Power supply for AC motors shall be as follows:

From 0.22 kW up to & including 180 kW - 415V, 3 Phase, 50Hz

All AC motors shall be suitable for following voltage and frequency variation as

Voltage Variation : (±) 10%

 Frequency Variation : (+) 3% to (-) 5%

 Combined Variation of Voltage & Frequency : 10% (absolute sum)

Maximum continuous motor ratings shall be at least 15% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.

Motor shall be designed to keep torsional and rotational natural frequencies of Vibration of the motor and driven equipment at least 25% above the motor Operating speed range.

System Grounding

For 415 V - Solidly Grounded

Fault Level

For 415 V - 50 kA for 1 second

Degree of Protection – IP 55

Winding Insulation - For 415V AC Motors –Class F

Winding Conductor Material - For 415V AC Motors – Copper

Bearing

a) For Drive End : Roller

(b) For Non Drive End : Roller / Ball

Locked Rotor Withstand Time

The starting time of the motor shall be at the minimum permissible voltage.
For motors with starting time up to 20 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 second more than starting time.
For motors with starting time more than 20 second and up to 45 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 second more than starting time.
 For motors with starting time more than 45 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.
 Speed switches mounted on the motor shaft shall be provided in cases

Starting Voltage Requirement
85% upto 1500 kW

Motor shall be designed for direct on line starting at full voltage.
The motor shall be capable of withstanding the stresses imposed if started at
110% rated voltage.
The motor shall be designed to withstand any torsional and/or high current stresses, which may result, without experiencing any deterioration in the normal life and performance characteristics.

Winding and Insulation

415V AC motors: Winding material shall be of copper. Insulation shall be of Class F with temperature rise limited to Class B.

Starting duty
Motors shall be suitable for 3 nos. consecutive Cold starts up and 2 nos. consecutive Hot starts up. Motors shall be suitable for three equally spread starts per hour when the motor is under normal service condition. However in case of multiple start motors like conveyor motors three starts shall be allowable from hot condition with maximum 20 starts per day and minimum 20,000 starts during life time of motor.

Temperature Rise
 For Air Cooled Motors, temperature rise of insulation should be limited to

70 Deg C over ambient temperature by resistance method.

Noise Level and Vibration

 Noise level shall be limited to 85 dB (A) at 1.5 meters from the motor.

However the same shall be as per IS: 12065 unless otherwise specified. The peak amplitude of vibration shall be within the specified limits laid down in IS: 12075.

Earthing

Motor body shall have two earthing points on opposite sides. Motor terminal boxes shall also have separate grounding terminals.

Termination

The main cable box / terminal box shall withstand a fault current up to 50 kA for 0.25 seconds for LT Motors.

All the terminal boxes except phase segregated terminal of main terminal box shall be capable of being turned through 360 degrees in steps of 90degrees.

Tropical Protection

 All motors shall have fungus protection involving special treatment of insulation and metal against fungus, insects and corrosion.

 All fittings and hardware shall be corrosion resistant.

 Space Heater

 Suitable single phase space heaters operated at 240 V, 50 Hz 1 Phase AC supply shall be provided on motors rated for 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided.

 The space heater shall be sized to maintain the motor internal temperature above dew point when the motor is in idle condition.

Rating Plate

Motor shall have Stainless steel nameplate(s) showing diagram of connections, all particulars as per IS: 325 / NEMA information:

a) Type of bearing and recommended lubricants along with location of insulated bearing.

b) Temperature rise under normal/abnormal conditions.

c) In addition to above, an arrow block shall be screwed on to the body of motor on the non driving end to indicate normal direction of rotation of motor.

d) Year of Manufacture

TESTS

LT MOTORS

Routine Test

All equipment shall be completely assembled, wired, adjusted and routine tested as per relevant IS/IEC Standards at manufacturer's works presence of consultant /purchaser or his representative.

Type Test

LT motors shall be of type tested quality. For each type & rating of LT motors rated above 50 KW, the bidder shall submit for owner's approval, the reports of all the type tests as per relevant standards These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been conducted at an independent laboratory.

In case the Bidder is not able to submit report of the type test(s) conducted or in case the type test report(s) are not found to be meeting the specification requirements, the Bidder shall conduct all such tests free of cost in the presence of the Owner and submit the reports for approval.

DRAWINGS, DATA & MANUALS

Drawings, data & manuals for the motors shall be submitted as indicated below:

Dimensional General Arrangement drawing

- Motor sizing calculation
- Foundation Plan & Loading
- Cable end box details
- Space requirement for rotor removal
- Thermal withstand curves hot & cold
- Starting and speed torque characteristics at 80% & 100% voltage
- Complete motor data
- Erection & Maintenance Manual
- Test reports

QAP