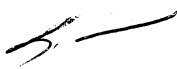


TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS
ITEM : LT MOTOR
Project : BHEL standard

NAME		DESIGNATION	SIGNATURE	DATE
PREPARED	K S S MANIAN	Sr Addl Engr		29.5.14
CHECKED	S RANGARAJAN	S D G M		29.5.14
APPROVED	S JAYAPRAKASAM	A G M		29.5.14

ISSUED BY EDC ECI

Record of revision

REVISION NO : 01

CI 2.1 Reviewed & Revised

REVISION NO : 00

INITIAL RELEASE : 19.3.2013

Based on TDC TCI 140 Rev 08 & TFN LTM rev 05

CI No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
1.0	<u>SITE CONDITIONS</u>		
1.1	Altitude above mean sea level	➤ 1000 m.	
1.2	Ambient temperature condition	6 to 50°C.	
1.3	Relative humidity	100 %	
1.4	Atmosphere	Tropical ,Dusty, salty, corrosive & highly polluted	
2.0	<u>GENERAL</u>	in a coal based Thermal power plant.	
2.1	Reference standards 	IS 325, IS 1231, IS 4722, IS 6362, IS 2253, IS 12065, IS 12075 , IS 4691 & <u>IS 12615-</u> <u>Energy efficient</u>	
2.2	Design ambient	50 Deg C	
2.3	Application/ Type(Normal/ Energy efficient)	As per Enquiry & PO.	
2.4	Duty cycle	Continuous S1	
2.5	Rated voltage, frequency & Phases	415 V AC $\pm 10\%$; 50 Hz $\pm 5\%$; (PI check enquiry for voltage) 10% absolute sum - 3 phase	
2.6	Minimum starting voltage	80% of the rated voltage	
2.7	Minimum voltage under which motor will run satisfactorily Capacity to restart (at voltage specified in point No. 2.4)	75% of the rated voltage for 5 minutes i. TWO successive starts from cold condition ii. Two HOT restarts starts from Hot condition iii. Three equally spread start per hour	
2.8	High speed bus transfer withstand capability	Suitable to withstand 150 % of rated voltage	
2.9	Type of balancing for rotor	Dynamic balancing	
2.10	Direction of rotation	Suitable for both direction	
2.11	Direction of cooling air	Non-drive end to driving end	
2.12	Class of insulation	Class F with temperature rise limited to Class B.	
2.13	Winding treatment	The insulation shall be given tropical and fungicidal treatment for successful operation of the motor in hot , humid & tropical climate.	
2.14	Allowed winding temperature rise at continuous full load	60°C by thermometer method & 70°C by resistance method	

CI No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
2.15	Starting current	Less than or equal to 600% full load current subject to tolerance as per IS.(Normal motor)	
2.16	Starting time & locked rotor withstand time	Less than or equal to 700% full load current subject to tolerance as per IS.(Energy efficient) The locked rotor withstand time (LRWT) at 110% rated voltage (RV) under HOT condition shall be at least 3 sec more than the starting time at 80% of rated voltage for motors with acceleration time upto 20 sec at RV and 5 sec where the accelerating time is more than 20 sec at RV.	
2.17	Vibration	The peak amplitude of vibration shall be as per IS 12075	
2.18	Noise level	Within the limits specified by IS 12065. (<80 db at full load condition) @ 1 metre distance.	
2.19	Type of enclosure	TEFC, IP 55 as per IS 4691.	
2.20	Type of mounting	Horizontal foot mounted.	
2.21	Bearings	Ball or roller type / bearings effectively sealed against ingress of dust. The bearing shall be so constructed that the loss of lubricating grease is kept to minimum. Sealed bearings are also acceptable.	
2.22	Lubricant Type	Grease	
2.23	Bearing life	Bearings shall have a minimum life of 40000 Working hours.	
2.24	Shaft extension	Motors shall be provided with key slotted bare shaft extension with key at the driving end.	
2.25	Terminal box Type	Weather proof IP 55 as per IS 4691, Capable of being turned through 360° in steps of 90°.	
2.26	Cable gland and lugs	Double compression type nickel plated brass cable glands and insulated tinned copper crimping lugs to suit the cable size shall be supplied along with the motor. i) Size of power cables will be intimated after PO. ii) For space heater cable glands and lugs suitable for 2CX2.5 to be provided	
2.27	Type of terminals	Stud / screw type with plain washers, spring washers / checknuts & lugs	

CI No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
2.28	Fault level	40 KA for 0.25 Sec (Suitable HRC fuse backup will be provided by BHEL in MCC/switchgear)	
2.29	Painting	Epoxy based paint (Colour shade 631/ Shade 632/ Shade 275/ RAL 5012 as per IS:5. This will be confirmed after PO.	
30.0	Space heaters		
30.0.A	Motors above 30 kW	Separate space heater suitable for 240V, 1 Phase, AC, 50 Hz shall be provided	
30.0.B	Motors below 30 kW	Winding shall be suitable for heating continuously at 24 V, Single phase, AC, 50 Hz	
30.0.C	Terminals for space heater	Separately terminated with clear identification in main terminal box.	
31.0	RTD for winding	Two numbers of Thermistors / RTD for each phase as below are to be provided A. Motors above 37 Kw shall have thermistors Or RTD if specifically called for in enquiry. B. Motor rated 160kW and above shall have RTDs	
32.0	Bearing RTD	For motors 132 Kw and above bearing temperature detectors(RTD) shall also be offered.	
33.0	Terminals for RTD/ Thermistor	Thermistors/ RTDs shall be terminated in a auxiliary terminal box. Details shall be furnished in TB diagram.	
34.0	Earthing	Two no of earthing provisions on terminal box and on motor body	
35.0	Name plate	As per IS 325 and Addl data on name plate:: a. Bearing DE/ NDE details. b. Year of manufacture	
36.0	Lifting Device	Eye bolt or lugs to facilitate safe lifting	
37.0	<u>INSPECTION & TESTING</u>	As per applicable quality plan	

CI No.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
38.0	<u>DOCUMENTS</u> a) Along with offer: b) After placement of Purchase order (within 15 days)	One set of technical data sheet as per the enclosed format and Motor general arrangement drawing giving foundation details, shaft details. Three sets of the following for approval: 1. Technical Data sheet as per the enclosed format of TECI LTMOTOR REV 00- sh 6 to 8 2. Motor general arrangement drawing giving foundation details, shaft details and weight 3. Motor Terminal box arrangement drawing 4. Motor characteristic curves . The following shall be submitted 1. Guarantee certificate. 2. O & M manuals. <u>3. Acceleration time and LRWT calculation shall be submitted for review.</u>	
39.0	<u>PACKING</u>	As per Packing Procedure QA:CI:STD:PR:03 or as per Manufacturer's Standard Practice subject to approval . The packing shall meet the Transport , Environment & Storage hazards. <u>Vendor shall check the applicable rated voltage in enquiry.</u>	

NOTE:

1. Refer current valid list for revision status of Quality Plan & Packing Procedure.
2. In 'Vendor compliance' column Vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'. Clarification , if any, in this column will not be considered.

PO no ::

DATA SHEET - Cust No ::

Project ::

CL. NO	CHARACTERISTICS	Vendor data (To be filled by vendor)
1.0	Application	Normal / Energy efficient Frame size: IP55 • 415 V AC $\pm 10\%$; 50 Hz $\pm 5\%$; (Check voltage as per enqy), 10% absolute sum - 3 phase Amps As per IS 12615 Eff-- PF-- Eff-- PF-- Eff-- PF-- S1 - Continuous 600% of full load current @ RV and Frequency a. Hot b. Cold a. Hot b. Cold a. Hot b. Cold Minutes
1.1	Fan / Load Curve referred	
2.0	Manufacturer	
3.0	Type & frame size	
3.1	Degree of Protection	
4.0	Rated output in kW	
4.1	Rated speed	
5.0	Rated voltage , frequency & phases	
6.0	Full load current	
7.0	Energy efficient	
8.0	Efficiency & power factor at Full load	
9.0	Efficiency & power factor at 75 % load	
10.0	Efficiency & power factor at 50 % load	
11.0	Duty Cycle	
12.0	Rated torque	
13.0	Starting current	
14.0	No load current (with mechanism coupled)	
15.0	Starting torque in % of full load torque	
16.0	Pull up torque in % of full load torque	
17.0	Pull out torque in % of full load torque	
18.0	No load starting time (without mechanism coupled)	
19.0	Locked rotor withstand time at rated voltage	
20.0	Locked rotor withstand time at minimum starting voltage	
21.0	Locked rotor withstand time at 110% rated voltage	
22.0	Starting time at minimum starting voltage with mechanism coupled	
23.0	Starting time at rated voltage with mechanism coupled	
24.0	Maximum permissible starting time	
25.0	Stator thermal time constant	
26.0	Type & No of terminals brought out	

Cl no	CHARACTERISTICS	Vendor Data (To be filled by vendor)
27.0	Stator winding connection	Delta / star
28.0	Class of insulation & temperature rise	Class F; 60°C by thermometer method / 70°C by resistance method.
29.0	Minimum permissible starting voltage	Volts
30.0	Resistance per phase @20 Deg C (Indicative)	Ohms
31.0	No of successive starts in Hot condition	ONE / TWO
32.0	Quantity and power consumption of space heater	Qty== Watts==
33.0	Direction of rotation	Bi-Directional.
34.0	Bearing make & type	Make:: Drive End; Non Drive End;
35.0	Lubricant quantity , grade & recommended interval of lubrication	
36.0	Type of mounting & shaft orientation <u>Terminal Box</u>	Foot mounting; Horizontal.
37.0	Location & angle of rotation	
38.0	Gland size for stator winding	
39.0	Gland size for space heater	Suitable for 2CX2.5 sq.mm(armoured), if applicable.
40.0	Cable entry	
41.0	GD ² of motor (kg-m ²)	
42.0	Total weight of motor (kg).	
43.0	Weight of stator (kg)	
44.0	Weight of rotor (kg)	
45.0	Anticipated bearing life in Hours	
46.0	Method of connection to driven equipment	
	Limiting rotor temperature for determining safe stall time	☐
47.0	RTD for winding/ Bearing	Applicable YES NO
48.0	Grade of balance of motor	
49.0	Standard continuous rating at 40 Deg C ambient.	
50.0	Derated rating of motor at 50 Deg C.	
51.0	a. Locked Rotor KVA b. Ratio of Locked rotor KVA / Rated KW	
52.0	a. Motor Dynamic Load b. Motor Static load	Upward/ Downward— Upward / Downward—
53.0	PAINT SHADE	
54.0		

Vendor's signature and seal

Rev No ::

Date ::

The following curves are to be enclosed during datasheet approval.

1. GA drawing , Terminal box arrangement
2. Torque Vs Speed with load curve superimposed.
3. Speed Vs Current
4. Time Vs Current
5. Thermal with stand curve
6. Load Vs Efficiency
7. Load Vs Slip
8. Load Vs Power factor
9. Speed Vs Time
10. Load Vs Current.

The following information shall be specifically provided for motors suitable for VFD drive (if called for in eqny during datasheet approval in addition to datasheet.

1. Stator RESISTANCE
2. Stator leakage reactance
3. Magnetising reactance
4. Rotor resistance referred to stator
5. Rotor reactance referred to stator

Vendor's signature and seal.

Date ::