MATERIALS MANAGEMENT :: FOSSIL BOILERS
(SUB – DELIVERY)

REF: AGM/MM-SD/FB
Date: 25 September, 2010

SUB: Requirement of Sump Pump and Motor Assembly - regarding.

Bharat Heavy Electricals Limited, Tiruchirappalli, Tamilnadu, India requires additional Vendors / Sources for the supply of Sump Pump and Motor Assemblies for Power Plant applications as per the specifications attached (Specifications umbers: TOS:2001 for Sump Pump and TCI:141/NTPC/00 for Flame Proof LT Motors).

Interested Vendors having experience may contact the following BHEL Senior Executives:

Dy. GENERAL MANAGER/PURCHASE (Sub-delivery)
Materials Management
4th Floor / 24 Building
Bharat Heavy Electricals Limited
Tiruchirappalli – 620 014 Phone No: (0431) 257 7074
Tamilnadu, India e-mail: mkraj@bheltry.co.in

SENIOR MANAGER / SUPPLIER DEVELOPMENT CELL
Materials Management
4th Floor / 24 Building
Bharat Heavy Electricals Limited
Tiruchirappalli – 620 014 Phone No: (0431) 257 7448
Tamilnadu, India e-mail: rmkrish@bheltry.co.in

M. MURUGIAH
AGM/MM-SD/FB

(3)

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI 620 014.

CONTROLS AND INSTRUMENTATION / FB

SPECIFICATION FOR LT MOTOR (FLAME PROOF)

SPECIFICATION NUMBER-TCI : 141 / NTPC/ REV 00

NATIONAL THERMAL POWER CORPORATION LIMITED

CUSTOMER No.

Rev. No.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00		Initial Release			

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
1.0	SITE CONDITIONS		
1.1	Altitude above mean sea level	m.	
1.2	Ambient temperature condition	°C.	
1.3	Relative humidity	%	
1.4	Atmosphere	Tropical , Dusty, salty, corrosive & highly polluted.	
2.0	GENERAL	Squirrel cage induction motor suitable for direct-on-line starting through any type of breaker. Max. continuous rating (MCR) shall have at least 10% margin over max. load demand including voltage and frequency variations, temperature rise and other variations unless otherwise specified in the mechanical sub-divisions.	
2.1	Reference standards	IS 325, IEC34, IS 1231, IS 4722, IS 6362, IS 2253, IS 12065, IS 12075, IS4691, IS:2148 (IIA & IIB)	
2.2	Application	As per Enquiry / PO	
2.3	Duty cycle	Continuous S1	
2.4	Rated voltage, frequency & Phases	415 V AC ± 10%; 50 Hz ± 5%; 10% absolute sum - 3 phase	
2.5	Minimum starting voltage	80% of the rated voltage	
2.6	Minimum voltage under which motor will run satisfactorily	75% of the rated voltage for 5 minutes	
2.7	Capacity to restart (at voltage specified in point No. 2.4)	Two successive hot starts from hot condition	
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 directions	
2.11	Direction of rotation indication	Arrow block on the non-driving end	
2.12	Direction of cooling air	Non-drive end to driving end	
2.13	Class of insulation	Class B or class F with temperature rise limited to Class B	
2.14	Winding treatment	The insulation shall be given tropical and fungicidal treatment for successful operation of the	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
		motor in hot humid & tropical climate. Windings shall be non-hygroscopic, oil resistant and flame resistant.	
2.15	Allowed temperature rise at continuous full load	60°C by thermometer method & 70°C by resistance method	
2.16	Starting current	Less than or equal to 600% full load current, subject to tolerance as per IS.	
2.17	Torque requirements :		
	i) Accelerating torque	Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor full load torque.	
	ii) Pull out torque	Pull out torque at rated voltage shall not be less than 205% of full load torque.	
2.18	Vibration	The peak amplitude of vibration shall be as per IS 12075	
2.19	Noise level	Within the limits specified by IS 12065.	
2.20	Type of enclosure	TEFC, IP 55 as per IS 4691, flame proof as per IS:2148	
2.21	Type of mounting	Horizontal foot mounted	
2.22	Bearings & Lubrication	Bearings shall be of ball or roller type effectively sealed against ingress of dust. The bearing shall be so constructed that the loss of lubricating grease is kept to minimum.	
2.23	Shaft extension	Motors shall be provided with key slotted bare shaft extension with key at the driving end.	
2.24	Terminal box		
2.24.1	Type	Weather proof IP 55 as per IS 4691, flame proof as IS:2148, capable of being turned through 360° in steps of 90°.	
2.24.2	Cable gland & lugs	Double compression type flame proof glands. Gland sizes will be informed to successful vendor. Tinned copper lugs suitable for the cable size.	
2.24.3	Cable entry	Suitable for both top & bottom entry	
2.24.4	Type of terminals	Stud type with plain washers, spring washers / check nuts & lugs	
2.25	Fault level	45 kA at 415 V for 1 second.	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
2.26	Painting	Epoxy based paint (Shade Blue as per RAL 5012)	
2.27	Space heaters		
2.27.1	Motors above 30 KW	Separate space heater suitable for 240V, single phase AC	
2.27.2	Motors below 30 KW	Winding shall be suitable for heating continuously at 24 V, single phase, AC.	
2.27.3	Terminals	Separately terminated with clear identification in main terminal box. Separated TBs for space heaters and RTDs shall be provided.	
2.27.4	Earthing	Motor body shall have two earthing points on opposite sides.	
2.28	Lifting Device	Eye bolt or lugs to facilitate safe lifting	
2.29	The spacing between gland plate & centre of terminal stud shall be as follows: -		
	13kW → 24 kW	167 mm	
	24kW → 37kW	196 mm	
	37kW → 55kW	249mm	
	55kW → 90 kW	277mm	
	90 kW → 125kW	331mm	
	125kW → 200 kW	403 mm	
3.0	QUALITY ASSURANCE, INSPECTION & TESTING	**i) For motors upto 20kW**. - TCs for routine and Type test have to be submitted as per IS 325 for review & acceptance by BHEL. **ii) For motors greater than 20kW and less than 50kW**. – Inspection by BHEL as per IS 325. Vendor shall give inspection call along with routine & type test certificates. iii) For motors rated 50kW and above. – Refer Annexure – I enclosed.	
4.0	Type test requirement	Type test reports for the tests as per IS & IEC shall be submitted for motors above 50kW for NTPC/Engg. approval. The type test reports shall not be earlier than 5 years from the date of enqiry.	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
5.0	DOCUMENTS		
	a) Along with offer:	i) Pointwise confirmation to the specifications. ii) 3 sets of technical data sheet as per the enclosed format. iii) Motor GA drawing giving foundation and shaft details.	
	b) After placement of order	6 sets of the following: 1. Final technical Data sheet as per the enclosed format 2. Motor general arrangement drawing giving foundation details, shaft details 3. Motor characteristic curves 4. Guarantee certificate 5. O & M manuals.	
6.0	PACKING	Shall be as per Packing Procedure QA:CI:STD:PR:03/01 or as per Manufacturer's Standard Practice. The packing shall meet the Transport, environment and Storage hazards.	
7.0	Starting time a) For motor 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 seconds more than starting time. b) For motor with starting time more than 20 seconds but not exceeding 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 seconds more than the starting time c) For motor with starting time more than 45s at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be 10% more than the starting time d) Speed switches mounted on the motor shaft shall be provided in unavoidable cases where the above requirement is not met.		
8.0	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.		

Data-sheet

CL. NO	CHARACTERISTICS	REQUIREMENT
1)	Customer/ Owners name	National Thermal Power Corporation Ltd.
2)	Application	
2.1)	Tag number	
3)	Manufacturer	
4)	Applicable standards	
5)	Type and Frame size and degree of protection	
6)	Rated output in KW & rated speed	
7)	Permissible variation of i. Voltage ii. Frequency iii. Combined voltage & frequency	 ± 10% ± 5% 10% (absolute sum)
8)	Minimum starting voltage	
9)	At rated voltage and frequency i) Full load current ii) No load current	
10)	Full load Efficiency and power factor at i. 100% load ii. 75% load iii. 50% load	
11)	Duty Cycle	S1, Continuous
12)	Starting current at i. 100% of voltage (% of FLC) ii. Min.starting voltage (% of FLC)	 600%
13)	Rated Torque	
13.1)	Minimum accelerating torque (% of FLT)	
13.2)	Starting torque in % of full load torque	
13.3)	Pull up torque % of full load torque	
13.4)	Pull out torque in % of full load torque	
14)	No load starting time	
14.1)	Locked rotor withstand time at rated voltage	a. Hot b. Cold
14.2)	Locked rotor withstand time at minimum starting voltage	a. Hot b. Cold

CL. NO	CHARACTERISTICS	REQUIREMENT
14.3)	Locked rotor withstand time at 110% rated voltage	a. Hot b. Cold
14.4)	Starting time with mechanism coupled (in seconds) i. 110% of rated voltage ii. 100% of rated voltage iii. min.starting voltage (80%)	
15)	Locked rotor KVA input	
15.1)	Locked rotor KVA / rated kW	
16)	Starting time at rated voltage with mechanism coupled	
17)	Maximum permissible starting time	
18)	Stator thermal time constant	
19)	Stator winding connection	
20)	Class of insulation & temperature rise	
20.1)	Temperature rise over ambient of 50°C by Resistance method	
21)	Resistance per phase (at 20°C)	
22)	Type & number of terminals brought out	
23)	Quantity and power consumption of space heater	
24)	Direction of rotation	
25)	Bearing make & type	a) Drive End; b) Non Drive End;
26)	Lubricant quantity, grade & recommended interval of lubrication	
27)	Type of mounting & shaft orientation	
28)	Terminal Box	
28.1)	Location & angle of rotation	
28.2)	Gland size for stator winding	
28.3)	Gland size for space heater	
28.4)	Cable entry	
29)	GD^2 of motor ($kg\text{-}m^2$)	

CL. NO	CHARACTERISTICS	REQUIREMENT
30)	Total weight of motor (in kg)	
31)	Anticipated bearing life	
32)	Method of connection to driven equipment	
33)	Limiting rotor temperature for determining safe stall time.	
34)	Noise level Vibration at load i. Velocity ii. Displacement	
35)	Paint/shade	Blue as per RAL 5012
36)	GA Drawing, Main and auxiliary terminal box drawings to be enclosed. Curves to be submitted (at 100%, 80% and 110% of rated voltage) i. Torque vs. Speed ii. Current vs. Speed iii. Speed vs. time iv. Current vs. time v. Efficiency and PF vs. load vi. Thermal withstand characteristic	

ANNEXURE-1

1.0 QUALITY ASSURANCE REQUIREMENTS.

1.1) THE VENDOR SHALL SUBMIT VENDOR QUALITY PLAN (VQP) AND THE VQP SHALL BE AS PER THE 'NTPC FORMAT' -COPY IS ENCLOSED.

1.2) VQP SHALL BE DULY SIGNED BY THE VENDOR WITH ALL DOCUMENT CONTROLS REQUIREMENTS LIKE QP NO:, REV. NO., PAGE CONTROL etc.,. ALL COLUMNS SHALL BE DULY FILLED INCLUDING NAME OF PROJECT, PACKAGE No: etc., AS INDICATED HERE.

PROJECT :
PACKAGE :
PACKAGE No :
CONTRACTOR: BHEL –TRICHY..

1.3) THE VQP SHALL INDICATE ALL QUALITY CHECKS PERFORMED FROM RAW MATERIAL, BOUGHT OUT ITEMS, MANUFACTURING, ASSEMBLY, FINAL ASSEMBLY, INSPECTION AND TESTING STAGE AND SHALL LIST DOWN ALL ROUTINE & TYPE TEST AS PER RELEVANT NATIONAL/ INTERNATIONAL STANDARDS. THIS SHALL ALSO INDICATE PRETREATMENT, PAINTING. REFERENCE SHALL BE DRAWN FROM NTPC DOCUMENT PAGE 18/63 & 19/63 OF SUB-SECTION-VII/PART-B/SECTION-VI, (COPY IS ENCLOSED)

1.4) TWO COPIES OF THE DOCUMENTS INDICATED UNDER REFERENCE DOCUMENTS COLUMN OF VQP (OTHER THAN IS / BS STANDARDS) SHALL BE SUBMITTED ALONG WITH VQP FOR REVIEW. THIS SHALL INCLUDE VARIOUS PROCEDURES ALSO.

1.5) FIVE COPIES OF SUCH VQP SHALL BE SUBMITTED FOR GETTING NTPC APPROVAL.

1.6) REFERENCE DOCUMENTS COLUMN:

THIS SHALL INCLUDE PURCHASE ORDER, APPROVED SPECIFICATION, DRAWINGS, DATA SHEETS AND NATIONAL/ INTERNATIONAL/ PLANT STANDARDS.

1.7) VQP SHALL INCLUDE PACKING REQUIREMENTS.

1.8) MANUFACTURING CAN START ONLY AFTER VQP IS APPROVED BY NTPC.

1.9.0) INSPECTION REQUIREMENTS.

1.9.1) WHEREVER 'CHP' (CUSTOMER HOLD POINT) IN THE APPROVED VQP, VENDOR SHALL OFFER THE MATERIAL FOR INSPECTION BY NTPC AND WHEREVER 'W' IS INDICATED IN THE APPROVED VQP, VENDOR SHALL OFFER THE MATERIAL FOR INSPECTION BY BHEL AND / OR NTPC.

1.9.2) WHEREVER **'C H P'** IS INDICATED AGAINST STAGE, FURTHER MANUFACTURING CAN START ONLY AFTER ' C H P ' STAGE IS CLEARED BY NTPC.

1.9.3) VENDOR SHALL GIVE 21 DAYS NOTICE FOR ARRANGING INSPECTION BY BHEL/ NTPC.

1.9.4) WHEREVER ' **C H P** ' IS INDICATED AGAINST VERIFICATION OF ' TYPE TEST CLEARANCE FROM ENGG' VENDOR SHALL ENSURE THE SAME PRIOR TO INSPECTION AND SUBMIT THE SAME DURING INSPECTION.

1.9.5) MATERIAL CAN BE DESPATCHED ONLY AFTER OBTAINING **M.D.C.C** (MATERIAL DESPATCH CLEARANCE CERTIFICATE) FROM NTPC. NO MATERIAL SHALL BE DESPATCHED WITHOUT MDCC.

1.9.6) VENDOR SHALL SUBMIT COPY OF ALL TEST CERTIFICATES/ DOCUMENTS AS INDICATED IN THE APPROVED VQP ALONG WITH INSPECTION CALL.

1.9.7) TESTING CHARGES FOR ROUTINE TESTS, IF ANY, SHALL BE INCLUDED IN THE PRODUCT COST AND NO SEPARATE TESTING CHARGES FOR THIS WILL BE CONSIDERED. SIMILARLY THE

1.9.8) TESTING CHARGES FOR TYPE TESTS ALSO, IF REQUIRED, (ONLY IF THE TYPE TEST REPORTS ARE NOT AVAILABLE) SHALL BE INCLUDED IN THE PRODUCT COST.

Bharat Heavy Electricals Limited
Tiruchirappalli-620 014

Fuel Systems/PE(FB)

Title Sheet

Specification for

Effluent Sump Pump And Motor Assy

Specification Number: TOS:2001 **Revision No. : 00**

Rev. No.	**Date**	**Revision statement**	**Checked & Approved**

	Name	Signature	Date
Prepared	S.Selvaraju	-sd-	13.01.2009
Checked	S.Selvaraju	-sd-	13.01.2009
Approved	M.Thandapani	-sd-	13.01.2009

1. Intent:

To design, manufacture, test and supply of the Vertical submerged pump with motor.

2. Scope:

The complete Sump pump with drive and required accessories as per the specification furnished below.

3. Functional and technical conditions:

The pump shall be designed to handle the HFO/LSHS/HPS and work in the environment as furnished.

Performance as per VDMA standard.

3.1	Fluid handled	:	Fuel oil / Sludge
3.2	Pumping Temperature	:	50-80Deg. C
3.3	Sp.gravity	:	0.925/1.05
3.4	Capacity	:	10 Cum/Hr.
3.5	Head (Diff) @ duty Point	:	50MLC(Minimum)
3.6	R.P.M	:	1450 Clockwise (As seen from motor end)
3.7	Minimum Submergence	:	Vendor to State
3.8	Ht. below Discharge Flange	:	3000mm(Approximately)

4. Constructional features and special requirements:

The pump shall be Vertical mounted, steel body

Delivery Flange shall be drilled as per ANSI B 16.5 Class 150 lbs.

Drive motor and base frame are by the vendor and shall be as per the specification enclosed for L.T. motor.

Materials:

4.1	Pump Casing	:	C.I , 2-3% Ni with Min 180 BHN Hardness
4.2	Pump Impeller	:	C.I , 2-3% Ni with Min 180 BHN Hardness
4.3	Pump Shaft	:	EN 8
4.4	Bearing	:	Vendor to State
4.5	Fasteners in Liquid	:	M.S. Galvanised

5. Marking:
Stainless steel nameplates with the following boldly engraved shall be firmly fixed to the body; Maker's name & production serial number, Full pump designation: Flow, Viscosity, Minimum allowable suction pressure, discharge pressure.
Each spare shall be individually tagged with part name, maker's name & spare code and BHEL material code.

6. Painting:
At interior surfaces supplied with rust preventive oil following hydraulic test & drying. At exposed surfaces degreased, derusted & epoxy coated over red oxide primer.

7. Packing:
All openings shall be firmly capped against ingress of water or dust.
Shall be seaworthy packed in wooden boxes with waterproof under cover.
Liberal packing material & struts shall be used to arrest rolling to protect from transmit damages.

8. Inward inspection:
Verify the works test certificate, marking particulars, nameplates of each accessory and the scope of supply. Watch for damages.Perform random check on all mounting dimensions, terminal connections and coupling details.

9. Applicable drawings:
GA Drg. With Overall Dimensions
Sectional Drg. With BOM

10. Inspection & testing:
Dimensional checks as per the approved drawing.
Performance test on each pump on standard oil over the entire operating range, with curves extrapolated for this specific application.
Body hydraulic tested for at 1.5 times body rating.
All tests envisaged shall be as per the approved Quality Plan.

11. Information to be furnished:

Foundation details, cross sectional drawing and the pump designation with description of designation.
Performance data sheet of the Pump/Filled in data sheet
Flow Vs Power,
Flow Vs Head,
Flow Vs Efficiency in %age
Calculation for
Pump Capacity, Power rating in Kw(motor),Hydraulic length, velocity & total pressure drop in MLC
O&M manuals in editable electronic form in floppy discs.
Spares quotation for 3 years operation with description, Part No. etc.

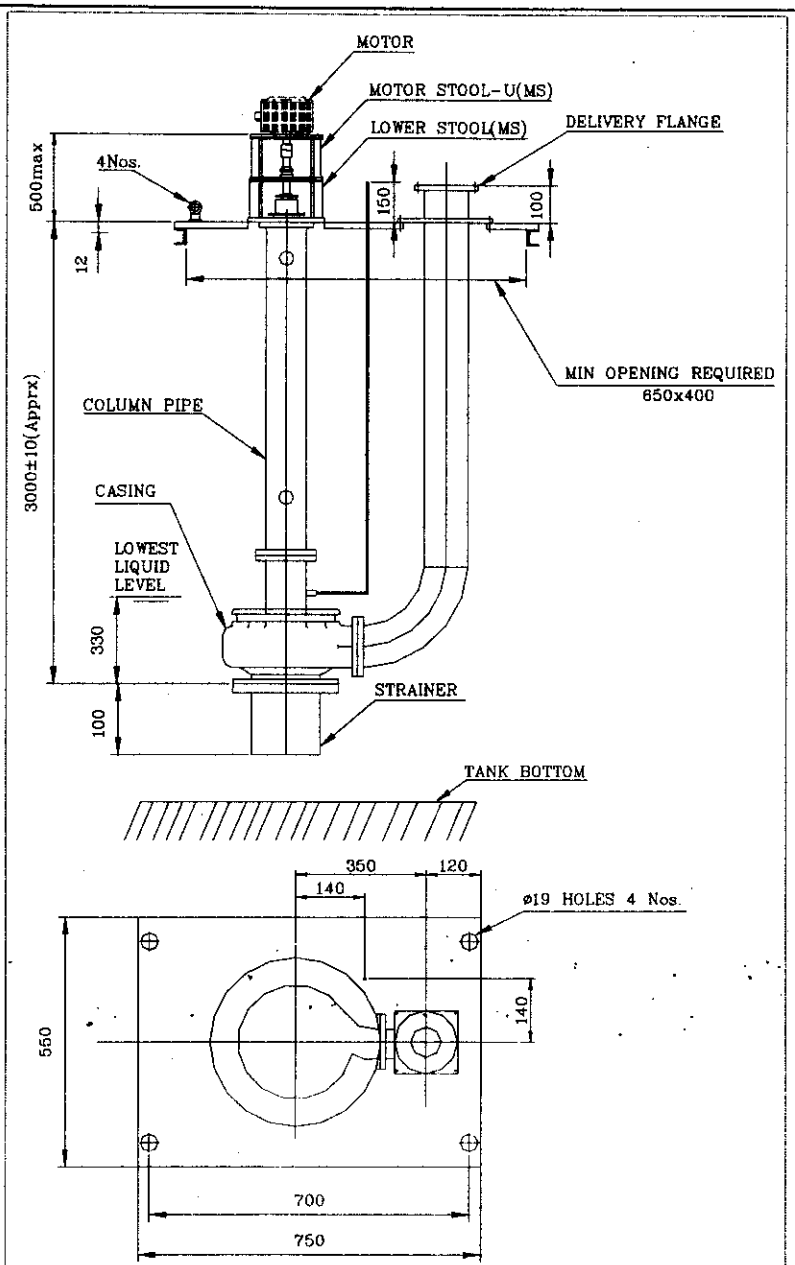
Effluent Sump Pump And Motor Assy.
Data Sheet

BHEL MATERIAL CODES:
ENQUIRY No.:

Sl. No.	Characteristics	Requirement	Supplier's Compliance
1.0	**Liquid Data**		
1.1	Liquid	Fuel Oil / Sludge	
1.2	Specific gravity	0.925/1.05	
1.3	Liquid Ambient temp.	50 Deg.C	
2.0	**Pump Data**		
2.1	Pump Type	Vertical Submerged	
2.2	Make & Model No.		
2.3	Quantity	Two Nos / Contract	
2.4	Height Below Discharge Flange	3000mm(Approximately)	
2.5	Flow	10Cum./Hr.	
2.6	Differential Head @ duty point	50MLC	
2.7	Minimum Safe Flow	Vendor to State	
2.8	Minimum Submergence	Vendor to State	
2.9	Delivery Flange Drilling Std	ANSI B 16.5 Class 150	
2.10	Pump Efficiency	Vendor to State	

Sl. No.	Characteristics	Requirement	Supplier's Compliance
2.11	Power BKw @ duty point	Vendor to Furnish	
2.12	Recommended Motor rating	Vendor to Furnish	
2.13	Motor Speed	1450rpm	
2.14	Impeller type	Closed	
2.15	Shaft Sealing	Gland Packing	
2.16	Motor Coupling	Rubber Spider	
3.0	**Material of Construction**		
3.1	Casing	CI +Ni 2-3% with Min. 180BHN	
3.2	Casing Wear Ring	CI +Ni 2-3% with Min. 180BHN	
3.3	Impeller (Closed)	CI +Ni 2-3% with Min. 180BHN	
3.4	Impeller (Wear Ring)	CI +Ni 2-3% with Min. 180BHN	
3.5	Shaft	En8	
3.6	Imp.Sleeve	AISI-410	
3.7	Int.Sleeve	AISI-410	

Sl. No.	Characteristics	Requirement	Supplier's Compliance
3.8	G.B.Bush	CA-15 Hardened	
3.9	Head Sleeve	AISI-410	
3.10	Column Pipe-L	M.S.ERW CL-C Galvanised	
3.11	Del.Pipe (DP)	M.S.ERW CL-C Galvanised	
3.12	Discharge Elbow	M.S.ERW CL-C Galvanised	
3.13	Rect.Sup.Plate (RSP)	Mild Steel	
3.14	Rsp Mounting Bolts	M.S.Galvanised	
3.15	SB Gland Packing	Vendor to Furnish	
3.16	Bearing	Vendor to Furnish	
3.17	Fasteners in Liquid	M.S.Galvanised	
4.0	**Accessories**		
4.1	Flexible Coupling	Cast Steel	
4.2	Strainer (STR)	AISI-316	
4.3	Flange	M.S.Ganvanised	
5.0	**Testing and Inspection**	**As per approved QP**	
6.0	**Motor Data**	**As per TDC:TCI:141: Rev. :08 (6 Sheets)**	



NOTE:

DIMENSIONS SHOWN ARE SUGGESTIVE ONLY. VARIATIONS IN DIMENSIONS ARE ACCEPTABLE SUBJECT TO APPROVAL .