

**SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT****PART 1 - GENERAL**

## 1.01 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small, and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

## 1.02 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
1. Motor controllers.
  2. Torque, speed, and horsepower requirements of the load.
  3. Ratings and characteristics of supply circuit and required control sequence.
  4. Ambient and environmental conditions of installation location.

## 1.03 SUBMITTALS

- A. Shop drawing submittals for motorized equipment shall include, but not limited to, the following information on motors provided with equipment.
1. Manufacturer's name and cutsheets.
  2. Motor type.
  3. Horsepower.
  4. Voltage/Phase/Hertz.
  5. RPM.
  6. Service factor.
  7. Insulation class.
  8. NEC code number.
  9. Motor efficiency and testing method and results.

**PART 2 - PRODUCTS**

## 2.01 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. All materials and equipment furnished shall be installed as per manufacturer's requirements and conform to the requirements of Division 26.

## 2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg. C and at altitude of 3300 feet above sea level.

- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- C. Incorporate latest IEEE and NEMA standards.
- D. All copper windings with ball bearings.
- E. Indoors; drip proof, 40 degree C rise.
- F. Outdoors; totally enclosed 55 degree C rise.
- G. Motors over 10 HP to be high efficiency with PF in excess of 0.9.

### 2.03 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
  1. For motors with 2:1 speed ratio, consequent pole, single winding.
  2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Rotor: Random-wound, squirrel cage.
- F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- G. Temperature Rise: Match insulation rating.
- H. Insulation: Class F.
- I. Code Letter Designation:
  1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
  2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

### 2.04 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
  1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
  2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
  3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
  4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

### 2.05 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp. shall be one of the following, to suit starting torque and requirements of specific motor application:
  1. Permanent-split capacitor.
  2. Split phase.
  3. Capacitor start, inductor run.
  4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

## 2.06 MOTOR STARTERS

- A. Fractional with horsepower up to ½ HP; electrical contract.
- B. Polyphase and single phase above ½ HP: this contract.
- C. Electrical contractor shall install all starters except for those provided as an integral part of equipment.
- D. Polyphase starters shall be magnetic combination type, across-the-line electrically operated, electrically held, three pole assemblies, with arc extinguishing characteristics, silver to silver renewable contacts, 3 pole thermal bi-metallic, red run pilot light, individual phase protection, with overload heaters matched to motors installed and with 4 auxiliary contact, Hand-off-Auto switch, and control transformer.
- E. For single phase motors above ½ HP provide magnetic combination single phase motor starters with overloads, non-fusible disconnect switch, red run pilot light, integral 120 volt control transformer with dual primary fusing auxiliary contacts.
- F. Starters shall be as manufactured by G. E., Siemens, Square "D", Cerus or Cutler-Hammer.

## PART 3 - EXECUTION

### 3.01 GENERAL:

- A. Motors shall be leveled, set in true angular and concentric alignment with driven equipment, and bolted firmly to motor base, if not mounted on equipment. Motors's factory-mounted on equipment shall be checked for alignment to driven equipment and mounting bolts shall be checked to ensure bolts are tightly fastened.
- B. Coordination: The Mechanical Contractor shall have the responsibility to provide adequate rough-in information to the Electrical Contractor. Any costs, such as patching and refinishing of walls, resulting from inadequate information shall be the responsibility of the Mechanical Contractor.
- C. For variable frequency drives, refer to Specification 23 09 93.

END OF SECTION

## **SECTION 23 05 18 - ESCUTCHEONS FOR HVAC PIPING**

### **PART 1 - GENERAL**

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Escutcheons.
  - 2. Floor plates.

#### 1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

### **PART 2 - PRODUCTS**

#### 2.01 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With [polished, chrome plated and rough brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring clip fasteners.

#### 2.02 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
  - 1. Escutcheons for New Piping:
    - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep-pattern type.
    - b. Chrome-Plated Piping: One piece, cast-brass type with polished, chrome-plated finish.

- c. Insulated Piping: One piece, stamped-steel type.
  - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast-brass type with polished, chrome-plated finish.
  - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, stamped-steel type.
  - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast-brass type with polished, chrome-plated finish.
  - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, stamped-steel type.
  - h. Bare Piping in Unfinished Service Spaces: One piece, cast-brass type with polished, chrome-plated finish.
  - i. Bare Piping in Unfinished Service Spaces: One piece, stamped-steel type.
  - j. Bare Piping in Equipment Rooms: One piece, cast-brass type with polished, chrome-plated finish.
  - k. Bare Piping in Equipment Rooms: One piece, stamped-steel type.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
- 1. New Piping: One piece, floor-plate type.
- 3.02 FIELD QUALITY CONTROL
- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION