ADDENDA

**ANSI/ASHRAE/IES Addendum cv to**
**ANSI/ASHRAE/IES Standard 90.1-2013**

# Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 25, 2016; by the ASHRAE Technology Council on June 29, 2016; by the IES Board of Directors on June 27, 2016; and by the American National Standards Institute on June 30, 2016.

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## FOREWORD

*This proposal updates the motor efficiency standards that are currently shown in Section 6. New federal standards will go into effect on June 1, 2016. Due to the expansion of the scope of federal energy efficiency standards for large motors, this proposal updates the tables to show the expanded scope of federal energy efficiency standards for large (1 to 500 hp [0.75 to 373 kW]) motors. The energy efficiency standards for fire-pump motors do not change from their current levels.*

***Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.***

## Addendum cv to 90.1-2013

*Revise Section 3 as follows (I-P):*

~~***general purpose electric motor (subtype I):*** a general purpose electric motor that~~

a. ~~is a single-speed induction motor;~~
b. ~~is rated for continuous duty (MG1) operation or for duty type SI (IEC);~~
c. ~~contains a squirrel-cage (MG1) or cage (IEC) rotor;~~
d. ~~has foot-mounting that may include foot-mounting with flanges or detachable feet;~~
e. ~~is built in accordance with NEMA T-frame dimensions or their IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents;~~
f. ~~has performance in accordance with NEMA Design A (MG1) or B (MG1) characteristics, or equivalent designs, such as IEC Design N (IEC);~~
g. ~~operates on polyphase alternating current 60 Hz sinusoidal power and~~
   1. ~~is rated at 230 or 460 V (or both), including motors rated at multiple voltages that include 230 or 460 V (or both) or~~
   2. ~~can be operated on 230 or 460 V (or both); and~~
h. ~~includes, but is not limited to, explosion-proof construction.~~

~~***general purpose electric motor (subtype II):*** any general purpose electric motor that incorporates the design elements of a general purpose electric motor (subtype I) and that is configured in one or more of the following ways:~~

a. ~~Is built in accordance with NEMA U-frame dimensions, as described in NEMA MG-1-1967, or in accordance with the IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents~~
b. ~~Has performance in accordance with NEMA Design C characteristics, as described in MG1, or an equivalent IEC design(s) such as IEC Design H~~
c. ~~Is a close-coupled pump motor~~
d. ~~Is a footless motor~~
e. ~~Is a vertical, solid-shaft normal thrust motor (as tested in a horizontal configuration) built and designed in a manner consistent with MG1~~
f. ~~Is an 8-pole motor (900 rpm)~~
g. ~~Is a polyphase motor with voltage rating of not more than 600 V, is not rated at 230 or 460 V (or both), and cannot be operated on 230 or 460 V (or both)~~

***IEC Design H motor:*** an electric motor that
a. is an induction motor designed for use with three-phase power;
b. contains a cage rotor;
c. is capable of direct-on-line starting;
d. has 4, 6, or 8 poles;
e. is rated from 0.4 to 1600 kW at a frequency of 60 Hz; and
f. conforms to Sections 8.1, 8.2, and 8.3 of IEC 60034-12, edition 2.1, requirements for starting torque, locked rotor apparent power, and starting.

***IEC Design N motor:*** an electric motor that

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a. is an induction motor designed for use with three-phase power;
b. contains a cage rotor;
c. is capable of direct-on-line starting;
d. has 2, 4, 6, or 8 poles;
e. is rated from 0.4 to 1600 kW at a frequency of 60 Hz; and
f. conforms to Sections 6.1, 6.2, and 6.3 of IEC 60034-12, edition 2.1, requirements for torque characteristics, locked rotor apparent power, and starting.

[ … ]

***NEMA Design A motor:*** a squirrel-cage motor that
a. is designed to withstand full-voltage starting and developing locked-rotor torque as shown in NEMA MG 1, paragraph 12.38.1;
b. has pull-up torque not less than the values shown in NEMA MG 1, paragraph 12.40.1;
c. has breakdown torque not less than the values shown in NEMA MG 1, paragraph 12.39.1;
d. has a locked-rotor current higher than the values shown in NEMA MG 1, paragraph 12.35.1, for 60 Hz and NEMA MG 1-, paragraph 12.35.2, for 50 Hz; and
e. has a slip at rated load of less than 5% for motors with fewer than 10 poles.

***NEMA Design B motor:*** a squirrel-cage motor that is
a. designed to withstand full-voltage starting;
b. develops locked-rotor, breakdown, and pull-up torques adequate for general application as specified in NEMA MG1, paragrahps 12.38, 12.39, and 12.40;
c. draws locked-rotor current not to exceed the values shown in NEMA MG1, paragraph 12.35.1, for 60 Hz and paragraph 12.35.2 for 50 Hz; and
d. has a slip at rated load of less than 5% for motors with fewer than 10 poles.

***NEMA Design C motor:*** a squirrel-cage motor that
a. is designed to withstand full-voltage starting and developing locked-rotor torque for high-torque applications up to the values shown in NEMA MG1, paragraph 12.38.2 (incorporated by reference; see §431.15);
b. has pull-up torque not less than the values shown in NEMA MG1, paragraph 12.40.2;
c. has breakdown torque not less than the values shown in NEMA MG1, paragraph 12.39.2;
d. has a locked-rotor current not to exceed the values shown in NEMA MG1, paragraph 12.35.1, for 60 Hz and paragraph 12.35.2 for 50 Hz; and
e. has a slip at rated load of less than 5%.

…

*Revise Section 10.4.1 as follows (I-P):*

**10.4.1 Electric Motors.** Electric motors manufactured alone or as a component of another piece of equipment with a power rating of 1 hp or more, and less than or equal to 500 hp, shall comply with the requirements ~~of the Energy Independence and Security Act of 2007,~~ as shown in Table 10.8-1 for ~~general purpose electric motors (subtype I)~~ *NEMA Design A motors*, *NEMA Design B motors*, and *IEC Design N motors* and Table 10.8-2 for ~~general purpose electric motors (subtype II)~~ *NEMA Design C motors* and *IEC Design H motors*.

~~General purpose electric motors with a power rating of more than 200 hp, but no more than 500 hp, shall have a minimum nominal full-load efficiency that is not less than as shown in Table 10.8-3.~~

Fire-pump electric motors shall have a minimum nominal full-load efficiency that is not less than that shown in Table 10.8-~~6~~5.

~~Motors that are not included in the scope of the Energy Independence and Security Act of 2007, Section 313, have no performance requirements in this section.~~

**Exceptions to 10.4.1:** The standards in this section do not apply to the following exempt electric motors:
1. Air-over electric motors
2. Component sets of an electric motor
3. Liquid-cooled electric motors
4. Submersible electric motors
5. Inverter-only electric motors

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*Delete the current Table 10.8-1 and replace with the new Table 10.8-1 as shown (I-P):*

**Table 10.8-1 Minimum Nominal Full-Load Efficiency for NEMA Design A, NEMA Design B and IEC Design N Motors (Excluding Fire Pump Electric Motors) at 60 Hz[a,b]**

| | Nominal full-load efficiency (%) as of June 1, 2016 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 Pole | | 4 Pole | | 6 Pole | | 8 Pole | |
| Motor horsepower (standard kilowatt equivalent) | Enclosed | Open | Enclosed | Open | Enclosed | Open | Enclosed | Open |
| 1 (0.75) | 77.0 | 77.0 | 85.5 | 85.5 | 82.5 | 82.5 | 75.5 | 75.5 |
| 1.5 (1.1) | 84.0 | 84.0 | 86.5 | 86.5 | 87.5 | 86.5 | 78.5 | 77.0 |
| 2 (1.5) | 85.5 | 85.5 | 86.5 | 86.5 | 88.5 | 87.5 | 84.0 | 86.5 |
| 3 (2.2) | 86.5 | 85.5 | 89.5 | 89.5 | 89.5 | 88.5 | 85.5 | 87.5 |
| 5 (3.7) | 88.5 | 86.5 | 89.5 | 89.5 | 89.5 | 89.5 | 86.5 | 88.5 |
| 7.5 (5.5) | 89.5 | 88.5 | 91.7 | 91.0 | 91.0 | 90.2 | 86.5 | 89.5 |
| 10 (7.5) | 90.2 | 89.5 | 91.7 | 91.7 | 91.0 | 91.7 | 89.5 | 90.2 |
| 15 (11) | 91.0 | 90.2 | 92.4 | 93.0 | 91.7 | 91.7 | 89.5 | 90.2 |
| 20 (15) | 91.0 | 91.0 | 93.0 | 93.0 | 91.7 | 92.4 | 90.2 | 91.0 |
| 25 (18.5) | 91.7 | 91.7 | 93.6 | 93.6 | 93.0 | 93.0 | 90.2 | 91.0 |
| 30 (22) | 91.7 | 91.7 | 93.6 | 94.1 | 93.0 | 93.6 | 91.7 | 91.7 |
| 40 (30) | 92.4 | 92.4 | 94.1 | 94.1 | 94.1 | 94.1 | 91.7 | 91.7 |
| 50 (37) | 93.0 | 93.0 | 94.5 | 94.5 | 94.1 | 94.1 | 92.4 | 92.4 |
| 60 (45) | 93.6 | 93.6 | 95.0 | 95.0 | 94.5 | 94.5 | 92.4 | 93.0 |
| 75 (55) | 93.6 | 93.6 | 95.4 | 95.0 | 94.5 | 94.5 | 93.6 | 94.1 |
| 100 (75) | 94.1 | 93.6 | 95.4 | 95.4 | 95.0 | 95.0 | 93.6 | 94.1 |
| 125 (90) | 95.0 | 94.1 | 95.4 | 95.4 | 95.0 | 95.0 | 94.1 | 94.1 |
| 150 (110) | 95.0 | 94.1 | 95.8 | 95.8 | 95.8 | 95.4 | 94.1 | 94.1 |
| 200 (150) | 95.4 | 95.0 | 96.2 | 95.8 | 95.8 | 95.4 | 94.5 | 94.1 |
| 250 (186) | 95.8 | 95.0 | 96.2 | 95.8 | 95.8 | 95.8 | 95.0 | 95.0 |
| 300 (224) | 95.8 | 95.4 | 96.2 | 95.8 | 95.8 | 95.8 | | |
| 350 (261) | 95.8 | 95.4 | 96.2 | 95.8 | 95.8 | 95.8 | | |
| 400 (298) | 95.8 | 95.8 | 96.2 | 95.8 | | | | |
| 450 (336) | 95.8 | 96.2 | 96.2 | 96.2 | | | | |
| 500 (373) | 95.8 | 96.2 | 96.2 | 96.2 | | | | |

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

1. A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers;
2. A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers; or
3. A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (1) or (2), whichever applies.

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*Delete the current Table 10.8-2 and replace with the new Table 10.8-2 as shown (I-P):*

**Table 10.8-2 Minimum Nominal Full-Load Efficiency for NEMA Design C and IEC Design H Motors at 60 Hz[a,b]**

| | Nominal full-load efficiency (%) as of June 1, 2016 | | | | | |
|---|---|---|---|---|---|---|
| | 4 Pole | | 6 Pole | | 8 Pole | |
| Motor horsepower (standard kilowatt equivalent) | Enclosed | Open | Enclosed | Open | Enclosed | Open |
| 1 (0.75) | 85.5 | 85.5 | 82.5 | 82.5 | 75.5 | 75.5 |
| 1.5 (1.1) | 86.5 | 86.5 | 87.5 | 86.5 | 78.5 | 77.0 |
| 2 (1.5) | 86.5 | 86.5 | 88.5 | 87.5 | 84.0 | 86.5 |
| 3 (2.2) | 89.5 | 89.5 | 89.5 | 88.5 | 85.5 | 87.5 |
| 5 (3.7) | 89.5 | 89.5 | 89.5 | 89.5 | 86.5 | 88.5 |
| 7.5 (5.5) | 91.7 | 91.0 | 91.0 | 90.2 | 86.5 | 89.5 |
| 10 (7.5) | 91.7 | 91.7 | 91.0 | 91.7 | 89.5 | 90.2 |
| 15 (11) | 92.4 | 93.0 | 91.7 | 91.7 | 89.5 | 90.2 |
| 20 (15) | 93.0 | 93.0 | 91.7 | 92.4 | 90.2 | 91.0 |
| 25 (18.5) | 93.6 | 93.6 | 93.0 | 93.0 | 90.2 | 91.0 |
| 30 (22) | 93.6 | 94.1 | 93.0 | 93.6 | 91.7 | 91.7 |
| 40 (30) | 94.1 | 94.1 | 94.1 | 94.1 | 91.7 | 91.7 |
| 50 (37) | 94.5 | 94.5 | 94.1 | 94.1 | 92.4 | 92.4 |
| 60 (45) | 95.0 | 95.0 | 94.5 | 94.5 | 92.4 | 93.0 |
| 75 (55) | 95.4 | 95.0 | 94.5 | 94.5 | 93.6 | 94.1 |
| 100 (75) | 95.4 | 95.4 | 95.0 | 95.0 | 93.6 | 94.1 |
| 125 (90) | 95.4 | 95.4 | 95.0 | 95.0 | 94.1 | 94.1 |
| 150 (110) | 95.8 | 95.8 | 95.8 | 95.4 | 94.1 | 94.1 |
| 200 (150) | 96.2 | 95.8 | 95.8 | 95.4 | 94.5 | 94.1 |

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.
b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:
   1. A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers;
   2. A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers; or
   3. A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (1) or (2), whichever applies.

*Delete Table 10.8-3, as requirements have been moved into Tables 10.8-1 and 10.8-2. Renumber the following tables (I-P):*

**Table 10.8-4~~2~~3 Minimum Average Full-Load Efficiency for Polyphase Small Electric Motors[a]**

**Table 10.8-~~5~~4 Minimum Average Full-Load Efficiency for Capacitor-Start Capacitor-Run and Capacitor-Start Induction-Run Small Electric Motors[a]**

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*Renumber the following table and add the footnote as shown (I-P):*

**Table 10.8-~~6~~5 Minimum Nominal Full-Load Efficiency for Fire-Pump Electric Motors[a,b]**

*… (Table is unchanged.)*

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a horsepower or kilowatt rating between two horsepower or two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed horsepower or kilowatt rating, determined as follows:

1. A horsepower at or above the midpoint between the two consecutive horsepowers shall be rounded up to the higher of the two horsepowers;
2. A horsepower below the midpoint between the two consecutive horsepowers shall be rounded down to the lower of the two horsepowers; or
3. A kilowatt rating shall be directly converted from kilowatts to horsepower using the formula 1 kilowatt = (1/0.746) horsepower. The conversion should be calculated to three significant decimal places, and the resulting horsepower shall be rounded in accordance with paragraph (1) or (2), whichever applies.

NR—No requirement

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*Revise Section 3 as follows (SI):*

~~***general purpose electric motor (subtype I):*** a general purpose electric motor that~~

a. ~~is a single-speed induction motor;~~
b. ~~is rated for continuous duty (MG1) operation or for duty type SI (IEC);~~
c. ~~contains a squirrel-cage (MG1) or cage (IEC) rotor;~~
d. ~~has foot-mounting that may include foot-mounting with flanges or detachable feet;~~
e. ~~is built in accordance with NEMA T-frame dimensions or their IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents;~~
f. ~~has performance in accordance with NEMA Design A (MG1) or B (MG1) characteristics, or equivalent designs, such as IEC Design N (IEC);~~
g. ~~operates on polyphase alternating current 60 Hz sinusoidal power and~~
   1. ~~is rated at 230 or 460 V (or both), including motors rated at multiple voltages that include 230 or 460 V (or both) or~~
   2. ~~can be operated on 230 or 460 V (or both); and~~
h. ~~includes, but is not limited to, explosion-proof construction.~~

~~***general purpose electric motor (subtype II):*** any general-purpose electric motor that incorporates the design elements of a general purpose electric motor (subtype I) and that is configured in one or more of the following ways:~~

a. ~~Is built in accordance with NEMA U-frame dimensions, as described in NEMA MG 1-1967, or in accordance with the IEC metric equivalents, including a frame size that is between two consecutive NEMA frame sizes or their IEC metric equivalents~~
b. ~~Has performance in accordance with NEMA Design C characteristics, as described in MG1, or an equivalent IEC design(s) such as IEC Design H~~
c. ~~Is a close-coupled pump motor~~
d. ~~Is a footless motor~~
e. ~~Is a vertical, solid-shaft normal-thrust motor (as tested in a horizontal configuration) built and designed in a manner consistent with MG1~~
f. ~~Is an 8-pole motor (900 rpm)~~
g. ~~Is a polyphase motor with voltage rating of not more than 600 V, is not rated at 230 or 460 V (or both), and cannot be operated on 230 or 460 V (or both)~~

***IEC Design H motor:*** an electric motor that
a. is an induction motor designed for use with three-phase power;
b. contains a cage rotor;
c. is capable of direct-on-line starting
d. has 4, 6, or 8 poles;
e. is rated from 0.4 to 1600 kW at a frequency of 60 Hz; and
f. conforms to Sections 8.1, 8.2, and 8.3 of the IEC 60034-12, edition 2.1, requirements for starting torque, locked rotor apparent power, and starting.

***IEC Design N motor:*** an electric motor that
a. is an induction motor designed for use with three-phase power;
b. contains a cage rotor;
c. is capable of direct-on-line starting;
d. has 2, 4, 6, or 8 poles;
e. is rated from 0.4 to 1600 kW at a frequency of 60 Hz; and
f. conforms to Sections 6.1, 6.2, and 6.3 of the IEC 60034-12, edition 2.1, requirements for torque characteristics, locked rotor apparent power, and starting.

…

***NEMA Design A motor:*** a squirrel-cage motor that
a. is designed to withstand full-voltage starting and developing locked-rotor torque as shown in NEMA MG 1, paragraph 12.38.1;

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b. has pull-up torque not less than the values shown in NEMA MG 1, paragraph 12.40.1;
c. has breakdown torque not less than the values shown in NEMA MG 1, paragraph 12.39.1;
d. has a locked-rotor current higher than the values shown in NEMA MG 1, paragraph 12.35.1, for 60 Hz and NEMA MG 1, paragraph 12.35.2, for 50 Hz; and
e. has a slip at rated load of less than 5% for motors with fewer than 10 poles.

***NEMA Design B motor:*** a squirrel-cage motor that
a. is designed to withstand full-voltage starting;
b. develops locked-rotor, breakdown, and pull-up torques adequate for general application as specified in NEMA MG1, paragraphs 12.38, 12.39, and 12.40;
c. draws locked-rotor current not to exceed the values shown in NEMA MG1, paragraph 12.35.1, for 60 Hz and paragraph12.35.2 for 50 Hz; and
d. has a slip at rated load of less than 5% for motors with fewer than 10 poles.

***NEMA Design C motor:*** a squirrel-cage motor that
a. is designed to withstand full-voltage starting and developing locked-rotor torque for high-torque applications up to the values shown in NEMA MG1, paragraph 12.38.2 (incorporated by reference; see §431.15);
b. has pull-up torque not less than the values shown in NEMA MG1, paragraph 12.40.2;
c. has breakdown torque not less than the values shown in NEMA MG1, paragraph 12.39.2;
d. has a locked-rotor current not to exceed the values shown in NEMA MG1, paragraph 12.35.1, for 60 Hz and paragraph 12.35.2 for 50 Hz; and
e. has a slip at rated load of less than 5%.

…

*Revise Section 10.4.1 as follows (SI):*

**10.4.1 Electric Motors.** Electric motors manufactured alone or as a component of another piece of equipment with a power rating of ~~1 hp~~ 0.75 kW or more, and less than or equal to ~~500 hp~~ 373 kW, shall comply with the requirements ~~of the Energy Independence and Security Act of 2007, as~~ shown in Table 10.8-1 for ~~general purpose electric motors (subtype I)~~ *NEMA Design A motors*, *NEMA Design B motors*, and *IEC Design N motors* and Table 10.8-2 for ~~general purpose electric motors (subtype II)~~ *NEMA Design C motors* and *IEC Design H motors*.

~~General purpose electric motors with a power rating of more than 200 hp, but no more than 500 hp, shall have a minimum nominal full-load efficiency that is not less than as shown in Table 10.8-3.~~

Fire-pump electric motors shall have a minimum nominal full-load efficiency that is not less than that shown in Table 10.8-~~6~~5.

~~Motors that are not included in the scope of the Energy Independence and Security Act of 2007, Section 313, have no performance requirements in this section.~~

**Exceptions to 10.4.1:** The standards in this section do not apply to the following exempt electric motors:
1. Air-over electric motors
2. Component sets of an electric motor
3. Liquid-cooled electric motors
4. Submersible electric motors
5. Inverter-only electric motors

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*Delete the current Table 10.8-1 and replace with the new Table 10.8-1 as shown (SI):*

**Table 10.8-1 Minimum Nominal Full-Load Efficiency for NEMA Design A, NEMA Design B and IEC Design N Motors (Excluding Fire Pump Electric Motors) at 60 Hz[a,b]**

| | Nominal full-load efficiency (%) as of June 1, 2016 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2 Pole | | 4 Pole | | 6 Pole | | 8 Pole | |
| Motor kilowatts | Enclosed | Open | Enclosed | Open | Enclosed | Open | Enclosed | Open |
| 0.75 | 77.0 | 77.0 | 85.5 | 85.5 | 82.5 | 82.5 | 75.5 | 75.5 |
| 1.1 | 84.0 | 84.0 | 86.5 | 86.5 | 87.5 | 86.5 | 78.5 | 77.0 |
| 1.5 | 85.5 | 85.5 | 86.5 | 86.5 | 88.5 | 87.5 | 84.0 | 86.5 |
| 2.2 | 86.5 | 85.5 | 89.5 | 89.5 | 89.5 | 88.5 | 85.5 | 87.5 |
| 3.7 | 88.5 | 86.5 | 89.5 | 89.5 | 89.5 | 89.5 | 86.5 | 88.5 |
| 5.5 | 89.5 | 88.5 | 91.7 | 91.0 | 91.0 | 90.2 | 86.5 | 89.5 |
| 7.5 | 90.2 | 89.5 | 91.7 | 91.7 | 91.0 | 91.7 | 89.5 | 90.2 |
| 11 | 91.0 | 90.2 | 92.4 | 93.0 | 91.7 | 91.7 | 89.5 | 90.2 |
| 15 | 91.0 | 91.0 | 93.0 | 93.0 | 91.7 | 92.4 | 90.2 | 91.0 |
| 18.5 | 91.7 | 91.7 | 93.6 | 93.6 | 93.0 | 93.0 | 90.2 | 91.0 |
| 22 | 91.7 | 91.7 | 93.6 | 94.1 | 93.0 | 93.6 | 91.7 | 91.7 |
| 30 | 92.4 | 92.4 | 94.1 | 94.1 | 94.1 | 94.1 | 91.7 | 91.7 |
| 37 | 93.0 | 93.0 | 94.5 | 94.5 | 94.1 | 94.1 | 92.4 | 92.4 |
| 45 | 93.6 | 93.6 | 95.0 | 95.0 | 94.5 | 94.5 | 92.4 | 93.0 |
| 55 | 93.6 | 93.6 | 95.4 | 95.0 | 94.5 | 94.5 | 93.6 | 94.1 |
| 75 | 94.1 | 93.6 | 95.4 | 95.4 | 95.0 | 95.0 | 93.6 | 94.1 |
| 90 | 95.0 | 94.1 | 95.4 | 95.4 | 95.0 | 95.0 | 94.1 | 94.1 |
| 110 | 95.0 | 94.1 | 95.8 | 95.8 | 95.8 | 95.4 | 94.1 | 94.1 |
| 150 | 95.4 | 95.0 | 96.2 | 95.8 | 95.8 | 95.4 | 94.5 | 94.1 |
| 186 | 95.8 | 95.0 | 96.2 | 95.8 | 95.8 | 95.8 | 95.0 | 95.0 |
| 224 | 95.8 | 95.4 | 96.2 | 95.8 | 95.8 | 95.8 | | |
| 261 | 95.8 | 95.4 | 96.2 | 95.8 | 95.8 | 95.8 | | |
| 298 | 95.8 | 95.8 | 96.2 | 95.8 | | | | |
| 336 | 95.8 | 96.2 | 96.2 | 96.2 | | | | |
| 373 | 95.8 | 96.2 | 96.2 | 96.2 | | | | |

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.
b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a kilowatt rating between two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed kilowatt rating, determined as follows:
   1. A kilowatt rating at or above the midpoint between the two consecutive kilowatts shall be rounded up to the higher of the two kilowatts;
   2. A kilowatt rating below the midpoint between the two consecutive kilowatts shall be rounded down to the lower of the two kilowatts.

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*Delete the current Table 10.8-2 and replace with the new Table 10.8-2 as shown (SI).*

**Table 10.8-2 Minimum Nominal Full-Load Efficiency for NEMA Design C and IEC Design H Motors at 60 Hz[a,b]**

| | Nominal full-load efficiency (%) as of June 1, 2016 | | | | | |
|---|---|---|---|---|---|---|
| | 4 Pole | | 6 Pole | | 8 Pole | |
| Motor kilowatts | Enclosed | Open | Enclosed | Open | Enclosed | Open |
| 0.75 | 85.5 | 85.5 | 82.5 | 82.5 | 75.5 | 75.5 |
| 1.1 | 86.5 | 86.5 | 87.5 | 86.5 | 78.5 | 77.0 |
| 1.5 | 86.5 | 86.5 | 88.5 | 87.5 | 84.0 | 86.5 |
| 2.2 | 89.5 | 89.5 | 89.5 | 88.5 | 85.5 | 87.5 |
| 3.7 | 89.5 | 89.5 | 89.5 | 89.5 | 86.5 | 88.5 |
| 5.5 | 91.7 | 91.0 | 91.0 | 90.2 | 86.5 | 89.5 |
| 7.5 | 91.7 | 91.7 | 91.0 | 91.7 | 89.5 | 90.2 |
| 11 | 92.4 | 93.0 | 91.7 | 91.7 | 89.5 | 90.2 |
| 15 | 93.0 | 93.0 | 91.7 | 92.4 | 90.2 | 91.0 |
| 18.5 | 93.6 | 93.6 | 93.0 | 93.0 | 90.2 | 91.0 |
| 22 | 93.6 | 94.1 | 93.0 | 93.6 | 91.7 | 91.7 |
| 30 | 94.1 | 94.1 | 94.1 | 94.1 | 91.7 | 91.7 |
| 37 | 94.5 | 94.5 | 94.1 | 94.1 | 92.4 | 92.4 |
| 45 | 95.0 | 95.0 | 94.5 | 94.5 | 92.4 | 93.0 |
| 55 | 95.4 | 95.0 | 94.5 | 94.5 | 93.6 | 94.1 |
| 75 | 95.4 | 95.4 | 95.0 | 95.0 | 93.6 | 94.1 |
| 90 | 95.4 | 95.4 | 95.0 | 95.0 | 94.1 | 94.1 |
| 110 | 95.8 | 95.8 | 95.8 | 95.4 | 94.1 | 94.1 |
| 150 | 96.2 | 95.8 | 95.8 | 95.4 | 94.5 | 94.1 |

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.
b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a kilowatt rating between two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed kilowatt rating, determined as follows:
   1. A kilowatt rating at or above the midpoint between the two consecutive kilowatts shall be rounded up to the higher of the two kilowatts.
   2. A kilowatt rating below the midpoint between the two consecutive kilowatts shall be rounded down to the lower of the two kilowatts.

*Delete Table 10.8-3, as requirements have been moved into the new Tables 10.8-1 and 10.8-2. Renumber the following tables as shown (SI):*

**Table 10.8-~~4~~3 Minimum Average Full-Load Efficiency for Polyphase Small Electric Motors[a]**

**Table 10.8-~~5~~4 Minimum Average Full-Load Efficiency for Capacitor-Start Capacitor-Run and Capacitor-Start Induction-Run Small Electric Motors[a]**

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*Renumber the current Table 10.8-6 as shown and add the footnote as shown (SI):*

**Table 10.8-~~6~~5 Minimum Nominal Full-Load Efficiency for Fire-Pump Electric Motors[a,b]**

*…. (Table is unchanged.)*

NR—No requirement

a. Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

b. For purposes of determining the required minimum nominal full-load efficiency of an electric motor that has a kilowatt rating between two kilowatt ratings listed in this table, each such motor shall be deemed to have a listed kilowatt rating, determined as follows:

   1. A kilowatt rating at or above the midpoint between the two consecutive kilowatts shall be rounded up to the higher of the two kilowatts.
   2. A kilowatt rating below the midpoint between the two consecutive kilowatts shall be rounded down to the lower of the two kilowatts.

## POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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8/16