

BHEL	Annex-1: Pump Assembly	
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<u>PUMP ASSLY (WITH AC MOTOR AND COUPLING)</u> (FGD LUBE OIL SYSTEM) 1.0.0 <u>SCOPE:</u> This standard specifies the requirements of Lube oil assembly, which is used in lubrication of bearings of compressor and Gear box for FGD projects 2.0.0 <u>TECHNICAL REQUIREMENTS:</u> 2.1.0 In case pump selected is Gear/screw in built relief valve shall be provided. 2.2.0 Suction isolating valve shall be of globe/gate type. 2.3.0 Delivery isolating valve shall be of globe/gate type 2.4.0 Suction flange as per ANSI B16.5 class. Size shall be 3” or below. Non ASI flange not acceptable. Discharge flange shall be 2” or below with ANSI B16.5 300 class 2.5.0 In case of Gear/screw pump onw way type coupling shall be preferred. 2.6.0 The supplier shall furnish AC Motor power consumption. Motors shall be selected with a margin of 25% higher than BHP of pump. 2.7.0 AC Motors shall be IE2 Motor as per IEC 60034-30, IS 12615 and IS 325 standard. 2.8.0 All the above mentioned equipment shall be mounted on top of tank. 2.9.0 Necessary strainer required for the protection of pump shall be included on suction of pump. 2.10.0 Vendor to ensure that the pump shall not be rotate in reverse direction. Proper arrangement shall be provided to avoid reverse rotation. 2.14.0 <u>DESIGN PHILOSOPHY/CRITERIA-GENERAL:</u> Selection of rotating equipment shall be based upon the following: 2.14.1 Consideration Suitability for the specified duty conditions. 2.14.2 Standard models under vendor’s regular range of manufacture. 2.14.3 Proven track record in similar service. 2.14.4 Optimum operating and maintenance costs. 2.14.5 Maximum interchangeability of parts. 2.14.5 Ease of operation and maintenance.		
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2.15.0. <u>THE ORDER OF PRECEDENCE IS TO BE FOLLOWED</u> 2.15.1 Customer / Consultant's pump data sheets 2.15.2 Engineering design basis 2.15.3 Applicable codes, standards 2.15.4 For design aspects not specifically covered by data sheets, specifications, codes and standards or regulations, the design shall be based on good engineering practices. 3.0.0 <u>OPERATING CONDITIONS:</u> * marked data to be filled by vendor in pump data sheet Rev 01 3.1.1 Fluid handled : Turbine oil type ISO, VG 46/32 3.1.2 Kinematic Viscosity : 18 CST at 65°C (operating) 280 CST at 10°C (during starting) 3.1.3 Specific gravity : 0.88 3.1.4 Delivery flow in LPM : 135 @ 280 cst 3.1.5 Pressure at inlet branch : Suction from tank(Refer Tank GAD) 3.1.6 Suction /Discharge pressure in Kg/cm² (g) : 1 5.5 Rev 01 3.1.9 Hydrostatic test pressure : 1.5 times of design pressure 3.1.10 Speed : 1450 RPM 3.1.11 Power absorbed by pump at 18 CST : * (Vendor to furnish actual value) (at 65°C) 3.1.12 Power absorbed by pump at 280 CST (at 10°C) and set pressure of safety relief valve including accumulation (As per API 614 clauses). : * (Vendor to furnish actual value) 3.1.13 Motor rating required (1.25 times for motor power) absorbed by pump at operating condition : * (Vendor to furnish actual value) 3.1.14 Installation : Outdoor under the roof 3.1.15 Pumping temperature in °C : 50 Vendor shall make all possible efforts to comply strictly with the requirements of this design basis. In case deviation is considered essential by the vendor (after exhausting all possible efforts), these shall be clearly brought out and consolidated under technical exception chapter at bidding stage. However vendor specific deviation (if any) to applicable codes/specifications shall be subject to Customer/Consultant's approval during detail engineering Construction features, Instrumentation & controls, Inspection & testing etc. using Data sheets of auxiliaries indicating operating parameters, performance requirements respective manufacturer's standard data sheet formats.		
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	3.2.0 <u>DESIGN AND CONSTRUCTION FEATURES:</u> * marked data to be filled by vendor in pump data sheet 3.2.1 Type : Gear / Vane/Screw. 3.2.2 Pump Model number / Make : * Vendor to furnish 3.2.3 Direction of rotation : * Vendor to furnish 3.2.4 Shaft sealing : Oil seal 3.2.5 Suction end connection : 3" ANSI 150# SORF 3.2.6 Discharge end connection : 2" ANSI 300# SORJ 3.2.7 Pressure relief valve. : Line mounted Pr. relief valve * Vendor has to specify make & model in pump data sheet set pressure 10% over pump discharge pressure The safety valve shall be capable to deliver maximum flow delivered by the pump at 18 CST & 280 CST viscosity conditions. The safety valve is not allowed any venting during starting. 3.2.8 Coupling : Spacer type coupling 3.3.0 <u>MATERIALS OF CONSTRUCTIONS:</u> 3.3.1 Body : Manufacturer standard 3.3.2 Gear / Shaft : Manufacturer standard 3.3.3 Shaft seal : Oil seal (Nitrile) 3.3.4 "O" ring : Nitrile Rubber : 3.4 <u>SCOPE OF SUPPLY:</u> The following items are to be supplied as a console 3.4.1 Pump with AC motor drive and built in pressure relief valve 3.4.2 Diaphragm Flexible coupling. 3.4.3 Coupling guard in non spark proof construction. The total pump & driver shaft shall be covered by coupling guard. 3.4.4 Suitable strainer with SS filter element. 3.4.5 Suitable for priming of pump. Check valve in suction can be considered. 3.4.6 Commissioning spare if applicable.	
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4.0	<u>INSPECTION AND TESTING:</u>	
4.1	Pumps are to be tested with the job driver at suppliers work for its satisfactory performance Quality plan to be submitted along with offer and the same to be approved by BHEL	
4.2	<u>Additional tests:</u>	
4.2.1	Vibration shall not exceed 7 mm/sec (RMS) as measured on bearing housing at all measuring points.	
4.2.2	Noise level not to exceed 85 dBA	
5.0	<u>TEST AND GUARANTEE CERTIFICATES:</u>	
5.1	<u>TEST CERTIFICATE:</u> 2 copies of the manufacturer's material test certificates for performance of the pump (Pressure and quantity of oil) shall be supplied for each item of the consignment quoting BHEL standard number, Purchase Order number and manufacturer identification serial number.	
5.2	<u>GUARANTEE CERTIFICATE:</u>	
5.2.1	A guarantee certificate for 24 months of trouble free performance from the date of shipment or 18 months from the date of commissioning whichever is earlier shall be supplied.	
5.2.2	If any malperformance or defects occur during the guarantee period, the vendor shall make all necessary alteration, repairs, or replacement free of charge	
6.0	<u>SPECIAL NOTES:</u>	
6.1	Final documents as per clauses 8.2 & 8.3 shall also be furnished in hard copy.	
6.2	O&M manuals shall be furnished in hard copy.	
7.0	<u>DOCUMENTATION:</u> The list of engineering data would be a comprehensive one including all engineering data / drawings / information for all brought out items and manufacturing items. All the drawings/ documents submitted by the vendor during detailed engineering stage shall be stamped "For Approval" or For Information" prior to submission. After the approval of the drawing, further work by the vendor shall be in strict accordance with these approved drawings and no deviations shall be permitted with out the written approval of customer. All manufacturing, fabrication and execution of work in connection with the equipment / system. Prior to the approval of drawings, Shall be at the vendor's risk. The vendor is expected not to make any changes in the design of the approval of the drawings equipment / system, once they are approved by customer. However, if some changes are necessitated in the design of equipment / system at a later date. The vendor may do so, but such changes shall promptly be brought to the notice of customer indicating the reasons for the change and get the revised.	
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	drawing approved again in strict conformance to the provisions of the technical specification. The no of copies / prints/CD/manuals to be furnished as follows: Drawings, Data sheets, Curves for Information / approval 1 print Final Drawings, Data sheets, Curves for Information / approval 1 print Performance and functional guarantee test reports 2 prints O&M manual with project drawings, data sheets, performance and functional guarantee test reports. 2 Prints 8.0 <u>DOCUMENTS:</u> 8.1 Documents to be sent along with offer (1 copy) (Without following data, offers will not be considered) 8.1.1 The descriptive leaflets / catalogues giving full sectional details of the items. (Pump and Line mounted pressure relief valve). 8.1.3 Performance curves of the pump at different viscosities 8.1.4 Filled in data sheet of the pump as per supplier format 8.1.5 Overall dimensions of assembled pump with motor including location of foundation packets, suction and discharge connections. 8.1.5 Weight of the complete assembly. 8.1.6 Cross - sectional Drawing of the pump & Safety valve with bill of material 8.1.7 AC Motors shall be IE2 Motor as per IEC 60034-30, IS 12615 and IS 325 standard. 8.1.12 Quality plan. 8.1.13 GD² Value & speed - torque characteristic curve of the offered pump. 8.1.14 Supplier's painting program, including surface preparation, primer and paint material, and components effected, shall be described completely 8.2.0 <u>DOCUMENTS TO BE SENT AFTER PLACEMENT OF ORDER FOR APPROVAL. (WITHIN 15 DAYS)</u> (1 Sets of hard copies & 1 Set of copy) 8.2.1 Final Pump data sheet as per Customer/consultant/API formats. 8.2.2 Overall G.A along with foundation details and cross sectional drgs for both Pump & Safety valve. 8.2.3 Performance curves of the pump at different viscosities	
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8.2.4 8.2.5 8.2.6 8.2.7 8.3 8.3.1 8.3.2 8.3.3 8.3.4 8.3.5 8.3.6 8.3.7 8.3.8 8.4 8.4.1 8.4.2 8.4.3 8.4.4 8.4.5 8.4.6 8.4.7 9.0.0 9.1.0 9.1.1 9.1.2 9.2.0 9.2.1 9.2.2 9.2.3	AC Motors shall be IE2 Motor as per IEC 60034-30, IS 12615 and IS 325 standard. Quality plan Cross - sectional drawing of the pump & Safety valve with bill of material. Supplier's painting program, including surface preparation, primer and paint material, and components effected, shall be supplied <u>DOCUMENT TO BE SUBMITTED AFTER APPROVAL</u> (1 Set of hard copies & 1 Set of copy) General arrangement drawing of the pump & safety valve Performance curve of the pump at different viscosities Final Pump data sheet as per Customer/consultant/API formats Quality plan AC Motors shall be IE2 Motor as per IEC 60034-30, IS 12615 and IS 325 standard. Supplier's cleaning & painting procedure Cross-sectional drawing of pump & safety valve with bill of materials O & M Manuals <u>DOCUMENT ALONGWITH CONSIGNMENT.</u>(1 COPY EACH) Hydrostatic pressure test certificate for pump casing. Performance test data calculations, performance curves and certificates Material test certificates for pump. Motor document (Data sheet, GAD and curve). Guarantee test certificate. List of spares along with ordering instructions. Installation, operation & maintenance manuals (2 Copies). <u>SPARES:</u> <u>COMMISSIONING SPARES:</u> The following commissioning spares shall be supplied along with main equipment. Spare "O" ring for pump ... 1No / each pump Spare set of oil seal for pump ... 1 Set. / each pump. <u>2-YEAR NORMAL OPERATIONAL SPARES:</u> Vendor to offer spares with split price & the validity of spares shall be 1 year after placement of main equipment order. Spare set of oil seal for pump Spare set of Bearings (DE+NDE) for JOP drive motor. Spare terminal block for JOP drive motor. Spare cooling fan for JOP drive motor.	
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10.0 11.0 12.0 13.0	<u>RATING PLATES</u> A rating plate of non-corrosive material upon which shall be engraved Manufacturer's name, pump type, pump model, Serial no. of pump, Capacity, Discharge pressure, Speed in RPM for pump and delivery flow, type, model, set pressure , accumulation pressure of pilot operated line mounted pressure relief valve. These rating plates shall be of White non-hygrosopic material with engraved black lettering. <u>PROTECTION AND PRESERVATIVE COATING REQUIREMENTS:</u> All coated surfaces shall be protected against abrasion impact, discoloration any other damages. All exposed threaded portions shall be suitably protected with either metallic or a nonmetallic protection device. The shaft ends of motor shall be properly sealed with suitable devices to protect them from damage The parts which are likely to get rusted due to exposure to whether, should also be properly treated and protected in a suitable manner. All primers / paints / coatings shall take into account the hot humid, corrosive & alkaline, subsoil or over ground environment as the case may be. Preservative shop coating: All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces that will not be easily accessible after the shop assembly shall be treated before hand and protected for the life of the equipment All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and pre heated in the shop. The surfaces that are to be finish painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of Customer / BHEL <u>PAINT AND FINISH</u> Motor external parts shall be finished and painted to produce a neat and durable surface, which would prevent rusting, and corrosion. The equipment shall be thoroughly degreased, all rust, sharp edges and scale removed and treated with one coat of primer and finished with two coats of RAL 9002 Grey paint. <u>PACKING:</u> The equipment shall be properly packed to withstand mechanical damage and rust during transit.	
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14.0 <u>MARKING:</u> 14.1 The manufacturer’s serial number and year of manufacturing shall be marked at suitable locations viz. name plate. 14.2 A tag bearing the relevant 12 digit material code shall be attached for each item 14.3 The nameplate of the pumps shall contain the following information 14.3.1 Manufacturer's name or trademark and serial number. 14.3.2 Pump serial number. 14.3.3 BHP of the pump. 14.3.4 Fluid handled. 14.3.5 Quantity of oil. 14.3.6 Discharge pressure 14.4 Following details shall be marked on the packing case. 14.4.1 Manufacturer's Name 14.4.2 B.H.E.L Purchase order number. 14.4.3 B.H.E.L Standard number 14.4.4 B.H.E.L Material code number 15.0 <u>SCHEDULE OF QUALITY CHECKS FOR LUBE OIL PUMP.</u> 15.1 Inspection &Testing for motor to be followed as per IS 325, IEC 60034, IS 12615. 15.2 Checks B S 15.2.1 Material certification 2 3 15.2.2 Shop Inspection 2 3 15.2.3 Dimensional check 1 3 15.2.4 Hydrostatic test pressure for pump 1 3 15.2.5 Pump running / mechanical and performance test 1 3 15.2.6 Radiography test on weld joints 2 3 15.2.7 Disassembly and inspection of complete pump after test 1 3 <u>AGENCY:</u> B S BHEL SUPPLIER			
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TYPE OF INSPECTION: 1 : Witnessed 2 : Review of certificates 3 : Certificate check by manufacturer 16.0 SPECIAL NOTE: Before forwarding the drawings and documents, vendor shall ensure that the following information is properly entered in each drawing. Name of the equipment. Equipment tag number. Name of the project. Client. Drawing / Document title & number. Revision and date.		
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