

**INTERPRETATION IC 90.1-2016-3 OF
ANSI/ASHRAE/IES STANDARD 90.1-2016
Energy Standard for Buildings Except Low-Rise Residential Buildings**

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Request from: John Bade, Johnson Controls, 631 S. Richland Avenue, York, PA 17403.

Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE/IES Standard 90.1-2016, Sections 6.5.3.1.1 and 6.5.3.1.2, regarding Nameplate Motor Horsepower requirements when no nameplate Motor Power is available on the motor.

Background: Section 6.5.3.1.1 provides two options for complying with the fan power limitation; option 1 *fan system motor nameplate horsepower* and option 2 *fan system bhp*. Option 1 requires that the motor nameplate horsepower be less than a certain calculated value. Standard 90.1 defines *nameplate horsepower* as the nominal motor output power rating stamped on the motor nameplate. However, there are motors in the market that are not provided with a motor nameplate horsepower, but instead are marked with only the motor's nominal electrical input power, either in watts (W), kilowatts (kW) or Full Load Amps (FLA).

Section 6.5.3.1.2 allows users to use the *fan brake horsepower* instead of the *fan system motor nameplate*. However, when this option is used, there are limits on size of the selected fan motor such that it shall be no larger than the first available motor size greater than the bhp with the following exceptions,

- 1) For fans less than 6 bhp, where the first available motor larger than the bhp has a *nameplate rating* within 50% of the bhp, the next larger nameplate motor size may be selected.
- 2) For fans 6 bhp and larger, where the first available motor larger than the bhp has a *nameplate rating* within 30% of the bhp, the next larger nameplate motor size may be selected.
- 3) Systems complying with Section 6.5.3.1.1, Option 1.
- 4) Fans with motor nameplate horsepower of less than 1 hp.

There is a related previous interpretation that applies to motor types that are not available in the standard sizes called out in NEMA MG 1, however that question specifically applied to motors that are marked with a *fan system motor nameplate horsepower*.

Interpretation: If a user would like to use Section 6.5.3.1.1 or wants to use the exceptions in Section 6.5.3.1.2, the user may use the marked input power or the marked input current and voltage to calculate the equivalent of the motor's *fan system motor nameplate*.

Question: Is this interpretation correct?

Answer: Yes

Comments: The motor's shaft output power can be calculated from the marked input power using the following formula:

$$\text{HP} = \text{kW} \times \eta / 0.746$$

Where:

HP = the motor shaft output power in horsepower

kW = the motor input power at full load marked on the motor. If in watts, then divide that value by 1,000.

η = decimal value the motor's full load efficiency, if known. If not known, use 1.0.

0.746 = conversion value for kW to horsepower.

If the input power is not marked on the motor, the motor input power for a three-phase motor may be calculated with the following formula:

$$\text{kW} = \text{V} \times \text{FLA} \times 1.732 \times \text{PF} / 1,000$$

Where:

kW = the motor power input.

V = the voltage at which the motor is rated.

FLA = the Full Load Amperage as marked on the motor.

PF = the decimal value of the power factor of the motor at full load if known. If it is not known, use 1.0

1,000 = conversion factor from W to kW