

**SPECIFICATION
PREMIUM ENERGY-EFFICIENT NEMA MOTORS
For Severe Duty Applications
Exceeding IEEE 841-2001**

- 1-300 HP**
- TEFC/TENV**
- 182T- 449T FRAMES**
- 600 VOLTS AND BELOW**

1.0 SCOPE

This specification details the mechanical and electrical requirements for Premium energy-efficient, totally enclosed fan-cooled and totally enclosed non-ventilated squirrel-cage induction motors, NEMA frame size 182T through 449T.

It is the intent of this specification to define premium quality motors which will provide energy efficient operation with high mechanical integrity under severe environment operating conditions for maximum life and minimum life cycle costs. Motors shall be Reliance 841XL or approved equal.

2.0 GENERAL

2.1 All motors covered by this specification shall conform to the latest applicable requirements of NEMA MG1, IEEE-841, ANSI, and NEC standards.

2.2 Motors are to be designed for continuous duty for 3-phase, 60 HZ, 200, 230, 460 or 575 volt operation and shall be NEMA design B. (*Note: - Design A motors are not acceptable due to the high locked rotor current except where approved by the owner.*)

2.3 Ratings to be based on a 40°C ambient, 3,300 feet (1000m) altitude or lower operation, with a maximum temperature rise of 80°C by resistance at 1.0 service factor, (and 90°C rise 1.15SF thru 150HP).

2.4 Motors applied on Variable Frequency Drives (VFD) Shall not exceed Class F rise at any speed under the defined load.

2.5 Motors to be furnished with Class F insulation, 1.15 service factor on sine wave operation but shall be selected for operation within their full load rating without applying the service factor.

2.6 Motors shall be of a premium efficient design and shall be different from the manufacturer's standard efficient product. Motor shall be Reliance XE or approved equal.

2.7 Motors shall be evaluated on conformance to this specification and total costs including initial cost and operating life-cycle cost. Life-cycle cost to be based on motor efficiency evaluation at minimum guaranteed efficiencies.

3.0 MECHANICAL

3.1.0 Bearings and Lubrication

3.1.1 Bearings shall be ball, open, single row, deep groove, Conrad type, and shall have a Class 3 internal fit conforming to ANSI/ABMA Std. 20-1996. For belted duty applications, drive end bearing may be cylindrical roller type.

3.1.2 Bearing shall be selected to provide L10 rating life of 100,000 hours minimum for flexible direct coupled applications and 26,280 hours minimum for belted applications.

3.1.3 Cast iron inner bearing caps shall be provided to prevent entry of harmful amounts of oil or grease into motor interior.

3.1.4 Bearing temperature rise at rated load shall not exceed 50°C for 3600 RPM designs or 45°C for 1800 RPM and slower. Temperature rise is to be measured by RTD or thermocouple at bearing outer race.

3.1.5 Bearing ABMA identification number shall be stamped on motor nameplate.

3.1.6 Motor lubrication system shall provide a grease inlet on motor bracket with capped grease fitting on inlet and a spring loaded cap on the outlet of each bearing grease chamber discharge.

3.1.7 Motor to be greased by manufacturer with a premium moisture resistant polyurea thickened grease containing rust inhibitors and suitable for operation over temperatures from -30°C to 150°C.

3.1.8 Both bearings shall be protected by INPRO/SEAL® bearing isolators.

3.2.0 ENCLOSURES

3.2.1 Motor enclosure including frame with integrally cast feet, end brackets, bearing inner caps, fan guard, and conduit box and cover shall be cast iron, ASTM Type A-48, Class 25 or better.

3.2.2 Motor conduit box shall be cast iron construction, rotatable in 90 degree increments, diagonally split with tapped NPT threaded conduit entrance hole and shall exceed the minimum volumes defined in IEEE 841-2001. Neoprene conduit box cover gasket and neoprene lead seal gasket with flexible nipples to ensure the seal is maintained as the leads are moved shall be furnished. Provision for grounding shall be provided in the conduit box utilizing a mounted clamp-type lug.

3.2.3 External cooling fan shall be corrosion-resistant, non-sparking, bi-directional, keyed, clamped and shouldered on the motor shaft.

3.2.4 Motor rotor construction shall be die cast aluminum or fabricated copper or their respective alloys. Rotors on frames 213T and above shall be keyed to shaft and rotating assembly dynamically balanced. Balance weights, if required, shall be secured to the rotor resistance ring by peened integrally cast sprues. Machine screws and nuts are prohibited. The rotating assembly shall be coated with a corrosion-resistant epoxy.

3.2.5 Vibration readings shall not exceed ½ the levels specified in IEEE Std 841-2001.

3.2.6 Stainless steel automatic breather drains shall be provided in the lowest part of both end brackets to allow drainage of condensation.

3.2.7 All mounting hardware shall be hex head, SAE Grade 5 or better, plated for corrosion protection. Screwdriver slot fasteners are prohibited. A forged steel shouldered eyebolt shall be provided on all frames with receptacle designed to prevent moisture or foreign material from entering motor when eyebolt is removed.

3.2.8 Corrosion-resistant stainless steel nameplate shall be affixed to motor frame with stainless steel or brass drive pins. Nameplate(s) shall include all required NEMA data and ABMA bearing numbers, and connection diagram for motors with more than three leads. For user convenience, nameplates shall define noise level, number of rotor bars and stator slots, and maximum surface temperature.

3.2.9 Frame to end bracket fits shall be protected and sealed by application of thick corrosion-resistant material to the machine surfaces prior to assembly.

3.2.10 The machined surface of the motor feet as well as shaft and flange mounting surfaces shall be free of paint and protected by easily removable rust inhibitor to ensure ease of mounting and alignment. Foot flatness shall meet IEEE 841-2001.

3.2.11 All motor parts including frame, brackets, fan guard, and conduit box shall receive a minimum of two coats of high grade USDA accepted epoxy paint. Motor assembly must satisfactorily withstand salt spray tests for corrosion per ASTM B-117 for 96 hours.

3.2.12 Draft angle of top surface of the motor foot in the area surrounding the mounting bolt hole shall be a maximum of 1.5 degrees.

4.0 ELECTRICAL

4.1 All motors shall successfully operate under power supply variations per NEMA MG1-1998-12.44

4.2 All motors shall be NEMA Design B with torque and starting currents in accordance with NEMA MG1-1998-12.35 and 12.38 except in special applications requiring higher starting torques where NEMA Design C is permitted.

4.3 Copper conductors shall be used for windings and motor leads. Copper alloy seamless compression type lead lugs shall be supplied on all motors.

4.4 Motor insulation system shall be Class F minimum, utilizing materials and insulation systems evaluated in accordance with IEEE 117 classification tests.

4.5 Motor leads shall be non-wicking type, Class F temperature rating or better and permanently numbered for identification.

4.6 Entire wound and insulated stator shall receive a coating of epoxy paint on all air gap surfaces to protect against moisture and corrosion.

4.7 Each completed and assembled motor shall receive a routine factory test per NEMA standards.

5.0 NOISE

5.1 The no-load sound pressure level, based on the A-weighted scale at 3 feet when measured in accordance with IEEE Std. 85 should not exceed 85 dBA.

6.0 EFFICIENCY

6.1 All motors shall be of an energy-efficient design, different from manufacturer's standard product through the use of premium materials, design and improved manufacturing process. Nominal efficiencies shall exceed NEMA MG1-1998 Table 12-11. Minimum efficiencies shall equal or exceed the nominal values in Nema -1993, Table 12-10. Minimum nameplated efficiencies must be no more than one efficiency band lower than nameplated nominal efficiencies.

6.2 Motor efficiency shall be determined in accordance with NEMA MG1-1998-12.58.1 and full load efficiency labeled on motor nameplate in accordance with NEMA MG1-1998-12.58.2

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