

## Product note

# USA adopts NEMA Premium: EPC92 requirements upgraded by EISA



### Energy Policy Act 1992 (EPC92)

The USA has been at the forefront in requiring minimum efficiency levels for low voltage motors. The former EPC92 established minimum efficiency levels for electric motors manufactured in or imported into the United States after October 1997. Based on the National Electrical Manufacturers Association (NEMA) standards, EPC92 provided a definition of energy efficiency in motors and specified which motors were covered by the requirements.

EPC92 covered the following general purpose motors :

- 2-, 4 and 6 pole, 1-200 HP
- Single-speed, polyphase T frame
- 3600, 1800 or 1200 RPM
- Foot-mounted
- Explosion proof
- IEC frames from size 90 upwards
- Squirrel-cage induction motors, NEMA design A and B
- Continuous rated
- Operating on 230/460 volts, constant 60 Hz line power as defined in NEMA standard MG1

The definition of general purpose motors includes explosion proof motors, inverter duty motors (when also suitable for DOL, direct on line, use) and the corresponding IEC frame designations with a 60Hz supply.

Also included are motors fitted with a removable brake.

In addition to these statutory requirements, a voluntary Premium Energy Efficiency Motor Standard was implemented in August 2001 by NEMA and was endorsed by the Consortium for Energy Efficiency (CEE).

### Energy Independence and Security ACT 2007 (EISA)

EISA was signed into law on December 19, 2007. It builds on the previous EPC92, updating the mandated efficiency standard for general purpose three-phase AC industrial motors from 1 to 500 HP (0.75 to 375 kW). It applies to motors manufactured or imported for sale in the United States after December 19, 2010.

General purpose electric motors (Subtype I) from 1 to 200 HP that were previously covered by EPC92, must meet or exceed nominal full-load efficiency levels based on the NEMA Premium class as shown in table 1.

General purpose electric motors (Subtype II) not previously covered by EPC92 will be required to comply with NEMA Energy Efficient levels as shown in table 2.

The following motor types are included in Subtype II :

- U-frame motors
- Design C motors
- Close-coupled pump motors
- C face or D flange without base
- Vertical solid shaft normal thrust motors (P base)
- 8-pole motors
- Polyphase motors less than 600V (other than 230 or 460V)
- 201 - 500 HP (150 to 375kW) motors not previously covered by EPC92

### Motors not covered by EISA

The following motors are not covered by EISA :

- Design D with high slip
- Adjustable speed with optimized windings (cannot be line started)
- Customized OEM mounting
- Intermittent duty
- Integral with gearing or brake where motor cannot be used separately
- Submersible motors
- Fractional HP and 48 or 56 frames
- Single-phase motors
- DC motors
- Multi-speed motors
- TENV and TEAO enclosures

**Table1: Efficiency value for Subtype I motors, NEMA Premium (NEMA MG1, table 12-12)**

Rated Power		Nominal Efficiency %		
HP	kW	2 poles	4 poles	6 poles
1	0.75	77.0	85.5	82.5
1.5	1.1	84.0	86.5	87.5
2	1.5	85.5	86.5	88.5
3	2.2	86.5	89.5	89.5
5	3.7	88.5	89.5	89.5
7.5	5.6	89.5	91.7	91.0
10	7.5	90.2	91.7	91.0
15	11	91.0	92.4	91.7
20	15	91.0	93.0	91.7
25	18.7	91.7	93.6	93.0
30	22	91.7	93.6	93.0
40	30	92.4	94.1	94.1
50	37	93.0	94.5	94.1
60	45	93.6	95.0	94.5
75	56	93.6	95.4	94.5
100	75	94.1	95.4	95.0
125	93	95.0	95.4	95.0
150	112	95.0	95.8	95.8
200	149	95.4	96.2	95.8
250	187	95.8	96.2	95.8
300	224	95.8	96.2	95.8
350	261	95.8	96.2	95.8
400	298	95.8	96.2	95.8
450	336	95.8	96.2	95.8
500	373	95.8	96.2	95.8

**EISA qualification**

Motors belonging to Subtype I or II must have an efficiency value equal to or better than the minimum efficiency value specified for the rated power and speed. The Premium efficiency class corresponds roughly to the IE3 level at 60Hz and the Energy Efficient class corresponds roughly to the IE2 level at 60Hz, as specified by IEC 60034-30:2008.

**Efficiency testing method**

Like EPA92, EISA requires that the test procedures for determining a motors' efficiency shall be as specified in NEMA MG1-2006 and IEEE standard 112, Test Method B or CSA 390. Both methods take into account stray load losses. The goal is to have motor manufacturers' test facilities accredited by a third party to assure that they do indeed adhere to the standard. ABB has CSA accredited test laboratories.

**Compliance and verification**

The US Department of Energy (DOE) will expect motor manufacturers to self-certify their motor efficiencies supported by tests or computer correlation programs. All nameplates for motors that are covered will be labeled with a DOE approved code, including the motor manufacturer's specific compliance number issued by the DOE. Each motor nameplate will also display the NEMA nominal efficiency.

**Penalties**

Importation of motors not meeting EISA requirements is subject to strict penalties. Motor manufacturers are not allowed

**Table2: Efficiency value for Subtype II motors, NEMA Energy Efficient (NEMA MG1, table 12-11)**

Rated Power		Nominal Efficiency %			
HP	kW	2 poles	4 poles	6 poles	8 poles
1	0.75	75.5	82.5	80.0	74.0
1.5	1.1	82.5	84.0	85.5	77.0
2	1.5	84.0	84.0	86.5	82.5
3	2.2	85.5	87.5	87.5	84.0
5	3.7	87.5	87.5	87.5	85.5
7.5	5.6	88.5	89.5	89.5	85.5
10	7.5	89.5	89.5	89.5	88.5
15	11	90.2	92.0	90.2	88.5
20	15	90.2	91.0	90.2	89.5
25	18.7	91.0	92.4	91.7	89.5
30	22	91.0	92.4	91.7	91.0
40	30	91.7	93.0	93.0	91.0
50	37	92.4	93.0	93.0	91.7
60	45	93.0	93.6	93.6	91.7
75	56	93.0	94.1	93.6	93.0
100	75	93.6	94.5	94.1	93.0
125	93	94.5	94.5	94.1	93.6
150	112	94.5	95.0	95.0	93.6
200	149	95.0	95.0	95.0	94.1
250	187	95.4	95.0	95.0	94.5
300	224	95.4	95.4	95.0	-
350	261	95.4	95.4	95.0	-
400	298	95.4	95.4	-	-
450	336	95.4	95.4	-	-
500	373	95.4	95.8	-	-

any leeway with the tolerances. The standard states that the efficiency indicated on the rating plate must be equal to or exceed the minimum nominal efficiency level.

**Small motors to be covered**

On February 28, 2010 the DOE also specified efficiencies for general purpose small motors, which have been defined as follows:

- 1/4 HP to 5HP
- ODP
- Single and three-phase
- CSCR and CSIR
- Frame sizes 42, 48, 56 and IEC equivalents

This regulation will come into effect in 2015.

**ABB and Nema Premium**

ABB has a wide range of NEMA motors complying with EPA92 requirements in frame sizes 405-587. ABB will introduce a range of motors meeting Nema Premium levels by the end of 2010.

For more information please contact:  
**[www.abb.com/motors&generators](http://www.abb.com/motors&generators)**

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