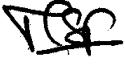
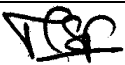


TD-106-1 Rev No. 5	Form No.		PRODUCT STANDARD BHEL, HYDERABAD –32. PROJECT ENGINEERING & SYSTEMS DIVISION		PY 51134 Rev No. 11 Page 1 of 3	
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Ref. Doc	Revisions :11 Refer to record of revisions :	Prepared : -sd- RAJEEV	Approved : -sd- SIVA PRASAD	Date : 22.06.17		

TD-106-2 Rev No. 5	Form No.	 HYDERABAD	PRODUCT STANDARD BHEL, HYDERABAD –32. PROJECT ENGINEERING – MECHANICAL		PY 51134																																			
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For details please refer to Specification DOC. No. PY-AS-4-M096-8714-01 & annexures. <u>VARIANT TABLE</u> <table border="1"> <thead> <tr> <th>Variant No.</th> <th>Item</th> <th>Material code</th> <th>Job Specification</th> <th>Project</th> </tr> </thead> <tbody> <tr> <td>28</td> <td>Reciprocating compressors-Main Supply</td> <td>PY9751134285</td> <td>PEMC-6924</td> <td>ONGC Hazira</td> </tr> <tr> <td>29</td> <td>Reciprocating compressors-Supervision of E&C</td> <td>PY9751134293</td> <td>PEMC-6924</td> <td>ONGC Hazira</td> </tr> <tr> <td>30</td> <td>Reciprocating compressors-Spare Supply</td> <td>PY9751134307</td> <td>PEMC-6924</td> <td>ONGC Hazira</td> </tr> <tr> <td>31</td> <td>Supervision of Reciprocating compressors</td> <td>PY9851134317</td> <td>PEMC-5291</td> <td>RINL</td> </tr> <tr> <td>32</td> <td>Air Blower for SBR</td> <td>PY9751134315</td> <td>PY-AS-4-M096-8714-01</td> <td>STP Project</td> </tr> <tr> <td>33</td> <td>Air Blower for Sludge Sump</td> <td>PY9751134323</td> <td>PY-AS-4-M096-8714-01</td> <td>STP Project</td> </tr> </tbody> </table>						Variant No.	Item	Material code	Job Specification	Project	28	Reciprocating compressors-Main Supply	PY9751134285	PEMC-6924	ONGC Hazira	29	Reciprocating compressors-Supervision of E&C	PY9751134293	PEMC-6924	ONGC Hazira	30	Reciprocating compressors-Spare Supply	PY9751134307	PEMC-6924	ONGC Hazira	31	Supervision of Reciprocating compressors	PY9851134317	PEMC-5291	RINL	32	Air Blower for SBR	PY9751134315	PY-AS-4-M096-8714-01	STP Project	33	Air Blower for Sludge Sump	PY9751134323	PY-AS-4-M096-8714-01	STP Project
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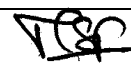
TD-106-3 Rev No. 5 Form No.	 HYDERABAD	PRODUCT STANDARD BHEL, HYDERABAD –32. PROJECT ENGINEERING – MECHANICAL			PY 51134
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RECORD OF REVISIONS					
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	00	14.11.14	FRESH ISSUE	-sd-	-sd-
	01	07.03.15	Variant 14 to 16 added	-sd-	-sd-
	02	19.05.15	Variant 17 added	-sd-	-sd-
	03	29.08.15	Variant 18 & 20 added	-sd-	-sd-
	04	03.09.15	Variant 21 & 22 added	-sd-	-sd-
	05	04.09.15	Variant 23 & 24 added	-sd-	-sd-
	06	21.09.15	Variant 25 added	-sd-	-sd-
	07	24.12.15	Variant 26 added		
	08	18.01.16	Variant 27 added		
	09	04.08.16	Variant 28 to 30 added	-SD-	-SD-
	10	12.06.17	Variant 31 added	-SD-	-SD-
	11	22.06.17	Variant 32 and 33 added	-SD-	-SD-
Ref. Doc.					

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TECHNICAL SPECIFICATION FOR AIR BLOWER

PROJECT	4.5 MLD STP,BHEL-BHOPAL
CUSTOMER	BHEL-BHOPAL

		Prepared by :	Checked by :	Approved by :	Date :
Revisions:00					
Refer to record of revisions		RAJEEV JAIN	GIRISH	M.S.P.B	22.06.17

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DOCUMENTS TO BE SUBMITTED WITH THE BID:

The bidder must submit the following documents along with their bid for each Air Blower, so as to enable BHEL to evaluate their offer.

- a) Duly filled in Air Blower-Motor datasheet
- b) Tentative GAD for Air Blower with Motor
- c) Performance curves for Air Blower with Motor
- d) Un-priced copy of price in attached BHEL price bid formats indicating quoted/ not quoted against each row & column.
- e) Equipment qualification criteria / PTR / Reference Lists
- f) Checklist as per annexure-4
- g) Deviation list [if any] as per annexure-8

In case the above mentioned documents are not submitted with the offer, the offer of the bidder may be liable for technical rejection.



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1.0.0 INTENT OF SPECIFICATION:

This specification specifies the requirement of Design, Engineering, Manufacturing, Assembling, Inspection, testing at manufacturer's works and Delivery of properly packed and painted for transport of Air Blower with drives and all accessories as specified in the scope of work and as required for the safe and trouble-free operation of equipment to be installed at site.

2.0.0 SPECIAL NOTES TO BIDDERS:

2.0.1 This specification shall be read in conjunction with its enclosures. In case of any discrepancy arising between this specification & its enclosures, the most stringent of all shall be followed and shall over-ride others. Further, if a requirement in this specification or its enclosures, calls for decision of BHEL, it shall be bidder's sole responsibility to clearly bring out the same distinctively in his technical tender offer, so as to enable BHEL to furnish their decision. If such a requirement is not duly addressed by bidder during tender stage and same comes out during order execution stage, it shall be binding on the bidder to comply with the decision furnished by BHEL then, without any cost, delivery, or any other commercial implications.

- a) Bidders shall comply with various requirements of this specification. Bidders can bring out only those deviations which are impractical to meet, for our review.
- b) Bidders may please note that unless the deviations are specifically brought out under deviations clause, it will be considered that no deviations are taken, even if they are mentioned elsewhere directly/indirectly in the offer.

2.0.2 Any additional equipment, material, etc., which are not specifically mentioned here, but are required to make the supplied equipment complete in all respect, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope of this specification.

2.0.3 The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipment. These shall be executed on the basis of proven design principle and in accordance with the latest state of the art in such a manner that the purpose to be served by the Pump unit is fulfilled in every respect and a maximum of operational dependability and efficiency are assured. Standardization of equipment, materials etc. shall be employed in the design. Care shall be taken to ensure safe operation as well as simplicity of assembling and dismantling of all parts of the plant.

2.0.4 Bidder shall quote strictly as per the scope of supply and requirements of this specification.

2.0.5 Bidder offer shall be strictly as per these specification requirements. Unsolicited or Alternate offers from the bidders will not be entertained.

2.0.6 In case bidder feels that it is necessary to exclude some components of scope of supply or some of the features of specification requirements due to any technical constraints, bidder shall bring the same to the notice of purchaser during pre-bid stage and take their prior approval before submission of their bid.

2.0.7 In case Bidder is unable to offer due to any specific requirement of specification. Bidder shall bring out the same in their regret letter. Otherwise it will be considered that non participation by the bidder is attributable to reasons other than any specification requirements.

3.0.0 APPLICATION OF SYSTEM:

3 Nos. [2W+1S] of Air Blower is envisaged to provide air into SBR-1&2 to prevent sludge to become anaerobic in Sequential batch reactor 1&2.

2 Nos. [1W+1S] of Air Blower is envisaged to provide air into sludge sump to prevent sludge to become anaerobic in Sludge Sump.

**4.0.0 TECHNICAL DETAILS/REQUIREMENTS:****4.1.0 Design Parameters and Technical Requirement of the Air Blower for SBR-1&2:**

Sl. No.	Description	Rated Condition
1	No. of Blowers	3 Nos. (2W+1S)
2	Type	Twin Lobe Type positive Displacement
3	Drive	Motor(Through V Belt)
4	Capacity	800 m ³ /hr
5	Discharge Pressure	0.65 Kgf/cm ² (g)
6	Application	Prevent sludge to become anaerobic in Sequential batch reactor 1&2.
7	Power Supply	3 Ph,415 V,+/- 10% Voltage Variation, 50Hz,+/- 5% Frequency variation, DOL Starting
8	Noise Level	85 dBA at 1.0 m in any direction [If the noise level of the Air Blower is higher, bidder to consider Acoustic enclosure (Individual) in order to meet noise level mentioned].
9	Material of Construction*	Casing: CI FG260as per IS 210,Lobe: CI FG260as per IS 210, Side Cover: CI FG260as per IS 210,Shaft: EN-24/817M40 Gears:EN-353/815M17(Hardened and Ground Mechanical Seal: Silicon Carbide Bearing: SKF/Equivalent. * In case bidder can't meet above mentioned material, Bidder can offer Equivalent /Superior material suitable to the requirement.

4.2.0 Design Parameters and Technical Requirement of the Air Blower for Sludge Sump:

Sl. No.	Description	Rated Condition
1	No. of Blowers	2 Nos. (1W+1S)
2	Type	Twin Lobe Type positive Displacement
3	Drive	Motor(Through V Belt)
4	Capacity	30 m ³ /hr
5	Discharge Pressure	0.35 Kgf/cm ² (g)
6	Application	Prevent sludge to become anaerobic in Sludge Sump.
7	Power Supply	3 Ph,415 V,+/- 10% Voltage Variation, 50Hz,+/- 5% Frequency variation, DOL Starting
8	Noise Level	85 dBA at 1.0 m in any direction [If the noise level of the Air Blower is higher, bidder to consider Acoustic enclosure (Individual) in order to meet noise level mentioned].
9	Material of Construction*	Casing: CI FG260as per IS 210,Lobe: CI FG260as per IS 210, Side Cover: CI FG260as per IS 210,Shaft: EN-24/817M40 Gears:EN-353/815M17(Hardened and Ground Mechanical Seal: Silicon Carbide Bearing: SKF/Equivalent. * In case bidder can't meet above mentioned material, Bidder can offer Equivalent/ Superior material suitable to the requirement.

Note:

1. SCFM: Standard Condition: 20Deg.C, 101.3 kPa; 36% relative humidity.
2. ACFM-Inlet Conditions, Considering corrections for extreme site conditions 38 Deg. C; 100 kPa; 65% relative humidity.

**5.0.0 SCOPE OF SUPPLY:**

The scope of supply for this enquiry is as given below:

Quantity of Air Blower & Drive Assembly:

- (i) 3 Nos. (2W+1S) of Air Blower for SBR-1 & 2.
- (ii) 2 Nos. (1W+1S) of Air Blower for Sludge Sump.

The scope of supply for each Air Blower & motor drive assembly is as given

5.1.0 Air Blower:

Twin Lobe positive displacement type Air Blowers complete with all accessories as per specification & required accessories for smooth running of Air Blower assembly. Performance requirement, Design and construction of the Air Blower shall be guided by the Manufacturer recommendation.

5.2.0 Motor:

Motor shall be as per IS 325/IEC60034.
Motor Efficient Class: IE3 as per IS 12615.
For Motor, Supply voltage is 3Ph, 415 V.

5.3.0 Relief Valve at outlet of Air Blower-1 No./Air Blower**5.4.0 Type of Sealing: Mechanical Seal****5.5.0 Inter connecting Piping & Instrumentation:**

- a) BHEL Discharge Pipe Size: 150 mm
Reducer/expander in order to meet BHEL discharge pipe.
- b) Flanges & Counter flanges with necessary gaskets & bolts at all terminal points. All counter flanges shall be of weld neck type.
Flanges: ASTM A234 Gr. WPB or ASTM A105 or equivalent.
Fittings: The material shall conform to ASTM A234 Gr. WPB or ASTM A105 or equivalent and dimensional standard conforming to ANSI B 16.9 (socket & threaded type), ANSI B 16.22 (for flanges and flanged fittings).
The fittings shall be galvanized as per IS: 4736 for galvanized pipe application.

5.5.0 Following Accessories to be considered for Air Blower as a minimum:

- i) Welded base frame DN ____ (as per manufacturer's recommendations);
- ii) Built in resonance silencer;
- iii) Absorption material free;
- iv) Motor hinged plate and 4 machine mounts;
- v) Combined inlet filter/silencer DN ____ (as per manufacturer's recommendations);
- vi) Vacuum dirt indicator;
- vii) Discharge silencer;
- viii) Common base;
- ix) Rubber sleeve and clamps;
- x) Full flow pressure relief valve DN ____ (as per manufacturer's recommendations);
- xi) Check valve DN ____ (as per manufacturer's recommendations) easily removable for inspection purposes without piping disassembly;
- xii) Perforated steel belt guard DN ____ (as per manufacturer's recommendations);
- xiii) Start-up automatic unloading valve;
- xiv) Discharge pressure gauge;
- xv) Dirty filter indicator;
- xvi) Flexible hose connector;
- xvii) Inlet piping connections;
- xviii) UE temperature switch;



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- xix) Pressure switch;
- xx) Acoustic Enclosure DN ____ (as per manufacturer's recommendations), c/w mechanical fan - indoor (package with Enclosures.
- xxi) skid mounted (oil drip pan) with ventilation & maintenance consideration);
- xxii) Commissioning Spare parts (as per manufacturer's recommendations).

Note: With respect to Accessories mentioned above;

A) If any of above items indicated by the specified name are not applicable, bidder to offer alternative item serving the same function as per equipment's design and indicate below the item being replaced.

B) If bidder is not able to meet the above note, then bidder may mention "Not Applicable". However, if found applicable during detailed engg. stage or alternative item as per equipment design can serve the same function, bidder to supply the specified quantity without any delivery and commercial implications to BHEL.

5.6.0 Necessary foundation bolts, nuts, shims/grouting pads etc.

5.7.0 Instrumentation: Bidder to consider required instrumentation, which are required for smooth & trouble free operation as per manufacturer recommendation.

5.8.0 All other items necessary for safe and smooth running of pump & Accessories required to make the supplied equipment complete in all respect.

5.9.0 Glands and lugs for power cable, control cable, Space heater cable and earthing cable (if any) suitable at Motor end has to be supplied along with the main equipment. Glands shall be Flame proof/weather proof (as per motor category) double compression type Nickel plated Brass (ET) shall be provided with back nut and PVC shroud. Lugs shall be tinned copper heavy duty lug Cable dimensions shall be furnished during detail engineering, accordingly glands, lugs shall be supplied.

5.10.0 Commissioning Spares:

A.1) For Air Blower for SBR-1&2:

Three sets (One set for each Air Blower & Drive assembly) of commissioning spares for Air Blower for SBR-1&2 shall be quoted and included in scope of supply as per manufacturer's recommendation.

A.2) For Air Blower for Sludge Sump:

Two sets (One set for each Air Blower & Drive assembly) of commissioning spares for Air Blower for Sludge Sump shall be quoted and included in scope of supply as per manufacturer's recommendation.

5.11.0 Mandatory Spares: Not Applicable.

5.12.0 Special Tools and Tackles:

For Air Blower for SBR-1&2/ Air Blower for Sludge Sump :

The bidder shall furnish a complete 2 sets [1 set each for Each type of Blower] of all special tools, wrenches etc. with necessary tools boxes as required for operation and maintenance [disassemble, assemble, or maintaining the unit] as a part of scope of supply. **Bidder shall furnish a list of such tools along with offer for the system.** Prices for the special tools and tackles shall be part of main scope of supply.

6.0.0 OPTIONAL PRICES: Please Refer to Attached Price Bid Format.

Bidder to furnish the following as optional prices:

- 1) 2 year recommended spares for each Blower

7.0.0 EQUIPMENT QUALIFICATION CRITERIA (EQC)

The bidder shall be an established manufacturer of Air Blower & having adequate engineering, manufacturing & testing facilities for Air Blower confirming to the relevant applicable codes and standards. The Air Blower model offered shall be from the existing regular manufacturing range of bidder.



The offered Air Blower model shall meet the minimum service & manufacturing experience specified as below:
Air Blower shall be identical or validly similar in terms of

- Type i.e. Twin Lobe Positive Displacement Type Air Blower
- Capacity/Flow Rate
- Materials etc.
- Application.

as compared to at least 10 Units of the proposed model designed, manufactured, tested and supplied from the proposed manufacturing plant in the last 7(seven) years from the date of Technical bid opening and at least Five of these units shall have successfully operated in the field for at least 8000 hours individually without any major problem as on the date of issue of enquiry in the last three years. **As a proof for the same, Date of Supply/ Commissioning report/Customer Satisfaction report will be considered and same to be provided by Bidder.**

Accordingly, Bidder to furnish reference list for the Air Blower consisting of year of supply, application, Customer Name, Quantity etc. as a minimum.

8.0.0 QUALITY PLAN & INSPECTION AGENCY & TESTING:

Quality Plan: Pls refer annexure-5 for typical quality plan.

Bidder to furnish Quality Plan to BHEL for approval after award of contract. Quality plan will be reviewed during detailed Engineering stage with respect to Inspection, standard Engineering practices & Specification Requirements and various tests and stages of inspection and appropriate agencies for Inspection will be Intimated. Bidder to abide by the same.

Inspection agency:

BHEL/Third Party appointed by BHEL. The various review/witness/observation stages by Individual agencies (or) Group of Agencies as above will be in line with approved quality plan.

Performance test: Bidder to conduct performance test as per applicable test standard as a minimum.

Material Test Report: Material test report to be furnished for BHEL review.

9.0.0 PAINTING:

As per Manufacturer standard practice. However standard quality paint to be used.

10.0.0 PACKING AND FORWARDING:

Packing Shall be as per Manufacturer standard (Domestic packing/Sea worthy packing in case of Import).

11.0.0 SUB VENDORS:

Motor:

SIEMENS INDIA LTD SECBAD.
GE T&D INDIA LIMITED
ABB INDIA LIMITED, HYD
KIRLOSKAR ELEC.CO.LTD
LAXMI HYDRAULICS PVT. LTD.
BHARAT BIJLEE LTD, MUMBAI
CROMPTON GREAVES

Signal Cable:

- a) Cord Cable, b) Udey Pyrocable, c) Special Cables & d) Thermo cables.

Cable Glands:

- a) Electromeg, b) CCI, c) Dowels, d) Metal Crafts Industries, Rajkot,

Cable Lugs:

- a) Phoneix, b) Dowells & c) Hex

LT Power Cable & Control Cable:

Polycab / apar industries / special cables / universal / RPG / KEI, Bhiwadi/ Havells / Skytone / Laser cables / Gems cab / Sbee cables / v-guard industries/ CCI / Cords/ General cable india / TBEA china / New Baofeng china / Far east china / Gupta power ltd.



Bidder shall follow approved sub vendors list. In case of any specific practical difficulty, bidder is requested to bring out the same with proper reason for not following vendor list. For other items for which sub vendors are not specified, bidder can follow their standard vendors. However, they have to ensure the Proven Track record of the sub vendors and Bidder to take prior approval of BHEL for the same.

12.0.0 DOCUMENTATION:

- a) Documentation shall be submitted by bidder during detailed engineering stage, as per the Master Document List to be mutually finalized during detailed engineering stage.

- b) No. of Copies to be furnished :

All the documents shall be submitted as given below:

S.N.	DESCRIPTION	No. of copies to be Provided	WHEN TO SUBMIT
1	Initial drawings/documents under approval and information category.	1	Within 2 weeks of placement of order
2	Revised drawings/documents incorporating BHEL's comments.	1	Within 1 week of receipt of commented Drawings from BHEL
3	Final Drawings/documents	4	Within 2 months of placement of order.
4	Erection Documentation	5	2 Months before dispatch of equipment, The list of documents identified under master document list for erection to be furnished in 5 nos. of folders.
5	Draft O & M Manuals without test certificates (if felt necessary)	1	2 months before the delivery date of equipment
6	Revised O & M Manuals with Test Certificates to be submitted to BHEL (Hyderabad)	6	Within one month after dispatch of equipment
7	Final O&M Manuals in a CD	3	Within one month after dispatch of equipment

Following drawings to be submitted for BHEL approval:

- GA drawing, Datasheet, Cross sectional drawing, Performance Curves for Pump & Motor
- GA drawing, wiring diagram of Pump Assembly

13.0.0 PRICE BID FORMAT:

Bidder to indicate his offer as per Price Bid format enclosed as Annexure-3.

All the items included in the price bid format shall be quoted as per tender specification and pre-bid clarifications as per annexure-7, if any. Responsibility of ensuring correctness & completeness of scope of supply as per specification requirement solely lies with bidder.

The equipment supplied shall be complete in all respects. The bidder shall not be eligible for any extra payment in respect of such mountings, fittings, fixtures and accessories if required for the safe and reliable operation of the equipment. Any additional equipment, material, etc., which are not specifically mentioned here, but are required to make the supplied



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equipment complete in all respect, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be in bidder scope Only.

Main offer consists of those items which will be part of main order after successful bidder is identified. Optional Items consists of those items which need to be quoted by bidder but may or may not be ordered by BHEL. Bidders are instructed to provide the pricing details listed under Main offer and Optional items as per the prescribed format. Prices quoted by the bidder shall remain firm till the successful handing over of the entire package to end customer. Any request for upward revision of price during any intermediate stage before handing over the plant to end customer will be summarily rejected by BHEL.

The Priced Bid shall be submitted in Original (without any copy) duly signed and stamped on each page in a separate sealed envelope super scribing "Price Bid –Do not Open" This shall not contain any condition whatsoever failing which the Bids shall be liable to be rejected. In case of any correction, the bidder shall put its signature and its stamp. Eraser fluid will not be allowed for making any correction.

Bidder shall confirm to the un-priced bid as part of their offer.

14.0.0 PRE-BID CLARIFICATIONS & DEVIATIONS:

14.1.0 Bidders shall comply with various requirements of this specification. It may please be noted that the requirements specified here in this specification are the standard practices being followed by the bidders. However, same things are presented in a structured form so that it can be ensured that the requirements of ultimate customer are complied with.

14.2.0 Bidders can bring out only those deviations which are impractical to meet, for our review in pre bid clarification only.

14.3.0 Bidders may also please note that the data sheets for, valves, instruments etc., submitted along with the offer will be considered as indicative only, as the requirements specified in the specification are standard in nature. These will not be reviewed by BHEL before award of contract. Same will be reviewed during order execution stage in line with the requirements of specification and agreed deviations.

14.4.0 All pre-bid clarifications & deviations shall be clear bring as per annexure- 7 & 8 Only.

14.5.0 In case bidder doesn't bring any clarification/deviation in prebid stage, the same shall be brought in their offer with following conditions:

- Any deviations to Customer specifications, same are acceptable provided these deviations are also regularly accepted by Customer for their direct orders on bidders. During detailed engineering stage if it is found that any deviation brought out by bidder is not a regular deviation accepted by Customer, the particular deviation brought out by bidder will not be considered as an acceptable deviation.
- Bidders may please note that unless the deviations are specifically brought out under deviations clause, it will be considered that no deviations are taken, even if they are mentioned elsewhere directly/indirectly in the offer.
- Price implication due to non-acceptance [by BHEL/Customer] of the deviations asked by bidder shall not be acceptable by BHEL.

15.0.0 ANNEXURES:

Following input documents and specifications are enclosed to facilitate the bidder to furnish the offer and ensure compliance:

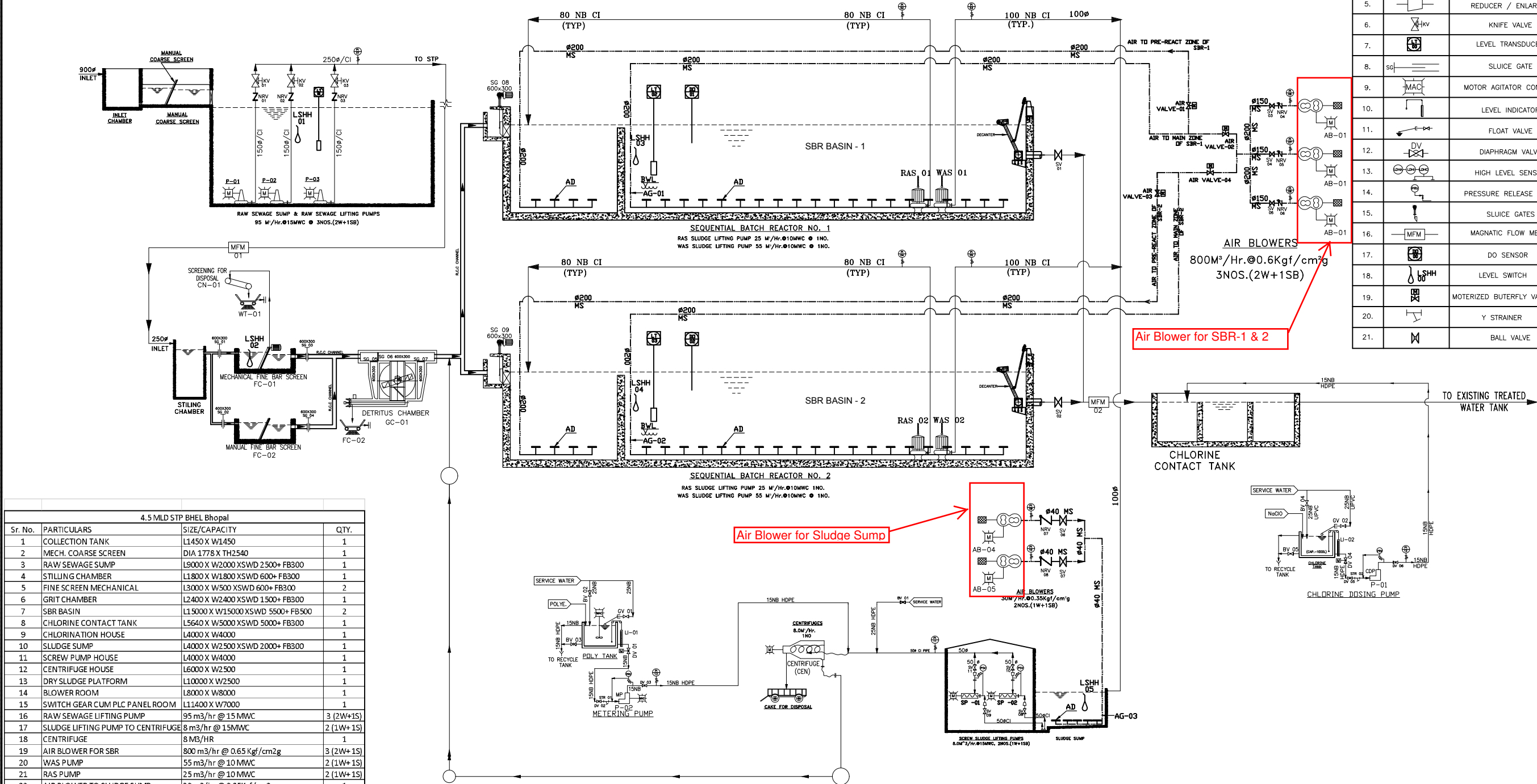
Annexure No.	Description
01	P& ID For Air Blower Assembly
02	Air Blower -Motor Data Sheet
03	Price Bid Format
04	Check List
05	QAP guide Line & Formats
06	BOM Standard Format & Master DOC List Format
07	Prebid clarification format
08	Deviation format

M SIVA
PRASAD BABU

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			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17



SL. NO.	LEGEND	REFERENCE
1.		PRESSURE INDICATOR
2.		MOTOR
3.		SLUICE VALVE
4.		NON RETURN VALVE
5.		REDUCER / ENLARGER
6.		KNIFE VALVE
7.		LEVEL TRANSDUCER
8.		SLUICE GATE
9.		MOTOR AGITATOR CONTROL
10.		LEVEL INDICATOR
11.		FLOAT VALVE
12.		DIAPHRAGM VALVE
13.		HIGH LEVEL SENSOR
14.		PRESSURE RELEASE VALVE
15.		SLUICE GATES
16.		MAGNETIC FLOW METER
17.		DO SENSOR
18.		LEVEL SWITCH
19.		MOTORIZED BUTTERFLY VALVE
20.		Y STRAINER
21.		BALL VALVE

4.5 MLD STP BHEL Bhopal			
Sr. No.	PARTICULARS	SIZE/CAPACITY	QTY.
1	COLLECTION TANK	L1450 X W1450	1
2	MECH. COARSE SCREEN	DIA 1778 X TH2540	1
3	RAW SEWAGE SUMP	L9000 X W2000 XSWD 2500+ FB300	1
4	STILLING CHAMBER	L1800 X W1800 XSWD 600+ FB300	1
5	FINE SCREEN MECHANICAL	L3000 X W500 XSWD 600+ FB300	2
6	GRIT CHAMBER	L2400 X W2400 XSWD 1500+ FB300	1
7	SBR BASIN	L15000 X W15000 XSWD 5500+ FB500	2
8	CHLORINE CONTACT TANK	L5640 X W5000 XSWD 5000+ FB300	1
9	CHLORINATION HOUSE	L4000 X W4000	1
10	SLUDGE SUMP	L4000 X W2500 XSWD 2000+ FB300	1
11	SCREW PUMP HOUSE	L4000 X W4000	1
12	CENTRIFUGE HOUSE	L6000 X W2500	1
13	DRY SLUDGE PLATFORM	L10000 X W2500	1
14	BLOWER ROOM	L8000 X W8000	1
15	SWITCH GEAR CUM PLC PANEL ROOM	L11400 X W7000	1
16	RAW SEWAGE LIFTING PUMP	95 m³/hr @ 15 MWC	3 (2W+1S)
17	SLUDGE LIFTING PUMP TO CENTRIFUGE	8 m³/hr @ 15 MWC	2 (1W+1S)
18	CENTRIFUGE	8 M³/HR	1
19	AIR BLOWER FOR SBR	800 m³/hr @ 0.65 Kg/cm²g	3 (2W+1S)
20	WAS PUMP	55 m³/hr @ 10 MWC	2 (1W+1S)
21	RAS PUMP	25 m³/hr @ 10 MWC	2 (1W+1S)
22	AIR BLOWER TO SLUDGE SUMP	30 m³/hr @ 0.35 Kg/cm²g	1
23	POLYELECTROLYTE SOLUTION TANK	3350 LITER	1
24	METERING PUMP	335 LPH	1
25	CHLORINE DOSING PUMP	125 LPH	1
26	NaClO STORAGE TANK	1000 LITER	2

				TITLE: TM ECOPROCESS SBR P&ID 4.5 MLD BHEL-BHOPAL		FABRICATION TOLERANCE: METRIC		PROJECT No.: T6982017		SIZE: A1	
R2 01.06.17 REVISE AS COMMENT				CLIENT: BHEL-HYDEREBAD		PREPARED BY: SHRIKANT		DATE: 27.05.17		REFERENCE DRAWING:	
R1 27.05.17 REVISE AS COMMENT						VERIFIED BY: B.N SEN		DATE: 27.05.17		VERIFIED BY:	
NO. DATE REVISION BY						APPROVED BY: VARSHA SINGH		DATE: 27.05.17		DRAWING BY: DIPEN SARKAR	
								DATE: 27.05.17		DRAWING NUMBER: T6982017- P&ID	

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			Annexure-2 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

CUSTOMER: BHEL BHOPAL
PROJECT: 4.5MLD STP PROJECT, BHEL-BHOPAL

DATA SHEET FOR AIR BLOWER FOR SBR-1&2			
Sl. No.	Description	BHEL Requirement	DETAILS
GENERAL DATA			
1	Service	To provide air into SBR-1&2 to prevent sludge to become anaerobic in Sequential batch reactor 1&2.	
2	Number of Air Blowers	Total : 3 Nos.[2 W+1 S]	
3	Location	Outdoor	
4	Duty	Continuous	
5	Drives	Motor [V Belt Driven]	
6	Pumping fluid	Ambient Air	
7	Fluid temp Deg C	Ambient	
AIR BLOWER PERFORMANCE & OTHER DETAILS			
8	Air Blower Type	Twin Lobe Type positive Displacement	
9	Design Standard of Blower	To be mentioned by Bidder	
10	Rated Flow (m ³ /hr)	800	
11	Discharge Pressure [Kg/cm ² (g)]	0.65	
12	Air Blower Model No.	To be mentioned by Bidder	
13	No. of Stages of Air Blower	To be mentioned by Bidder	
14	Parallel operation	Yes	
15	Rated Speed of Air Blower (rpm)	To be mentioned by Bidder	
16	Rated speed of Motor (rpm)	To be mentioned by Bidder	
17	Air Blower Efficiency in %	To be mentioned by Bidder	
18	Available Pressure at inline of Suction Silence	Atmospheric Pressure	
AIR BLOWER CONSTRUCTION FEATURES			
19	Material of Construction: Casing: CI FG260as per IS 210, Lobe: CI FG260as per IS 210, Side Cover: CI FG260as per IS 210, Shaft: EN-24/817M40 Gears: EN-353/815M17 (Hardened and Ground) Mechanical Seal: Silicon Carbide Bearing: SKF/Equivalent. * In case bidder can't meet above mentioned material, Bidder can offer Equivalent/Superior material suitable to the requirement.	To be Confirmed by Bidder	
20	Sealing arrangement	Mechanical seal as per Manufacturer's Standard	
21	Type of bearings for Air Blower	To be mentioned by Bidder	
22	Bearings lubrication	To be mentioned by Bidder	
23	V- Belt used between Blower and Motor	To be mentioned by Bidder	
PERFORMANCE TEST STANDARD FOR AIR BLOWER			
24	Performance test standard	To be mentioned by Bidder	
25	Maximum Allowed Working Pressure (MAWP) in Kg/cm ² g	To be mentioned by Bidder	
26	Hydraulic test pressure of casing Kg/cm ² (g)	Hydraulic test pressure of casing shall be 1.5 times the MAWP. Test duration shall be minimum 30 min.	
27	Noise level for Air Blower	85 dBA at 1.0 m in any direction [If the noise level of the Air Blower is higher, bidder to consider Acoustic enclosure (Individual) in order to meet noise level mentioned].	
28	Vibration for Air Blower	To be mentioned by Bidder	
29	Air Blower Instruments	As per Manufacturer recommendation	
30	Relief Valve	1 No. of Relief valve to be provided per Blower	

CUSTOMER: BHEL BHOPAL
PROJECT: 4.5MLD STP PROJECT, BHEL-BHOPAL

Sl. No.	Description	BHEL Requirement	DETAILS
MOTOR DETAILS			
31	Drive	Motor	
32	BKW at the rated point		
33	BKW at Max. Flow		
34	Selected drive rating in kW: Motor Drive Rating (At 50 Deg.C ambient) shall at least 10% above rated point or maximum demand of the Blower in the entire operating range of the Blower, whichever is	Bidder to mention motor kW rating for the motor duly taking care of the requirements.	
35	Design Standard of Motor/	IS 325/IEC60034	
36	Energy Efficient Class	IE3 as per IS 12615	
37	Manufacturer	As per Approved Sub Vendor List	
38	Ambient Temperature	50 Deg C All motors shall be designed to operate in humid atmosphere with a maximum ambient temperature of 50 Deg C.	
39	Area classification for motor	Safe Area	
40	Rated Voltage & Frequency	415 V & 50 Hz	
41	Permissible variations in Voltage/Frequency/Combined	(+/-)/10%/(+/-)/5%/(+/-)/10%	
42	No of poles / synchronous speed	Based on Air Blower Speed	
43	Method of Starting	Motor shall be capable of starting with DOL	
44	Method of cooling	To be Confirmed by Bidder	
45	Class of Insulation & Temp. rise	Class F with Temperature rise ltd. to class B	
46	Degree of protection	IP 55	
47	TB Short time-Current & Short time-Time	40 kA , 0.25 Sec	
48	Cable, Cable glands & Lugs	Cable details shall be furnished during DDE. Accordingly suitable double compression Nickel plated brass cable glands with back nut and PVC shroud and Tinned copper lugs to be provided by the bidder.	
49	No. of Starts	As per Manufacturer Recommendation	
50	Bearing RTDs, Winding RTDs & TGs	As per Manufacturer Recommendation	

CUSTOMER: BHEL BHOPAL
PROJECT: 4.5MLD STP PROJECT, BHEL-BHOPAL

DATA SHEET FOR AIR BLOWER FOR SLUDGE SUMP			
Sl. No.	Description	BHEL Requirement	DETAILS
GENERAL DATA			
1	Service	To provide air into Sludge Sump to prevent sludge to become anaerobic in Sludge Sump	
2	Number of Air Blowers	Total : 2 Nos.[1 W+1S]	
3	Location	Outdoor	
4	Duty	Continuous	
5	Drives	Motor [V Belt Driven]	
6	Pumping fluid	Ambient Air	
7	Fluid temp Deg C	Ambient	
AIR BLOWER PERFORMANCE & OTHER DETAILS			
8	Air Blower Type	Twin Lobe Type positive Displacement	
9	Design Standard of Blower	To be mentioned by Bidder	
10	Rated Flow (m ³ /hr)	30	
11	Discharge Pressure [Kg/cm ² (g)]	0.35	
12	Air Blower Model No.	To be mentioned by Bidder	
13	No. of Stages of Air Blower	To be mentioned by Bidder	
14	Parallel operation	No	
15	Rated Speed of Air Blower (rpm)	To be mentioned by Bidder	
16	Rated speed of Motor (rpm)	To be mentioned by Bidder	
17	Air Blower Efficiency in %	To be mentioned by Bidder	
18	Available Pressure at inline of Suction Silence	Atmospheric Pressure	
AIR BLOWER CONSTRUCTION FEATURES			
19	Material of Construction: Casing: CI FG260as per IS 210, Lobe: CI FG260as per IS 210, Side Cover: CI FG260as per IS 210, Shaft: EN-24/817M40 Gears: EN-353/815M17 (Hardened and Ground) Mechanical Seal: Silicon Carbide Bearing: SKF/Equivalent. * In case bidder can't meet above mentioned material, Bidder can offer Equivalent/Superior material suitable to the requirement.	To be Confirmed by Bidder	
20	Sealing arrangement	Mechanical seal as per Manufacturer's Standard	
21	Type of bearings for Air Blower	To be mentioned by Bidder	
22	Bearings lubrication	To be mentioned by Bidder	
23	V- Belt used between Blower and Motor	To be mentioned by Bidder	
PERFORMANCE TEST STANDARD FOR AIR BLOWER			
24	Performance test standard	To be mentioned by Bidder	
25	Maximum Allowed Working Pressure (MAWP) in Kg/cm ² g	To be mentioned by Bidder	
26	Hydraulic test pressure of casing Kg/cm ² (g)	Hydraulic test pressure of casing shall be 1.5 times the MAWP. Test duration shall be minimum 30 min.	
27	Noise level for Air Blower	85 dBA at 1.0 m in any direction [If the noise level of the Air Blower is higher, bidder to consider Acoustic enclosure (Individual) in order to meet noise level mentioned].	
28	Vibration for Air Blower	To be mentioned by Bidder	
29	Air Blower Instruments	As per Manufacturer recommendation	
30	Relief Valve	1 No. of Relief valve to be provided per Blower	

CUSTOMER: BHEL BHOPAL
PROJECT: 4.5MLD STP PROJECT, BHEL-BHOPAL

Sl. No.	Description	BHEL Requirement	DETAILS
MOTOR DETAILS			
31	Drive	Motor	
32	BKW at the rated point		
33	BKW at Max. Flow		
34	Selected drive rating in kW: Motor Drive Rating (At 50 Deg.C ambient) shall at least 10% above rated point or maximum demand of the Blower in the entire operating range of the Blower, whichever is	Bidder to mention motor kW rating for the motor duly taking care of the requirements.	
35	Design Standard of Motor	IS 325/IEC60034	
36	Energy Efficient Class	IE3 as per IS 12615	
37	Manufacturer	As per Approved Sub Vendor List	
38	Ambient Temperature	50 Deg C All motors shall be designed to operate in humid atmosphere with a maximum ambient temperature of 50 Deg C.	
39	Area classification for motor	Safe Area	
40	Rated Voltage & Frequency	415 V & 50 Hz	
41	Permissible variations in Voltage/Frequency/Combined	(+/-)/10%/(+/-)/5%/(+/-)/10%	
42	No of poles / synchronous speed	Based on Air Blower Speed	
43	Method of Starting	Motor shall be capable of starting with DOL	
44	Method of cooling	To be Confirmed by Bidder	
45	Class of Insulation & Temp. rise	Class F with Temperature rise ltd. to class B	
46	Degree of protection	IP 55	
47	TB Short time-Current & Short time-Time	40 kA , 0.25 Sec	
48	Cable, Cable glands & Lugs	Cable details shall be furnished during DDE. Accordingly suitable double compression Nickel plated brass cable glands with back nut and PVC shroud and Tinned copper lugs to be provided by the	
49	No. of Starts	As per Manufacturer Recommendation	
50	Bearing RTDs, Winding RTDs & TGs	As per Manufacturer Recommendation	

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			Annexure-3 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions:	Prepared by :	Checked by :	Approved by :	Date :
Refer to record of revisions	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

	BHARAT HEAVY ELECTRICALS LIMITED R.C.PURAM, HYDERABAD-502032				
	PROJECT ENGINEERING & SYSTEMS DIVISION				
	PRICE FORMAT (R00) FOR AIR BLOWER ASSEMBLY WITH ELECTRIC MOTOR DRIVE FOR CUSTOMER : BHEL-BHOPAL PROJECT : PROJECT 4.5 MLD STP,BHEL-BHOPAL				
SL NO	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (RS.)	TOTAL (RS.)
	Bidder's Name : <Bidder to indicate> Bidder's Offer No. & Dt. : <Bidder to indicate> Bidder's Ref No. & Dt. :<Bidder to indicate> BHEL Enq. No. & date :<Bidder to indicate>				
1	MAIN OFFER				
A	Air Blower for SBR-1&2 with Drive Assembly				
A.1.	MATERIAL SUPPLY-Air Blower for SBR-1&2 with Drive Assembly[800 m3/hr,0.65 kgf/cm2]				
	Air Blower[800 m3/hr,0.65 kg/cm2] with Drive Assembly with required accessories as per Manufacturer standard duly taking care of requirements mentioned in specification	3	Set		
A.2	Commissioning spares				
	One set of commissioning spares per Blower shall be quoted as per manufacturer's recommendation. (Ref. Note-12)	3	Set		
A.3	Special Tools & Tackles				
	One set of Tools and tackles shall be quoted as per manufacturer's recommendation.	1	Set		
B	Air Blower for Sludge Sump with Drive Assembly[30 m3/hr,0.35 kg/cm2]				
B.1.	MATERIAL SUPPLY-Air Blower for Sludge Sump with Drive Assembly[30 m3/hr,0.35 kg/cm2]				
	Air Blower with [30 m3/hr,0.35 kg/cm2]Drive Assembly with required accessories as per Manufacturer standard duly taking care of requirements mentioned in specification	2	Set		
B.2	Commissioning spares				
	One set of commissioning spares per Blower shall be quoted as per manufacturer's recommendation. (Ref. Note-12)	2	Set		
B.3	Special Tools & Tackles				
	One set of Tools and tackles shall be quoted as per manufacturer's recommendation.	1	Set		
C	Supervision charges for erection & commissioning at site[Refer Note-4]				
a	Travel expenses from vendor works to site and back per visit /person	--			
b	Per day charges per person for supervision of erection & commissioning at site including boarding, lodging, local transportation etc., except for travel expenses as above.	--			

	BHARAT HEAVY ELECTRICALS LIMITED R.C.PURAM, HYDERABAD-502032				
PROJECT ENGINEERING & SYSTEMS DIVISION					
PRICE FORMAT (R00) FOR AIR BLOWER ASSEMBLY WITH ELECTRIC MOTOR DRIVE FOR CUSTOMER : BHEL-BHOPAL PROJECT : PROJECT 4.5 MLD STP,BHEL-BHOPAL					
SL NO	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (RS.)	TOTAL (RS.)
Bidder's Name : <Bidder to indicate> Bidder's Offer No. & Dt. : <Bidder to indicate> Bidder's Ref No. & Dt. :<Bidder to indicate> BHEL Enq. No. & date :<Bidder to indicate>					
2	Optional Items				
A	2 Years Recommended Spares				
	Recommended spares list for two years normal operation along with unit price breakup for Blower, Drive & other accessories[For Each Variety of Blower seperate list to be provided].. (List with price break up to be enclosed) (1 set stands for quantity required for the replacement of one Blower, drive (or) accessories)	As per List	Set		
TOTAL					
Notes:					
1) Bidder to quote strictly as per BHEL's NIT requirements.					
2) Bidder to note that this is a LUMP SUM Turn-Key Order. However (a) Changes to the tender specification during execution of the project for successful operation of the system need to be carried out by bidder and commercial implications if any will be settled suitably. (b) Unit rates quoted by bidder shall be applicable for any changes in BOQ during detailed engineering stage.					
3)Main offer consists of those items which will be part of main order after successful bidder is identified. Optional Items consists of those items which need to be quoted by bidder but may or may not be ordered by BHEL. Bidders are instructed to provide the pricing details listed under Main offer and Optional items as per the prescribed format.					
4) Prices quoted by bidders for items under main offer : Sl. No. I [A to C] will be considered for evaluation of lowest bidder. For Supervision of E&C, total no of 2 Man days to be covered in 1 Visit have been considered. However, either or both of the number of man days or no of visits may change on either side based on the actual site requirement.However, BHEL reserves the right (a) To include any of the optional items in scope of supply (as per customer contract requirements) and accordingly consider the same in evaluation. Any such scope increase and change in evaluation will be intimated to vendor during technical evaluation(before price bid opening). (b) To place PO for any of the Optional items with in the contract period. Hence bidders need to mandatorily quote reasonable prices for all optional items considering such requirement and keep the validity of the prices till the end of contract period.					

	BHARAT HEAVY ELECTRICALS LIMITED R.C.PURAM, HYDERABAD-502032				
PROJECT ENGINEERING & SYSTEMS DIVISION					
PRICE FORMAT (R00) FOR AIR BLOWER ASSEMBLY WITH ELECTRIC MOTOR DRIVE FOR CUSTOMER : BHEL-BHOPAL PROJECT : PROJECT 4.5 MLD STP,BHEL-BHOPAL					
SL NO	ITEM DESCRIPTION	QTY	UNIT	UNIT RATE (RS.)	TOTAL (RS.)
Bidder's Name : <Bidder to indicate> Bidder's Offer No. & Dt. : <Bidder to indicate> Bidder's Ref No. & Dt. :<Bidder to indicate> BHEL Enq. No. & date :<Bidder to indicate>					
5.a) For all items including Optional items, prices to be furnished in this prescribed price bid format only for each individual item. No combined prices, common prices or any other format will be accepted and such bids may be liable for rejection.					
5.b) Bidder must not change the indicated item description, quantity & units in the price bid format. Bidder should only fill the unit rates & total price.					
5.c) Bidder to quote for all the items as per price bid format. Incomplete/partial offer may be liable for rejection.					
6) Bidder to quote the base rates only. All other commercial charges for packing, freight, transportation, insurance, taxes & duties etc., shall be indicated separately.					
7 a.) Commissioning spares are those spares which are required at the time of commissioning and shall be recommended(as per bidders experience) and quoted by bidder. However commissioning spares indicated in the price bid format shall be quoted as minimum.					
8)With respect to Mandatory Spares; A) If any of above items indicated by the specified name are not applicable, bidder to offer alternative item serving the same function as per equipment's design and indicate below the item being replaced. B) If bidder is not able to meet the above note, then bidder may mention "Not Applicable". However, if found applicable during detailed engg. stage or alternative item as per equipment design can serve the same function, bidder to supply the specified quantity with out any delivery and commercial implications to BHEL.					
9) Reference document: PY51134 R11 , BHEL Doc. No. PY-AS-4-M096-8714-01Rev. 00 & annexures.					
10) Unpriced price bid format indicating as quoted against each applicable item shall be submitted duly signed & stamped along with technical offer by bidder as a token of concurrence that prices are submitted in this format only. The offer shall be liable for rejection in case if un-priced price bid format is not submitted or any modification is carried out in price bid format.					
11) In case the systems are being supplied from outside India, reputed Third Party Inspection like Llyods or equivalent has to be considered and the charges should be included in the Main offer. For those bidders who are supplying from India, such third party inspection charges need not be considered and same will be arranged by BHEL/BHEL nominated inspection agency.					
12) Any commissioning spare consumed over and above the recommended commisioning spares, during commissioning shall be supplied free of cost by the equipment vendor.					

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			Annexure-4 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions:	Prepared by :	Checked by :	Approved by :	Date :
Refer to record of revisions	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

ANNEXURE-4
CHECKLIST FOR OFFER FOR AIR BLOWER WITH DRIVE ASSEMBLY

Description	Enclosed (Yes/No)
Bidder to confirm to the scope of supply as per BHEL specs Doc. No. PY-AS-4-M096-8714-01	
Bidder to furnish duly filled Air Blower datasheet as per Annexure-2. <u>Datasheets in other formats are strictly not accepted. Bidder to furnish filled in the Datasheets as per BHEL tender enquiry only.</u>	
Bidder to confirm that the relief valve is considered in their scope of supply as mentioned in Cl. No. 5.3.0 of Doc. No. PY-AS-4-M096-8714-01.	
Bidder to confirm that the Motor Efficiency class considered is IE3 as per IS 12615 as mentioned in Cl. No. 5.2.0 of Doc. No. PY-AS-4-M096-8714-01.	
Bidder to confirm the consideration of Acoustic Enclosure for Individual Air Blower wherever the Noise level Exceeds 85 DbA @ 1.0 m.	
Bidder to confirm that all the Suitable reducers/expanders & counter flanges along with gaskets & stud nuts at all the terminal point shall be in their scope as mentioned in specification.	
Bidder to furnish a list of commissioning spares (Refer Cl. No. 5.10 of Doc. No. PY-AS-4-M096-8714-01).	
Bidder to furnish a list of special tools & tackles (Refer Cl. No. 5.12 of Doc. No. PY-AS-4-M096-8714-01).	
Bidder's confirmation required for furnishing a list of 2 year recommended spares in their offer separately with optional price.	
Bidder to furnish reference list for the offered Air Blower inline with Cl. No. 7.0 of Doc. No. PY-AS-4-M096-8714-01).	
Bidder to furnish the filled in unpriced price bid format along with their offer as per Annexure-3.	
Bidder to Confirm that the Sea worthy packing is considered if imported from outside India as per Annexure-9 of Doc. No. PY-AS-4-M096-8714-01.	
Bidder to quote individual price for each item mentioned in the seal priced bid as per price bid format (Annexure-03 of BHEL specs Doc. No. PY-AS-4-M096-8714-01). Bidder to confirm the same.	
Deviations to the BHEL tender specifications shall be clearly bought by bidder in a separate deviation list. Bidder to furnish deviation list, if any, as per Annexure-07 of BHEL specs Doc. No. PY-AS-4-M096-8714-01.	
All important documents such as unpriced price bid, reference list, Blower performance curve, Blower & drive assembly GA drawings, CS drawings must necessarily to be furnished by bidder along with their offer.	
Bidder to raise Pre bid queries, if any, must be raised as per Attached format (Annexure-08) before submission of technical and commercial bid. Any deviation/ queries raised during technical bid submission shall not be entertained.	

SIGNATURE:
NAME:
DESIGNATION:
COMPANY:
DATE:

ESP-001-2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION	Std. / Doc. Number	
			Annexure-5 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

TD-201 Rev No. 00 Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE
			Rev No. 00
			Page 1 of 3
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	QAP GUIDELINES & FORMAT (ANNEXURE) The QAP format and guidelines for filling up the format shall be used by vendor for preparation and submission of QAP after order placement. Note : 1. Typical /Indicative /Standard QAP(s) for equipment /package attached is reference document and to use by successful bidder in future for preparation and submission of QAP for BHEL /CUSTOMER approval. 2. No deviation to reference document is acceptable.		

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE Rev No. 00 Page 2 of 3
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	<u>GUIDELINES TO VENDORS FOR PREPARATION OF QUALITY ASSURANCE PLAN</u> 1. QAP shall be made in landscape mode on A4 size paper as per the format enclosed. Font size shall be minimum 10. 2. Each page of QAP shall contain the following information. a) Vendor's name & address. b) Customer: BHEL, Hyderabad. c) Project. d) BHEL Product Standard Number/revision number as referred in P.O. e) BHEL Purchase Order Number & Date. f) Product as per P.O. description. g) QAP Number (unique and shall not repeat)/revision number/date. h) Page number and number of pages 3. QAP shall contain four parts / stages as follows. a) Raw materials and bought out items. b) In process Control / Inspection. c) Final assembly, Inspection & Testing. d) Painting, preservation & packing. 4. Under 'Component', indicate name of the component (say casing, rotor, pressure gauge, etc). 5. Under 'Characteristics', indicate appropriately (say chemical analysis, mechanical properties, NDT (UT,DP etc.), hydrostatic test, calibration check etc.) 6. Under 'Class', indicate minor, major or critical depending on the importance of characteristic. 7. Under 'Type of check', indicate appropriately (say chemical, mechanical, UT, DP etc.) 8. Under 'Quantum of check', indicate appropriately (say 100%, 10%, sample, per melt, per heat, all pieces etc.) 9. Under 'Reference document' and 'Acceptance norms', appropriate National & International standards, BHEL standards, approved drawing references etc. should be indicated. It is not correct to mention as "Vendor's internal standards or Vendor's standard practice etc.". If vendors' internal standards are referred, same shall be in line with BHEL Spec. indicated in the P.O. These may require review & approval by our Engineering dept. 10. Under 'Format of record', indicate appropriately supplier's test certificate, calibration certificate, lab report, inspection report etc.		
	11. Please refer 'Agency' in QAP format. Under P: Perform, W: Witness, V: Verify Indicate against each characteristic 1: (BHEL CQS/Nominated inspection agency), OR 2: (Vendor / Sub vendor)		

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE
	Rev No. 00		
	Page 3 of 3		
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		Note: Performing agency is normally vendor or his sub vendor (Legend 2). Where witness points are indicated in specification, P.O., Drawing etc., for such operations, Under Witness (W) column use 1. Under 'Verify' column, use code 1. 12. Under 'D' please put (☐ Tick) against each characteristic where vendor proposes to submit test certificate/report etc. OR as required as per BHEL Specification. 13. Vendor's signature & stamp should be available on each page of QAP. 14. Vendor should read the BHEL Product Standard thoroughly and QAP should be made only inline and relevant to the Specification & Approved Drawings. 15. The following operations/characteristics/check points may be included (AS APPROPRIATE) a) Visual check b) Dimensional check c) Mechanical and Chemical properties. d) Surface preparation before painting (by chemical cleaning, sand blasting, shot blasting etc. as the case may be.) e) Painting check for shade, Dry Film Thickness (DFT), Adhesion/ peel off test etc. f) Check for correctness for all components mounted as per General arrangement Drawing, Bill Of Materials (BOM), etc. for range, rating, make, color, size, location as per GA, quantity, label description including tag nos., annunciator facia, loose components, accessories, spares etc. g) Verification of test certificate for protection class for the enclosures. h) Mechanical functioning of switches. i) Continuity of earthing and provision of earth points. j) Colour coding of wiring, size, tightness & dressing of wiring. k) Review of test certificates of assembled items, raw materials, internal test reports etc. l) Witness of functional checks, which may include mechanical run & electrical run, H.V.test, IR measurement, Electrical and Mechanical tests etc. m) PQR, WPS, Welder Qualification Record, welding records (fit up, DP) etc. n) Material identification (for punch marks of serial numbers, Heat No, Melt No, Inspector's stamp etc.) o) Hydraulic Pressure Test, Pneumatic Pressure Test, Liquid Penetration Examination and other Non-Destructive Tests. p) Tests on Galvanised items (Visual, Hammer Test, Knife Test, Thickness, Pierce Test (Copper sulphate test), Hydrogen evaluation test, Stripping test (for Mass of Zinc coating) q) All tests as per BHEL Product Standard & approved drawings including Type tests and Routine tests on individual items and on System as a whole. r) Packing and Preservation. 16. QAP Format enclosed. 17. Typical Manufacturing QAP(s) is /are attached.	
		Ref. Doc	

VENDOR'S NAME & ADDRESS:			MANUFACTURING QUALITY PLAN						QP. NO.:				
			CUSTOMER: BHEL, HYDERABAD – 32.			BHEL P.O.NO.:			REV NO:		DATE:		
			PROJECT: PRODUCT:			P.O.DATE: BHEL SPEC:			REV:		PAGE 1 OF 1		
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
2.0	INPROCESS INSPECTION												
3.0	FINAL INSPECTION & TESTING												
4.0	PRESERVATION & PACKING												

VENDOR TO NOTE: THIS FORMAT IS IN MICROSOFT WORD. HEADER & FOOTER SHALL BE AVAILABLE IN EACH PAGE OF QP. QP SHALL BE IN LANDSCAPE & A4 SIZE ONLY. FONT SIZE SHALL BE MIN 10. VENDOR SHALL SIGN & STAMP IN EACH PAGE OF QP. LOI REF. & DATE ARE NOT ACCEPTABLE. P.O.NO. & DATE SHALL BE INDICATED. QP NO. SHOULD BE UNIQUE AND SHALL NOT REPEAT. ALL THE TESTS / CHECKS INDICATED IN THE BHEL SPEC. SHALL BE INDICATED IN THE QP.

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.	PREPARED BY	APPROVED BY	APPROVED BY
	VENDOR'S SIGNATURE & STAMP	BHEL QA SIGNATURE & STAMP	CUSTOMER'S SIGNATURE & STAMP

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
								REV NO:		DATE:			
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032				PROJECT: PACKAGE: AIR BLOWER BHEL TECH SPEC:			PAGE 1 OF 3				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0 RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	Body and Cover/Plates	Chemical & Mech. Properties	Major	Chemical & Mech. analysis	1 per heat/lot	Tech Spec/ Approved Datasheet/ Approved Drawing		MTC	√	2	2	1	
1.2	Screw Shaft & Gears	Chemical & Mech. Properties	Major	Chemical & Mech. Analysis	1 per heat/lot			MTC	√	2	2	1	
1.3	Mechanical seal	Material and leakage check (Air test)	Major	OEM's certificate review	100%			MTC / COC	√	2	2	1	
1.4	Bearing and bearing housing	Make and Model	Major	Visual	100%			MTC / COC	√	2	2	1	
1.5	Accessories *	Chemical & Mech. Properties	Major	Chemical & Mech. Analysis	1 per heat/lot			MTC	√	2	2	1	* accessories as per scope of supply
1.6	(inter connecting piping, strainers, filters, silencers instruments, JB etc.)	MOC, hydro test reports, Calibration reports and Type test certificates for instruments.	Major	OEM's certificate review	100%			OEM test certificates	√	2	2	1	
1.7	Safety Relief Valve	Chemical & Mech. Properties	Major	Chemical & Mech. Analysis	1 per heat/lot			MTC	√	2	2	1	
1.8		Hydro Test, Set Pressure Test	Minor	Hydro Test, Set Pressure Test	100%			TC	√	2	2	1	
LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.													

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: AIR BLOWER BHEL TECH SPEC:			REV NO:		DATE:			
								PAGE 2 OF 3					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
2.0	INPROCESS INSPECTION												
2.1	Fabrication of body and other components	WPS, PQR and WQR	Major	Document verification	100%	Tech Spec/ Approved Datasheet/ Approved Drawing	WPS, PQR and WQR	--	2	2	1		
2.2	Body and Cover/Plates	NDE	Major	DPT/MPI	100%		NDE reports	√	2	2	1		
2.3		Leakage	Critical	Hydro test	100%		Test reports	√	2	1	--		
2.4	Screw Shaft & Gears	NDE and hardness	Major	UT and hardness test	100%		NDE reports	√	2	2	1		
2.5	Rotor assembly	Dynamic balancing	Critical	Balancing	100%		IR	√	2	2	1		
3.0	FINAL INSPECTION & TESTING												
3.1	<u>Air blower assembly</u>	Performance test	Critical	Testing	100%	Tech Spec/ Approved Datasheet/ Approved Drawing	TC	√	2	1	--	Only 10% witness by BHEL / BHEL's TPIA, subjective to minimum 1 pump of	
3.2		Mechanical run test	Critical	Testing	100%		TC	√	2	1	--		
3.3		Strip Examination	Critical	Dismantling	100%		TC	√	2	1	--		
3.4		Overall Dimensions	Major	Measurement	100%		IR	√	2	1	--		

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		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: AIR BLOWER BHEL TECH SPEC:			REV NO:		DATE:			
								PAGE 3 OF 3					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
3.5		Spares (if any)	Major	BOM check	100%			IR	√	2	1	--	each size & type.
4.0	PRESERVATION & PACKING												
4.1	Air blower and its components	Direction of rotation, Stamping and Painting	Major	Visual, Shade & DFT	Random	Tech Spec/ Approved Datasheet/ Approved Drawing		IR	√	2	1	--	
4.2		Packing #	Major	Visual	100%			Packing List	√	2	2	1	# Seaworthy packing for export orders

Notes:-

1. This MQP should be read along with specification ((Latest revisions to be considered as per PO), approved drawings & approved datasheet.
2. Specification/drawing/datasheet shall prevail over quality plan for contradiction if any.
3. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

Abbreviations:-

MTC	–	Material Test certificate	COC	–	Certificate of Compliance	DFT	–	Dry Film Thickness
TC	–	Test Certificate	NDE	–	Non Destructive Examination	IR	–	Inspection Report
DFT	–	Dry Film Thickness	IBR	–	Indian Boiler Regulations	IS	–	Indian Standards

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED ✓ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: MOTOR BHEL TECH SPEC:			REV NO:	DATE:				
								PAGE 1 OF 4					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
1.0	RAW MATERIALS & BOUGHT OUT ITEMS												
1.1	<u>COPPER WIRE</u> Enameled Copper Wire	Overall diameter, elongation, Mandrel winding test, Peel test, springiness, Abrasion test, Cut through test, Heat shock test, Continuity test	Major	Measurem ent and mechanical & electrical testing	One sample per heat/lot	National & international standard (IS or IEC) / technical specification/ approved drawing/ datasheet		IR / supplier test certificate	√	2	2	1	
1.2	<u>STEEL SHAFT</u> Straightened Steel bar in black Finish	Dimensions, surface finish, chemical composition	Major	Visual, measurem ent and chemical testing	One sample per heat/lot			supplier test certificate	√	2	2	1	
1.3		NDT	Major	UT	100%			supplier test certificate	√	2	2	1	
1.4	<u>ALUMINIUM INGOTS</u>	Chemical properties	Major	Chemical testing	One sample per heat/lot			supplier test certificate	√	2	2	1	
2.0	INPROCESS INSPECTION												
2.1	ASSEMBLY	Completeness and correctness of assembly	Major	Visual verification	100%	MO and manufacturer's internal processes		Log book	--	2	2	2	

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बी एच ई एल BHEL		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: MOTOR BHEL TECH SPEC:			REV NO:		DATE:			
								PAGE 2 OF 4					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
3.0	FINAL INSPECTION & TESTING												
3.1	ROUTINE TESTING	Measurement of winding resistance in cold condition	Major	Testing	100%	National & international standard (IS or IEC) / technical specification		TC	√	2	1	--	
3.2		SH heater resistance (if applicable)	Major	Testing	100%			TC	√	2	1	--	
3.3		Insulation resistance (before and after HV test)	Major	Testing	100%			TC	√	2	1	--	
3.4		High voltage test at 1.8 KV for 1 minute and space heater HV test	Major	Testing	100%			TC	√	2	1	--	
3.5		Direction of rotation	Major	Testing	100%			TC	√	2	1	--	
3.6		No load test (measurement of NL A, voltage, NL power and NL RPM)	Major	Testing	100%			TC	√	2	1	--	
3.7		Reduced run up voltage test at (rated volt√3)	Major	Testing	100%100%			TC	√	2	1	--	
3.8		Locked rotor test at full load current	Major	Testing	100%			TC	√	2	1	--	
3.9		Vibration measurement	Major	Testing	100%			TC	√	2	1	--	
3.10		Measurement of noise level	Major	Testing	100%			TC	√	2	1	--	
3.11		120% over speed test	Major	Testing	100%			TC	√	2	1	--	

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बी एच ई एल 		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:					
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032			PROJECT: PACKAGE: MOTOR BHEL TECH SPEC:			REV NO:		DATE:			
								PAGE 3 OF 4					
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
3.12	TYPE TESTS	Measurement of winding resistance in cold condition	Major	Testing	One /rating	National & international standard (IS or IEC) / technical specification		TC	√	2	--	1	Verification of Identical Type test Report of same Rating
3.13		Temp. rise test at full load (load point for 100%, 75% & 50% load (full load, ¾ and ½ load)	Major	Testing	One /rating			TC	√	2	--	1	
3.14		160% momentary overload test	Major	Testing	One /rating			TC	√	2	--	1	
3.15		Locked rotor amp and torque test	Major	Testing	One /rating			TC	√	2	--	1	
3.16		No load test	Major	Testing	One /rating			TC	√	2	--	1	Identical type test reports for motor ratings (not more than 5 years old) will be provided.
3.17		Reduced voltage running up test	Major	Testing	One /rating			TC	√	2	--	1	
3.18		Insulation resistance test (before and after HV test)	Major	Testing	One /rating			TC	√	2	--	1	
3.19		HV test – 1.8 KV for winding and 1.5 KV for space heater	Major	Testing	One /rating			TC	√	2	--	1	
3.20		Vibration test	Major	Testing	One /rating			TC	√	2	--	1	
3.21		120% over speed test	Major	Testing	One /rating			TC	√	2	--	1	

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		TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:						
								REV NO:		DATE:				
		PROJECT ENGINEERING & SYSTEMS DIVISION BHEL, RC PURAM, HYD-502032						PROJECT: PACKAGE: MOTOR BHEL TECH SPEC:				PAGE 4 OF 4		
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	D	AGENCY P W V			REMARKS
4.0	PRESERVATION & PACKING													
		Painting*, (Shade, DFT,) Marking	Major	Visual, DFT	Random	Technical specification/ approved drawing/datasheet	TC	√	2	--	1			
		Packing*	Major	Visual	Random		Packing List	√	2	--	--			

Notes:-

- This MQP should be read along with specification ((Latest revisions to be considered as per PO), approved drawings & approved datasheet.
- Specification/drawing/datasheet shall prevail over quality plan for contradiction if any.
- Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

Abbreviations:-

MTC	–	Material Test certificate	COC	–	Certificate of Compliance	DFT	–	Dry Film Thickness
TC	–	Test Certificate	NDE	–	Non Destructive Examination	IR	–	Inspection Report
DFT	–	Dry Film Thickness	IBR	–	Indian Boiler Regulations	IS	–	Indian Standards

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ESP-001-2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION	Std. / Doc. Number	
			Annexure-6 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

MASTER DOCUMENT LIST - Air Blower[illegible]

MASTER DOCUMENT LIST - Air Blower															
Vendor Name:		PROJECT:				PO date:		PO Dly. Date:							
Vendor Contact Person:		BHEL PO No.				PO date:		PO Dly. Date:							
Vendor contact No.		Supplier's Job No.													
	SYSTEM/PACKAGE:	Air Blower				TODAY-DATE	23/Jun/17								
Sl.No	DRG/DOC. NAME	DRG/DOC NO.	NO. OF SHTS.	CAT	CRITICAL FOR MFG?	REQD.FOR CUSTOMER SUBMISSION?	Plan date of submission	Count of DUE as on Dt.	STATUS	Rev-0			Rev-1		
			NO.	(A / I)	(Y/N)	(Y/N)	dd-mmm-yyyy		" *PV/PB /PC/AA	SD	AD	APP.CAT	SD	AD	APP.CAT
10	BILL OF MATERIAL			A	N	N									
11	BILLING BREAKUP			A	N	N									
12	QUALITY ASSURANCE PLAN			A	N	Y									
13	SUB VENDOR LIST			I	N	N									
14	COMMISSIONING SPARES LIST			A	N	N									
15	Mandatory Spares List			A	N	N									
16	LUBE OIL SCHEDULE			I	N	N									
17	STARTUP PROCEDURE			I	N	N									
18	ERECTION PROCEDURE & Comissioing procedure			I	N	N									
19	INSPECTION/TESTS REPORTS/CERTIFICATE			I	N	N									
20	O& M Manuals(Soft Copies)			A	N	N									
21	O& M Manuals(Hard Copies)** ** hard copy shall be furnished after getting concurrence on soft copy.			I	N	N									
							TOTAL	0		*APP.CAT					
	A-Approval Category	PV-Commented and pending with vendor					TOTAL "PV"		0	A1-'Approved					
	I-Information Category	PB- Pending with BHEL					TOTAL "PB"		0	A2-Mfg. Clearance given subject incorporation of comments					
		PC- Pending with Customer					TOTAL "PC"		0	A3-Commented.Revision & resubmission required.					
		AA- Approved					TOTAL "AA"		0	A4- Retained for info.					
		** - Not yet Due.													
		OD-Overdue					TOTAL "OD"		0						
		** - Not yet Due.													

Vendor documentation status									Status/ Remarks
Total No of Docs	Due as on Date	Submitt ed by vendor as on Dt.	Approv ed by BHEL as on Dt.	Commented by BHEL as on Dt.	Pending with BHEL/CUSTOM ER as on date	%age of Dos Approved	%age of critical Dos Approved	Is Mfg. Clearance given?	
(Nos)	(Nos)	(Nos)	(Nos)	(Nos)	(Nos)	% age	% age	(Y/N)/ (If Y) put Dt.	
0	0	0	0	0	0	#DIV/0!	0.00%	Y	

ESP-001-2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION	Std. / Doc. Number	
			Annexure-7 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

DEVIATION SCHEDULE TECHNICAL

Bidder are requested to mark “✓” as applicable

☐ No Deviation required

☐ Deviation required

List of deviations (expectations and /or addition requested by Bidder) from specification, standards and /or drawing etc.

Sl. No.	Section / Part/Subsection	Page No.	Clause No.	Bid Specification	Bidder's Query	Purchaser's Reply

Note: Bidder to furnish this duly filled format along with SEAL & SIGN at pre-bid stage only and any deviations appearing elsewhere shall not be considered.

SIGNATURE : _____
NAME : _____
DESIGNATION : _____
COMPANY : _____
DATE : _____

COMPANY SEAL

ESP-001-2A Rev.00		PROJECT ENGINEERING & SYSTEMS DIVISION	Std. / Doc. Number	
			Annexure-8 to Doc. No. PY-AS-4-M096-8714-01	
			Rev. No.	00

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Revisions: Refer to record of revisions	Prepared by :	Checked by :	Approved by :	Date :
	Rajeev Jain	GIRISH	Siva Prasad Babu	23.06.17

DEVIATION SCHEDULE TECHNICAL

Bidder are requested to mark “✓” as applicable

☐ No Deviation required

☐ Deviation required

List of deviations (expectations and /or addition requested by Bidder) from specification, standards and /or drawing etc.

Sl. No.	Section / Part/Subsection	Page No.	Clause No.	Bid Specification	Bidder's Query	Purchaser's Reply

Note: Bidder to furnish this duly filled format along with SEAL & SIGN at pre-bid stage only and any deviations appearing elsewhere shall not be considered.

SIGNATURE : _____
NAME : _____
DESIGNATION : _____
COMPANY : _____
DATE : _____

COMPANY SEAL