**Baldor Electric Position on DOE Small Motor Rule – 10/3/14**

On March 9, 2010 the US Department of Energy issued a Final Rule to 10 CFR Part 31, Energy Conservation Program: Energy Conservation Standards for Small Electric Motors. The DOE later issued an FAQ to the Rule on June 17, 2014 which provided guidance for the initial coverage. The rule mandates certain efficiencies for motors effective March 9, 2015. After this date, Baldor will not be allowed to produce non-compliant motors covered by this legislation for use in the United States. Any motors built prior to this date and in inventory will be allowed to be sold and used. Motors mounted to machinery and imported into the United States are also covered by this rule and must be compliant by March 9, 2015.

The Small Motor Rule covers NEMA two-digit frame motors (42-48-56 frames) and IEC equivalents (IEC 63-71-80 frames) for Open Drip Proof General Purpose motors in both single and three phase designs; ¼ through 3 HP (and kW equivalents) with 2, 4 and 6 pole speeds operating from 60 Hz with less than 600 volts.

For purposes of the 2010 final rule, DOE interpreted the term "NEMA general purpose alternating current single-speed induction motor" as referring to elements within paragraph MG1-1.05 of NEMA MG1-1987, which provides a list of characteristics to help determine whether a particular motor is a general purpose alternating current motor. These characteristics (as identified by that NEMA document) include the following elements that DOE considered for purposes of defining small electric motors in the 2010 final rule:

1) Built with an open construction;

2) Rated for continuous duty;

3) Incorporates the service factor in MG1-12.47 of MG1-1987; DOE clarified that they include service factors up to, and including these numbers.

| | Service Factor | | |
|---|---|---|---|
| | Synchronous Speed, RPM | | |
| HP | 3600 | 1800 | 1200 |
| 0.25 | 1.35 | 1.35 | 1.35 |
| 0.33 | 1.35 | 1.35 | 1.35 |
| 0.5 | 1.25 | 1.25 | 1.25 |
| 0.75 | 1.25 | 1.25 | 1.15 |
| 1 | 1.15 | 1.15 | 1.15 |
| 1.5 - 3 | 1.15 | 1.15 | 1.15 |

4) Uses insulation that satisfies *at least* the minimum Class A insulation system temperature rise specifications detailed in MG1-12.42 of MG1-1987;

5) Designed in standard ratings (e.g., horsepower (HP) or kilowatt (kW) ratings);

6) Has standard operating characteristics;

7) Has standard mechanical construction;

8) Designed for use under usual service conditions; and

9) Is not restricted to a particular application.

**Electrical Motor Designs Covered**
The Small Motor Rule states that only: (1) capacitor-start, induction-run (CSIR); (2) capacitor-start, capacitor-run (CSCR); and (3) polyphase motors can qualify as NEMA general purpose motors and therefore be considered small electric motors as defined in the 2010 final rule. Required average efficiency levels for various motor types are shown in the appendix.

Split-phase, shaded-pole, and permanent-split capacitor (PSC) motors do not qualify as NEMA general purpose motors – and, therefore, cannot meet the definition of a small electric motor.

Motors which are designed for 50 Hz only are not covered under the Small Motor Rule.

**Mechanical Designs Covered**
So for this rule and the FAQ, DOE did not follow the guidance used for the Energy Policy Act of 1992 (EPAct) and the Energy Independence Act of 2007 (EISA) as to motor characteristic that were covered and exempt. Not only are general purpose base mounted motors with and without C-face or D-flange covered, but footless motors are also covered. Base mounted designs also include motors with resilient mounting bases with the exception of single and three-phase 1/3 – 1 HP with ATO 4-pole MG1 Part 18 which are exempt.

The DOE has added motors with longer than NEMA shafts. No specifics were given but we decided to limit the shaft length to 50% to 200% of the standard NEMA "V" dimension for that frame size. The shaft shall have a flat or keyway. Special purpose shafts such as 56J are not covered as they are designed for a particular application.

Motors with non-NEMA "BA" dimensions are included. These are often the result of adding a C-face to a standard motor in Mod Express or even some custom configurations.

**Motor Enclosure**
Only Open Drip Proof designs are covered. This includes Baldor designation such as Open slotted band, open tandem fan, etc. Open air-over or enclosed designs are not covered by the Small Motor Rule.

**Thermals**
When we speak of thermals, these are not thermostats but either manual (MTO) or automatic (ATO) thermal overloads. These may be either UL Recognized or not. If they are not UL Recognized, the motor using these must be compliant by March 9, 2015. If the thermals are UL Recognized, we are allowed extra time for certification and the motors must be compliant by March 9, 2017.

**Baldor Stock and Custom Motors**
The Baldor CA501 Stock Products Catalog dated October 1, 2014 contains a new section of motors with bases and C-face with bases which are compliant to the Small Motor Rule. These are single and three phase motors. This catalog went to press when the DOE released their FAQ that expanded the scope, so the additional new motors that are C-face less base and resilient mount motors are not included. Baldor will be issuing a catalog with the new Small Motor Rule motors.

All current motors that are not allowed to be built after March 9, 2015 are marked with a note to that effect. These motors are allowed to be sold and used if built prior to that date.

Customers who use motors covered by this rule are encouraged to work with their local Baldor District Office to convert to the new design as soon as possible. The higher efficiency requires more active material which makes the new motors larger in size. Customers using single phase motors may see some ratings change from capacitor start – induction run to capacitor start – capacitor run designs, adding a much larger capacitor box and even a larger motor diameter. In this case, an enclosed motor which is not covered by the Small Motor Rule, may be a more suitable solution if there are size restraints.

**Appendix**

**§431.446 Small electric motors energy conservation standards and their effective dates.**

(a) Each small electric motor manufactured (alone or as a component of another piece of non-covered equipment) after March 9, 2015, or in the case of a small electric motor which requires listing or certification by a nationally recognized safety testing laboratory, after March 9, 2017, shall have an average full load efficiency of not less than the following:

| Motor horsepower/standard kilowatt equivalent | Average full load efficiency | | |
|---|---|---|---|
| | Polyphase | | |
| | Open motors (number of poles) | | |
| | 6 | 4 | 2 |
| 0.25/0.18 | 67.5 | 69.5 | 65.6 |
| 0.33/0.25 | 71.4 | 73.4 | 69.5 |
| 0.5/0.37 | 75.3 | 78.2 | 73.4 |
| 0.75/0.55 | 81.7 | 81.1 | 76.8 |
| 1/0.75 | 82.5 | 83.5 | 77.0 |
| 1.5/1.1 | 83.8 | 86.5 | 84.0 |
| 2/1.5 | N/A | 86.5 | 85.5 |
| 3/2.2 | N/A | 86.9 | 85.5 |
| **Motor horsepower/standard kilowatt equivalent** | **Average full load efficiency** | | |
| | **Capacitor-start capacitor-run and capacitor-start induction-run** | | |
| | **Open motors (number of poles)** | | |
| | **6** | **4** | **2** |
| 0.25/0.18 | 62.2 | 68.5 | 66.6 |
| 0.33/0.25 | 66.6 | 72.4 | 70.5 |
| 0.5/0.37 | 76.2 | 76.2 | 72.4 |
| 0.75/0.55 | 80.2 | 81.8 | 76.2 |
| 1/0.75 | 81.1 | 82.6 | 80.4 |
| 1.5/1.1 | N/A | 83.8 | 81.5 |
| 2/1.5 | N/A | 84.5 | 82.9 |
| 3/2.2 | N/A | N/A | 84.1 |

| SMALL ELECTRIC MOTOR RULE COVERAGE DETAILS 10/3/14 | |
|---|---|
| **Covered Product** | **Excluded Product** |
| For use in the United States | Exported from the United States |
| NEMA General Purpose per MG 1-1987<br>Includes:<br>Base mounted with or without C-face or D-flange,<br>C-face or D-flange without base<br>Non-NEMA "BA" dimension | Definite or Special Purpose Motors<br>(Examples: Air Over, Vertical mounting, Thrust or Sleeve Bearing, Submersible, Immersible, Component Sets, Partial motors (3/4 motor), Integral and Non-Integral Brake, Liquid Cooled, Inverter-Only, Encapsulated, Double Shafts, close coupled pump, 56J configuration flanged motors<br>Motors designed for a specific application or purpose |
| Resilient Mounting Base | NEMA Part 18 Motors including motors for Belted or Shaft-Mounted Fans and Blowers specifically including 4-pole ratings 1/3, 1/2, 3/4, and 1 horsepower with automatic reset thermal overload protector (ATO) |
| Open Drip Proof enclosure | Totally Enclosed, Air-over, submersible, immersible, liquid-cooled |
| NEMA Two-Digit Frame Numbers 42, 48, and 56, including equivalent IEC frame numbers 63, 71, & 80 | All other frame numbers |
| Foot-Mounted with Single Straight-Shaft Extension having standard dimensions as given in MG1-11.31 (1987) - now 4.4.1 (2011) ;<br>Also motors with a standard diameter shaft 50% to 200% of NEMA "V" dimension with flat or keyway. | Foot-Mounted with Single or double Straight-Shaft Extension having non-standard length or diameter; motors with single tapered or double straight/tapered extensions |
| Foot or Footless with Type C Face or D-flange -Mounting having standard dimensions as given in MG1-11.34 (1987) - now 4.4.4 (2011) or IEC equivalent. | Foot or Footless with Type C Face-Mounting having non-standard dimensions; Customer defined mounting |
| Alternating Current | Direct Current |
| Single Speed (e.g. 60, 60/50Hz) | 50 Hz only; Two-Speed, Multispeed and Adjustable Speed |
| Voltage 115, 115/230, 115/208-230, 230, 208-230, 277, 575 | Voltage above 600V |
| 2, 4 and 6 Pole | 8 Pole or greater |
| ¼ to 3 HP (0.18 to 2.2 kW) per Tables I.1 and I.2 below<br>Intermediate Horsepower's within scope shall be rounded up or down to the next closest HP (kW) rating | Outputs outside scope of Tables I.1 and I.2 |
| Polyphase, CSIR (Capacitor Start Induction Run), CSCR (Capacitor Start/Capacitor Run) | PSC (Permanent Split Capacitor), Split Phase, Shaded Pole, ECM (Electronically Controlled Motor), PMAC (Permanent Magnet AC Motor), Switched Reluctance, etc. |
| Continuous Duty (S1-IEC Equivalent) | Intermittent, Short-Time (S2-S10 IEC Duties) |
| NEMA Service Factor up to and including MG 1-12.47 (1987) - now 12.51 (2011) | Non-standard Service Factors greater than NEMA MG 1-12.47 (1987) – now 12.51 (2011) |
| Dual-and Broad-Voltage Motors (e.g. 115/208-230V)<br>Note: DOE left the determination of the voltage level for determining compliance with the efficiency standard to the discretion of the small electric motor manufacturer | No exclusion |
| Small Electric Motors included as components of non-covered equipment | Small Electric Motors included in equipment that are covered by other energy efficiency regulations |
| Small electric motors with thermal protection that has not been evaluated by a nationally recognized safety test laboratory shall comply on March 9, 2015.<br>Small electric motors included in nationally recognized safety testing laboratory listings or certifications are granted an additional 2 years effective date – March 9, 2017. (Examples: "Thermally Protected", "Impedance Protected") | NEMA MG 1 Part 18 motors for Belted or Shaft-Mounted Fans and Blowers specifically including 4-pole ratings 1/3, 1/2, 3/4, and 1 horsepower with automatic reset thermal overload protector (ATO) |
| All insulation Classes A and above | No exclusion |