


		Document No. PB615MTR00										Total sheets	
												25	
<h1>TECHNICAL SPECIFICATIONS FOR</h1> <h2>LV MOTORS</h2>													
Rev	Date	Description of Revisions	Status	Ppd	Ckd	Appd	PM	Ppd	Mech	Elec	C&I	Civil	QA
CLINET				M/s. Harinagar Sugar Mills Ltd., Bihar.									
CONSULTANT													
PROJECT				1 X 35 TPH Pulsating Grate Boiler									
EPC				 M/s.Uttam Energy Limited, Pune.									

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	2

INDEX

Index.....	2
1. Scope of Supply.....	3
2. Scope of Services.....	3
3. Terminal Points.....	3
4. Exclusions.....	3
4.1. Mechanical.....	3
4.2. Electrical.....	3
4.3. Instrumentation.....	4
4.4. Civil.....	4
5. General requirements.....	4
5.1. Design & Construction requirements for ht motors.....	4
5.1.1. design codes & standards.....	4
5.1.2. General design.....	4
5.1.3. Construction.....	5
5.2. Inspection & Testing.....	10
5.2.1. Type Tests.....	10
5.2.2. Routine Tests.....	10
5.3. Performance Requirements.....	11
5.3.1. Starting.....	11
5.3.2. Supply Voltage and Disturbances.....	11
5.3.3. Vibration and Noise Level.....	12
5.3.4. Other Requirements.....	12
5.3.5. Temperature Rise.....	12
5.4. Drawing & Document requirements.....	12
5.5. Deviations & Alternate Design.....	13
6. Specific Requirements.....	14
6.1. Design Data Sheet.....	14
6.2. Technical Data Sheet.....	17
7. Annexures.....	23
7.1. Annexure 1 – Project Information.....	24
7.2. Annexure 2 – Deviation List.....	25

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	3

This specification is intended for the purchase of LV motors (Voltage level 415 V +/-10 %) with satisfactory and trouble-free continuous operation, as per the scope of supply.

Any additional equipment / material / services which are not specified herein, but required to meet the requirements mentioned and for safe operation, shall be deemed covered under the scope of supply by bidder.

1. SCOPE OF SUPPLY

Re	Item / Part	Required Yes / No
1	LV Motors as per the data sheet	Yes
2	Accessories	Yes
3	Commissioning spares as required	Yes/No
4	Spares for 2 years for trouble free operation	Yes/No
5	Special tools & tackles	Yes/No
6	O&M Documents	Yes

2. SCOPE OF SERVICES

Re	Service	Required Yes / No
1	Design, Engineering, Manufacturing	Yes
2	Routine and functional Tests	Yes
3	Supervision of erection, testing & commissioning of above the equipment	Yes/No

3. TERMINAL POINTS

Re	Stream / Service	Location
1	Power supply	At terminal box
2	Accessories	At aux. terminal box

4. EXCLUSIONS

4.1. MECHANICAL

Fire Fighting System

4.2. ELECTRICAL

All cables

Motor Control Centre

Any AC / DC power supply system

Earthing & Lighting

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	4

4.3. INSTRUMENTATION

Cables

Plant DCS

4.4. CIVIL

All Civil works such as foundations etc.

5. GENERAL REQUIREMENTS

5.1. DESIGN & CONSTRUCTION REQUIREMENTS FOR HT MOTORS

5.1.1. DESIGN CODES & STANDARDS

The design, material, construction, manufacture, inspection, testing and performance of LV Motor and accessories supplied under the scope of this specification, shall comply with latest revisions of relevant Indian & International Standards / IEC such as IS 12615/ IEC 60034. In case of conflict between standards and this specification, this specification shall govern.

5.1.2. GENERAL DESIGN

AC Motors shall be totally enclosed, fan cooled, squirrel cage, 3 phase, induction type. Motors shall be designed for operation on continuous duty and shall be suitable for outdoor installation as per degree of protection mentioned in Design Data.

Motors shall be designed to operate continuously in the design ambient temperature, relative humidity as well as plant environment conditions specified in Design Data Sheet.

5.1.2.1. OPERATING CONDITIONS

The reference ambient temperature for the motors shall as specified in Design Data Sheet.

The motor characteristics shall match the requirements of the driven equipment so that adequate starting, accelerating, pull up, breakdown and full load torque are available for the intended service. The speed – torque characteristics of the equipment to be checked for the suitability of the motor. Application check up to be done by motor vendor to ensure the suitability of the motor for the required application.

The motors shall be rated for voltage & frequency as specified in Design Data Sheet.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	5

5.1.2.2. Direction of Rotation

Motors shall be suitable for either direction of rotation. (Except 2 pole motors)

Normally, clockwise rotation is desired as observed at (facing) the driving (coupling) end when the terminals marked as per IS: 4728 are connected to a supply giving a terminal phase sequence corresponding to the alphabetical sequence of the terminal letters. However direction of rotation for all motors shall be suitable for desired direction of rotation of driven equipment (Pump, Fans etc). Counter clockwise rotations of the motor shall be obtained by connecting the supply to terminals, so that the phase sequence corresponds to the reversed alphabetical sequence of terminal letters. Ample space shall be provided at terminal box for interchanging any two external leads for obtaining reverse phase sequence.

5.1.3. CONSTRUCTION

1. Frame

The frames and all external parts of the motors shall be of rigid fabricated steel or a casting. In the latter case, the material shall be cast iron conforming to relevant standards.

Motor enclosures shall conform to the degree of protection as specified in Design Data Sheet.

2. Windings

End connections between winding leads and motor terminal studs shall be done through crimping type lugs, nuts, bolts and spring washers. Connections by soldering are not acceptable.

3. Winding Insulation

Motors insulation class & its temperature rise shall be as specified in Design Data Sheet.

Motor winding insulation shall be adequately designed to withstand stresses developed in inter turn and slot insulation due to switching surge over voltage generated during switching off of circuit breaker controlled motors.

The windings, fittings and hardware shall be corrosion resistant. Motor winding shall be given special tropical, fungicidal treatment for protection against tropical weather conditions, fungus growth and moisture, dust and the corrosive effects of environment. Overhangs of windings shall be treated with epoxy gel coat. The windings shall be suitably varnished & baked.

4. Stator

The stator laminations shall be made from suitable magnetic sheets varnished on both sides.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	6

5. Rotor and Cooling Fans

The rotor design shall provide a rigid cage construction with bars firmly wedged in bar slots and solidly bonded to the end rings. The end ring assembly shall be such that it is free to move with the expansion of the bars without distortion. The rotor cage shall be designed to operate satisfactorily under respective starting and load cycles. Rotors shall have anti-corrosive material for protection against the plant environment.

The rotor shall be dynamically balanced and shall rotate perfectly with no preferential stop points.

Cooling fan shall be made of suitable material to resist the corrosion effect of plant environment. Fan shall be complete with guide key and reference points so that wrong assembly can be prevented, bi-directional in design such that it permits the rotation of motor in both the directions without changing fan orientation. Cooling fan shall be balanced independently of rotor.

6. Accessories and Fitments

Space Heaters

Space heaters shall be provided for the motors of rating as specified in Design Data Sheet.

The rating of space heater shall be such that condensation is prevented in all parts of motor and absorption of moisture by the insulation of motor winding is also prevented.

Temperature Measurement facilities

Necessary RTD / BTD / PT 100 for temperature measurement facilities shall be provided as specified in Design Data Sheet

Terminal Boxes

Motors shall be provided with suitable cable boxes to suit Purchaser's cables as specified in Design Data Sheet.

The terminal box shall be fabricated from sheet steel plates / cast iron to suit motor enclosure. Cover of the terminal box shall preferably be fabricated from sheet steel. The stator leads shall be brought into the terminal box through a non-inflammable insulating

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	7

material high melting seal to prevent entry of dust and water into motor through terminal box. In case of large size motors porcelain insulators / studs may be used. Adequate clearance shall be provided between terminals for termination by suitable lugs.

Minimum available air clearance between two terminals after termination of cable shall be 30 mm. Terminals shall be stud type and shall be complete with check nuts and washers. Terminal box shall be provided with amply rated shorting links of electrolytic copper.

Based on the specified cable sizes, cable entries shall be provided on terminal box for fixing of Purchaser's double compression cable glands.

Terminals shall be stud type, rugged constructed and thoroughly insulated from the frame.

The terminal box shall be complete with shorting links & the terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non-drive end of mo

Nameplate:

Each motor shall have a nameplate displaying all the particulars specified in relevant standards. In addition, the nameplate shall indicate the identification number of bearings used for motor and the details of recommended lubricant including required quantity of lubricant and interval at which the bearings are to be re-lubricated. In addition to the above information, motor nameplate shall also contain the information about number of successive cold and hot restarts permissible.

Nameplates shall be made of 1mm thick stainless steel with the relevant details embossed on them in English.

7. Bearings and Bearing Housing

Bearings shall be provided with seals to exclude dirt and water and to prevent lubricant from reaching the windings. Motors shall be provided with ball / roller bearings.

The bearing and housing shall be so designed that lubrication shall be possible while the motor is running without removal of any cover. Bearing housings for grease lubricated bearings shall be provided with exterior fill and relief plugs in tapped holes. Grease release arrangement shall be provided so that old grease is simultaneously expelled when re-greasing is being done. Grease nipple shall be located at the top of the end shield so that on line greasing can be carried out without risk of any accident. Alternatively, sealed type pre-lubricated bearings may be provided.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	8

Sleeve bearings shall be split type, ring oiled with permanently aligned, close running shaft sleeves. Grease lubricated bearings shall be pre lubricated and shall have

provisions for in-service positive lubrications with drains to guard against over lubrication. Oiled bearings shall have integral self cooled oil reservoir with oil ring inspection ports, oil sight glass with oil level marked for standstill and running conditions and oil fill and drain plugs. Forced lubricated or water cooled bearing shall not be used without prior approval of Owner / Consultant.

Lubricant shall not deteriorate under all service conditions. The lubricants shall be limited to normally available types with IOC or equivalent.

Earthing

Earthing arrangement shall be as specified in Design Data Sheet.

8. Painting

All surfaces shall be sand blasted, pickled and ground as required to produce a smooth, clean surface free of scale, grease, rust and dents.

Subsequent to above pre-treatment, the motor enclosure shall be finished with one coat of primer and final one coat of paint as specified in Design Data Sheet. The paint shall not scale off or rinkle or be removed by abrasion due to normal handling. The paint shade of final coat & paint thickness shall be as per Design Data Sheet.

5.2. INSPECTION & TESTING

5.2.1. TYPE TESTS

Only type tested equipment shall be acceptable. Type test certificates for all tests conducted on similar / higher rated motor shall be furnished along with the bid. If type tests have not been conducted so far then it shall be conducted during the tenure of contract, without any cost or delivery implication. The Purchaser reserves the right to witness such tests. The following tests shall be considered as type tests:

Measurement of cold resistance

Temperature rise test

Load point for $\frac{3}{4}$ & $\frac{1}{2}$ load

Momentary overload test

Degree of enclosure protection test carried out on identical motors for both digits

Locked rotor amp & torque test

No load test

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	9

Reduced voltage running up test

HV test & Insulation resistance test (before & after HV test)

Vibration test

5.2.2. ROUTINE TESTS

The Routine tests shall be conducted during manufacture and on completion of the HT Motor. In addition, any other routine tests, according to the latest version of IS / IEC shall also be conducted. The following minimum tests shall be carried out:

Insulation resistance test

High voltage test

No load test

Running at low voltage

Locked rotor test

Vibration measurement

Speed measurement

In addition, any special test required for the driven equipment shall be performed.

Tests shall be performed in presence of purchaser's representative. The Vendor shall give at least four (4) weeks advance notice of the date.

5.3. PERFORMANCE REQUIREMENTS

5.3.1. STARTING

Motors shall be capable of starting and accelerating the full load to its rated speed at 80% of rated voltage.

The starting torque and pull out torque at rated voltage shall have sufficient margin over the torque requirement of the load.

Motors shall be designed to meet the starting duty cycles specified in Design Data Sheet.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	10

The motor shall be suitable for the application as specified & as per enclosed equipment data sheets & characteristics.

Vendor shall carryout the application check up for the starting / acceleration time calculation for BFP/ ID/ FD/ SA/ PS motors with given equipment data & starting method as Star / Delta. Vendor shall furnish following data with star delta starting method

1. T/ S curves of motors with Y/D starting & with equipment T/S curves superimposed on it.
2. Starting current (in % of rated current) with Y/D starting
3. Duration of starting current with Y/D starting method
4. Total acceleration time of motor from zero speed to full speed (up to 90 to 95 % of rated speed with Y/D starting method.

For BFP motor , when started with VFD or Y/D starter , motor should reach to 50 % of its rated speed within 8 secs.Please select the torque values of motor to fulfill this requirement.

BFP/ID Fan/ FD Fan/ Drum Extractor Motors shall be suitable to run on IGBT based drive and hence to be sized to operate satisfactorily under lowest speed condition without affecting the cooling of motor.

The winding shall be with VPI treatment. These motors shall be sized to operate satisfactorily under the lowest speed conditions. Operating speed requirement shall be as below:

Fans : 30% to 100%

Pumps : 50% to 100%

Bagasse drum Extractors Feeders : 10% to 100%

5.3.2. SUPPLY VOLTAGE AND DISTURBANCES

The motors may be subjected to sudden application of 150% rated voltage during bus transfer, due to the phase difference between incoming voltage and motor residual voltage.

Motors shall be designed to operate continuously under the specified power supply conditions.

5.3.3. VIBRATION AND NOISE LEVEL

Vibration & noise level for motor shall be as specified in Design Data Sheet.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	11

5.3.4. OTHER REQUIREMENTS

Provision shall be made in motor by providing opening on fan side to enable measurement of motor speed by tachometer.

5.3.5. TEMPERATURE RISE

The temperature rise above design ambient temperature under working conditions and while delivering full load shall not exceed the values specified in the standards for class B insulation.

The maximum temperature attained in stator winding and the squirrel cage rotor under locked rotor condition shall be so limited that permissible temperature for stator winding, rotor conductor and brazing material is not exceeded.

Heating due to direct exposure to solar radiation shall be taken into account in temperature rise consideration.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	12

5.4. **DRAWING & DOCUMENT REQUIREMENTS**

B – With Bid

P – During Execution

The drawings, data and manuals listed hereunder are only the minimum requirement. Any other necessary write up, curves and information required to fully describe the equipment shall be submitted. Nothing in this specification shall be construed to relieve the vendor of their responsibility for design, manufacture, testing and performance of the LV Motor and its accessories.

On award of contract, the vendor shall prepare a Drawing & Document Schedule in Purchaser's standard format, listing all the drawings and documents which will be submitted during the course of execution of the order. All drawings and documents shall be numbered in accordance with Purchaser's Vendor Drawing Numbering System, in addition to vendor's own drawing number.

Sr.	Description	Code
1	Drawing and Document submission List	B
2	Descriptive and illustrative literature on the equipment offered	B
3	GA drawing with dimensions, Foundation detail, weight, loading details, Terminal box details, etc.	B
4	Complete Data Sheets listed under section 7.3	B
5	Torque/speed characteristic, curves of motors duly superimposed on equipment speed-torque characteristics.	B
6	Stator thermal withstand curves (hot and cold) and corresponding values of heating time constant and cooling time constant.	B
7	Technical leaflets	B
8	Performance curves (output Vs efficiency, Output Vs current, Output Vs slip, current Vs speed, time Vs speed, negative sequence curve)	B
9	Starting characteristics (at 80%, 100% and 110% rated voltage)	B
10	Comprehensive write-up or brochure on details of manufacturing and testing facilities in the shop of the manufacturer	B
11	Quality Assurance Plan & Type test certificates of similar rating	B
12	List of Special tools and tackles and List of commissioning spares	B
13	List of spares for 2 years normal operation and List of accessories	B
14	Installation list for similar rated motors	B
15	Complete Bill of Material with Make of all components	B
16	Instruction manuals for the Storage, Erection, Commissioning, Operation, Maintenance, Repair, Replacement and Spares ordering	P
17	Test certificates of all bought out items	P
18	Packing procedures	P

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	13

5.5. DEVIATIONS & ALTERNATE DESIGN

Deviations to this technical specification, if any, shall be listed along with the offer (with reference description and reasoning), without which, the offer shall be deemed to comply completely with this specification.

The bidder is requested to suggest better alternative design/s, if any, through an alternate offer/s.

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	14

6. SPECIFIC REQUIREMENTS

6.1. DESIGN DATA SHEET

Sr.	Description	Required data
1	Rating	As per motor details given elsewhere
2	Quantity required	As per motor details given elsewhere
3	Application	As per motor details given elsewhere
4	Speed	As per motor details given elsewhere
5	Duty	Continuous / Application specific
6	Design Ambient Temperature	50 deg.C
7	Type	3 Phase Squirrel Cage Induction Type
8	Direction of Rotation	Bi-Directional except 2P motors.
9	Cooling Fans	Bi-Directional
10	Suitability for long period of inactivity	Required
11	Service	Outdoor / Indoor
12	Degree of Protection	IP 55
a	Indoor Application	IP 55
b	Outdoor Application	IP 55 with Canopy (Canopy is in Motor Vendor's scope)
13	Frame Size Dimensions	As per IS / IEC
14	Mounting type	Horizontal /Vertical (As applicable)
15	Coupling detail	Direct coupled.
16	Type of enclosure	TEFC
17	Efficiency Class	IE-2 as per latest IEC
18	Class of Insulation	Class F
19	Temp. rise above Design Ambient Temperature	Limited to Class B at full load condition
20	Voltage	415
21	No. of phases	3
22	Frequency	50 Hz
23	Permissible voltage and frequency variation under normal running condition	Voltage $\pm 10\%$ Frequency $\pm 5\%$ Combined absolute 10 %

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	15

24	Connection	Delta
25	Stator Winding Leads	All six leads shall be brought out to terminal box for all ratings.
26	Method of starting	DOL/VFD/VFD+Star-Delta (As applicable)
27	Starting Current for Motor	Shall not exceed DOL 6 times full load current + IS tolerance for DOL starting. 3 times of Full Load Current of Motor for Y/D starting.
28	Pull out Torque	$\geq 250\%$ of Full Load Torque
29	Slip	$< 5\%$ at Full Load
30	Axial Play of Rotor	0.1 mm Max.
31	System Earthing	Solidly Earthed
32	Temperature Measurement Facilities	
a.	Stator Winding	12 nos. Simplex, PT-100 type RTD for motors rated 75 kW & above.
b.	Bearing	2 nos Duplex, PT-100 type for motors rated 75 kW & above.
c.	Thermistors	NA
d.	Connectivity of RTDs / BTDs	To DCS /Temperature scanner.
33	Provision of Space Heater	To be provided for motor rating ≥ 30 kW
34	Location of Space Heaters	To be mounted inside motor at lower part which can be accessible for easy removal. Space Heater terminals shall be brought in separate terminal box
35	Voltage Rating for Space Heaters	230V, 1 Ph, 50 Hz,
36	Connection for Space Heaters	Parallely connected
37	Starting Duty Cycle	
a	Successive starts from Cold condition	3
b	Successive starts from Hot condition	2
c	Equally Spread starts / hour	3
38	Thermal withstand time	Shall be based on maximum permissible temperature of stator and rotor.
39	Thermal withstand time (Hot) in locked rotor condition at 110% rated voltage	Shall be more than acceleration time of motor with full load connected at voltage specified. It shall be more than 5 seconds for drives with acceleration

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	16

		time more than 20 seconds & 2.5 seconds for drives with acceleration time less than 20 seconds
40	Cold Thermal withstand time in locked rotor condition	It shall be minimum 15 seconds & under hot condition same shall be minimum 5 seconds.
41	Bearing Type	Anti-friction, Ball / Roller / Sleeve type / Project Specific
42	Bearing Insulation	Required to prevent shaft current for VFD driven motors.
43	Stress during Bus Transfer	Motors shall be designed to withstand stresses developed due to vector difference between motor residual voltage and incoming supply voltage equal to 150% rated motor voltage during supply changeover operation
44	Overhang of winding	Suitably strengthened to withstand stresses developed during direct -on-line starting of motor. All hardware used for strengthening the overhang shall be of non-magnetic material.
45	Strengthening of the winding	To be provided for VFD driven motors. Winding shall be VPI treated and Dual coat enamelled Insulation shall be suitable for the voltage level of 1600V to take care of voltage surges during switching operation of VFDs.
46	Surge Voltage Withstand for Windings	As per IS / IEC
47	Suitability to operate at reduced voltage	Motor shall be suitable to operate satisfactorily for 5 minutes with 75% rated voltage @ motor terminals without injurious heating. Motor shall be able to start & accelerate at 80% of rated voltage
48	Noise Level	As per IS 12065

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	17

49	Provision for Vibration Measurement	NA
50	Vibration Level	As per standard IS 12075 / IEC at no load condition
51	Short circuit withstand capacity	System fault level of 50kA for 0.25 sec.
52	Terminal box requirements	
a	Provision of Terminal Boxes	Separate Terminal Box is required for – 1. Main Stator Leads 2. Space Heater Leads 3. RTD & BTD
b	Location of Main Terminal Box	Left hand side of motor while viewing from Non-Drive End (Exact location of TB will be confirmed during detail engg.)
c	Cable Entry	Bottom / Side
d	Terminal Box rotation	TB shall be suitable to turn through 360° in steps of 90°
e	Power Cable type / Size	XLPE / Size -as given elsewhere in specification
f	Control Cable type / Size	During detail engineering
g	Additional Requirements for Terminal Box	Shorting links to be provided, Terminals to be identified by Phase markings, corresponding direction of rotation to be shown on Non-Drive End.
h	Gland Plate for Terminal Box for Single Core Cables	Non-Magnetic type Gland Plate shall be provided
i	Caution Plate for Terminal Box	Required for all Terminal Boxes
j	Threaded Plugs for Cable Entry	Required to prevent entry of dust during transportation
53	Provision of drain holes to permit drainage of condensed water from enclosure	Required with threaded metallic plugs at bottom most point of motor frame
54	Earthing Terminals/Pads	
a	on Motor Body	2 Nos diagonally opposite
b	on Main Terminal Box / Inside TB	1 No
c	on Space Heater Terminal Box	1 No
d	on Thermistor Terminal Box	NA
e	on RTD/BTD Terminal Box	1 No.
e	Earthing Terminals suitability	Shall be suitable for connection of earthing strip conductor / cable
f	Hardware for Earthing Arrangement	GI Bolts, nuts, spring washers at motor end for earthing shall be provided
55	External nuts, bolts & hardware	Cadmium plated

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	18

56	Lifting facility	Required with eyebolts, lugs to facilitate safe lifting operation
57	Final paint shade	-
a	Type	Epoxy
b	Shade	Shade 631 of IS 5 for indoor & Shade 632 of IS 5 for outdoor Application
c	Minimum Thickness	100 Microns
58	Name Plate Details	As per IS / IEC Standards
59	Provision of additional name plate for Motor Tag No.	Required
60	Time Constants (for motors with rating of 55kW & above)	
a	Heating Time Constant	
b	Cooling Time Constant	
c	Starting Time Constant	
d	Overload capability	60 % for 15 minutes
e	Over speed capability	120 % for 2 minutes.

Motor Details

Sr. No	Application	KW Rating	RPM/Pole	Type of Starter	Qty	Note
1	Boiler Feed Water Pump	150	3000/2	VFD + Star-Delta	2	
2	ID Fan	200	750/8	VFD + Star-Delta	1	
3	FD Fan	75	1500/4	VFD + Star-Delta	1	
4	SA Fan	110	1500/4	Star-Delta	1	
5	PS Fan	30	1500/4	Star-Delta	1	
6	Feed Water Transfer Pump	18.5	3000/2	DOL	2	
7	Bagasse drum Extractors Feeder	7.5	1500/4	VFD	3	
8	Bagasse Screw Feeders	5.5	1500/4	DOL	3	

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	19

MOTOR CABLE SIZE DETAILS

Sr.No	Rating (KW)	Cable runs, Cable Core, Cable size	Cable OD in mm
1	150	2R-3C x 120 Sq.mm, Aluminum Arm.	38.4
2	200	2R-3C x 150 Sq.mm, Aluminum Arm.	42.0
3	75	2R-3C x 70 Sq.mm, Aluminum Arm.	31.1
4	110	2R-3C x 95 Sq.mm, Aluminum Arm.	33.5
5	30	1R-3C x 16 Sq.mm, Aluminum Arm.	19.7
6	18.5	1R-3C x 16 Sq.mm, Aluminum Arm.	19.7
7	7.5	1R-3C x 2.5 Sq.mm,Copper Arm.	14.5
8	5.5	1R-3C x 2.5 Sq.mm,Copper Arm.	14.5

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	20

6.2. TECHNICAL DATA SHEET

To complete the proposal, the bidder must completely fill up the below mentioned entire Technical Particulars schedule & other lists and the same shall be properly signed by authorised representatives of the bidder as verification of the data submitted.

Sr.	Parameter	Unit	Value
	Motor Tag No.		
A	General Data		
1	Manufacturer		
2	Service & Application		
3	Reference standard		
4	Degree of protection for enclosure	IP	
5	Type of motor		
6	Duty cycle and designation		
7	Rated voltage and variation range	V, %	
8	Rated frequency and variation range	Hz	
9	Method of starting		
10	Winding Connection		
11	Class of insulation / Temp. rise		
12	Temp. rise above ambient		
13	Painting		
a.	Type		
b.	Paint shade		
c.	Paint Thickness		
13	Motor Terminal Box		
a.	Type		
b.	Fault withstand current and time		
12	Impulse withstand	kV	
13	Power frequency withstand	kV	

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	21

B			
Sr.	Parameter	Rating, kW (Data to be filled up for each motor)	
		Unit	Value
1	Quantity, Nos.		
2	Type of drive Belt / Direct coupled		
3	Rated Speed. RPM		
4	Rated continuous output at 50 Deg. C		
5	Full load current, A		
6	No load current, A		
7	Frame Size		
8	Stator winding		
a.	Connection		
b.	Resistance per phase		
c.	Resistance between terminal		
9	Rated power factor		
a.	At no load		
b.	At 100 % load		
c.	At 75 % load		
d.	At 50 % load		
10	Efficiency at rated voltage and frequency		
a.	100 % load		
b.	75 % load		
c.	50 % load		
d.	25 % load		
11	Method of starting		
12	Starting current		
a.	Starting current at rated voltage, %		
b.	At 80 % of rated voltage, %		

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	22

13	Starting torque, %		
14	Time to attain full speed		
a.	With load		
b.	Without load		
15	Locked rotor withstand time		
a.	From cold		
b.	From hot		
16	Method of cooling		
17	No. of consecutive hot starts		
18	Slip		
a.	At 100 % load		
b.	At 75 % load		
19	For VFD driven motors		
20	Max. Allowable % THD for voltage		
21	Bearing		
a.	Type – DE		
b.	Type – NDE		
22	Recommended Lubricant		
23	Space heaters		
a.	Voltage		
b.	Power		
24	Type of RTDs		
25	Details of Thermistors		
a.	Type of Thermistors		
b.	No. of Thermistors per phase		
26	No. of earthing pads provided & suitable for earthing conductor size		
a.	On motor body	-	
b.	On main terminal box		

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	23

c.	On space heater TB		
d.	On RTD TB		
e.	On Thermistors TB		
27	Type of mounting		
28	Overall dimensions		
a.	Length		
b.	Breadth		
c.	Height		
29	Weight		
a.	Stator		
b.	Rotor		
c.	Total		
30	Moment of inertia		
31	Dynamic load on foundation		
32	Noise level at 1.5 m		
33	Vibration		
a.	Shaft		
b.	Body		

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	24

7.ANNEXURES

6.3. ANNEXURE 1 – PROJECT INFORMATION

(This sheet would be made by the concerned EPM, once per project. It shall be inserted here without editing.)

Sr. No	Parameter	Unit	Value
1	Ambient Temperature		
	Electrical equipment design	°C	50.0
	Performance design	°C	50.0
2	Site elevation above mean sea level	m	105
3	Normal Rainfall		
4	Seismic Zone		As per IS 1893
5	Wind	m/s	As per IS 875
6	Environment		Non Corrosive
7	Area Classification Hazardous		Safe and Non-Hazardous
8	Relative Humidity (Performance)	%	60
9	Electrical Data		
	LT Voltage Level	V	415± 10%
	Control Voltage	V	240± 10%
	Frequency	Hz	50± 5%
	Combined variation of volt. & frequency	%	±10%

Note : Refer attached torque –speed curves, data sheet of Pump/Fan

Project	Document Title	Doc. No.	Rev.	Sheet
M/s. Harinagar Sugar Mills Ltd., Bihar	Technical Specification for LV Motors	PB615MTR00	0	25

Vendor's name :

Equipment / system :

The following are the deviations from this specification.

Re	Description in Specification	Deviation	Reasons for deviation

Certified that the deviations mentioned above are the only deviations to this specification.

Signature :

Date : (Name) :

Place Designation