Question	Answer
Are motors manufactured outside the EU included?	The Ecodesign regulation includes motors imported and sold in the UK and EU/EEA.
Are motors for export included?	Does not apply for motors exported outside of the UK (or) EU/EEA, however, care must be taken to observe any regulations on efficiency for that region. ie MEPS, NEMA Premium, etc
I am replacing a motor that doesn't meet the latest Ecodesign regulations, can I source a 'like for like' design?	Until 30th June 2029, an identical replacement motor may be supplied, if the original was placed on the market before 1st July 2021 (safe area, Ex ec, Ex tb, Ex tc, Ex db) and 1st July 2023 (Ex eb). The new motor must show that it is to be used as a replacement and be marked accordingly.
My client is requesting motors for 60Hz supply, are these included?	Amending Regulation [EU] 2021/341 confirmed motors for 60Hz supply must meet minimum efficiency performance requirement, with dedicated 60Hz efficiency data.

Efficiency levels

Minimum efficiency level at rated output power (P_N) for each Energy efficiency class.

50Hz								
kW	IE2 - High Efficiency				IE3 - Premium Efficiency			
	2 pole	4 pole	6 pole	8 pole	2 pole	4 pole	6 pole	8 pole
0.12	53.6	59.1	50.6	39.8	60.8	64.8	57.7	50.7
0.18	60.4	64.7	56.6	45.9	65.9	69.9	63.9	58.7
0.20	61.9	65.9	58.2	47.4	67.2	71.1	65.4	60.6
0.25	64.8	68.5	61.6	50.6	69.7	73.5	68.6	64.1
0.37	69.5	72.7	67.6	56.1	73.8	77.3	73.5	69.3
0.40	70.4	73.5	68.8	57.2	74.6	78.0	74.4	70.1
0.55	74.1	77.1	73.1	61.7	77.8	80.8	77.2	73.0
0.75	77.4	79.6	75.9	66.2	80.7	82.5	78.9	75.0
1.1	79.6	81.4	78.1	70.8	82.7	84.1	81.0	77.7
1.5	81.3	82.8	79.8	74.1	84.2	85.3	82.5	79.7
2.2	83.2	84.3	81.8	77.6	85.9	86.7	84.3	81.9
3.0	84.6	85.5	83.3	80.0	87.1	87.7	85.6	83.5
4.0	85.8	86.6	84.6	81.9	88.1	88.6	86.8	84.8
5.5	87.0	87.7	86.0	83.8	89.2	89.6	88.0	86.2
7.5	88.1	88.7	87.2	85.3	90.1	90.4	89.1	87.3
11	89.4	89.8	88.7	86.9	91.2	91.4	90.3	88.6
15	90.3	90.6	89.7	88.0	91.9	92.1	91.2	89.6
18.5	90.9	91.2	90.4	88.6	92.4	92.6	91.7	90.1
22	91.3	91.6	90.9	89.1	92.7	93.0	92.2	90.6
30	92.0	92.3	91.7	89.8	93.3	93.6	92.9	91.3
37	92.5	92.7	92.2	90.3	93.7	93.9	93.3	91.8
45	92.9	93.1	92.7	90.7	94.0	94.2	93.7	92.2
55	93.2	93.5	93.1	91.0	94.3	94.6	94.1	92.5
75	93.8	94.0	93.7	91.6	94.7	95.0	94.6	93.1
90	94.1	94.2	94.0	91.9	95.0	95.2	94.9	93.4
110	94.3	94.5	94.3	92.3	95.2	95.4	95.1	93.7
132	94.6	94.7	94.6	92.6	95.4	95.6	95.4	94.0
160	94.8	94.9	94.8	93.0	95.6	95.8	95.6	94.3
200 - 1000	95.0	95.1	95.0	93.5	95.8	96.0	95.8	94.6

50Hz				
kW	IE4 - Super Premium			
	2 pole	4 pole	6 pole	8 pole
0.12	66,5	69.8	64.9	62.3
0.18	70,8	74.7	70.1	67.2
0.20	71.9	75.8	71.4	68.4
0.25	74.3	77.9	74.1	70.8
0.37	78.1	81.1	78.0	74.3
0.40	78.9	81.7	78.7	74.9
0.55	81.5	83.9	80.9	77.0
0.75	83.5	85.7	82.7	78.4
1.1	85.2	87.2	84.5	80.8
1.5	86.5	88.2	85.9	82.6
2.2	88.0	89.5	87.4	84.5
3.0	89.1	90.4	88.6	85.9
4.0	90.0	91.1	89.5	87.1
5.5	90.9	91.9	90.5	88.3
7.5	91.7	92.6	91.3	89.3
11	92.6	93.3	92.3	90.4
15	93.3	93.9	92.9	91.2
18.5	93.7	94.2	93.4	91.7
22	94.0	94.5	93.7	92.1
30	94.5	94.9	94.2	92.7
37	94.8	95.2	94.5	93.1
45	95.0	95.4	94.8	93.4
55	95.3	95.7	95.1	93.7
75	95.6	96.0	95.4	94.2
90	95.8	96.1	95.6	94.4
110	96.0	96.3	95.8	94.7
132	96.2	96.4	96.0	94.9
160	96.3	96.6	96.2	95.1
200 - 249	96.5	96.7	96.3	95.4
250 - 314	96.5	96.7	96.5	95.4
315 - 1000	96.5	96.7	96.6	95.4

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