	SPECIFICATION FOR IMPULSE STEAM TRAPS WITH INTEGRAL STRAINER	TOS:NTPC:441 Rev.:00 Sheet No.1/2

1.	Item Name and size	:	Impulse Steam Trap, NB 15
2.	Body size	:	NB 15
3.	Body Rating	;	ANSI 300 lbs
4.	End Connection	:	Socket weld
5.	Socket Weld Bore	:	21.72 to 21.97 mm (to suit NB 15 SCH40 Tube)
6.	Trap Materials	:	
	a) Body	:	Cast carbon steel
	b) Valve seat assembly	:	Stainless steel
	c) Strainer element	:	Stainless steel (AISI 316 / AISI 304)
7.	Max. Operating Pressure	:	32 kg/cm^2 (g)
8.	Trap capacity	:	Minimum 50 kg/hr over the operating DP range.
9.	Differential Pressure across trap	:	1.5 to 15 kg/cm^2 (g)
10.	Inlet strainer	:	Integral, built in.
11.	Strainer Mesh	:	0.5mm (500 microns)

12. Certificates and Documents to be furnished by the vendor:
    a) Quality Plan in NTPC format shall be submitted for approval.
    b) IBR certificate in FORM-IIIC.
    c) Body hydraulic test done at 48 kg/cm^2 (g).
    d) Certificate of material and dimensional compliance.
    e) DP Vs Discharge performance type test for each lot.
    f) Certificate of chemical composition and mechanical properties of major components.

	Name	Signature	Date
Prepared	**Srinivas Arugula**		**16.07.07**
Checked	**M.Anbazhagan**		**16.07.07**
Approved	**Md Farooq Basha H**		**16.07.07**

13. MARKING

In addition to manufacturer's standard nameplate, name tags carrying item name and BHEL material code shall be permanently affixed to each strainer.

14. PACKING

All interior surfaces applied with rust preventive, oil Ends firmly capped Bulk supplies packed in wooden boxes with suitable packing material and well protected against ingress of water and transit damages.

15. INWARD INSPECTION

Verification of Nametag, Nameplate details and test certificates, Socket bore dimensions and surface finish shall be carried out.

16. Along with quotation vendor shall submit point to point reply to Along with quotation vendor shall submit point wise confirmation to this specification and vendor shall enclose catalogues, sectional drawings, graphs and other relevant details to assess the offer for its technical conformity to this specification.

	Name	Signature	Date
Prepared	Srinivas Arugula		16.07.07
Checked	M.Anbazhagan		16.07.07
Approved	Md Farooq Basha H		16.07.07

	SPECIFICATION FOR INVERTED BUCKET TYPE STEAM TRAPS	TOS:NTPC:440 Rev.:00 Sheet No.1/3

1. Item Name and size

Item-1	:	Inverted Bucket type Steam Trap NB 50
Item-2	:	Inverted Bucket type Steam Trap NB 40
Item-3	:	Inverted Bucket type Steam Trap NB 25
Item-4	:	Inverted Bucket type Steam Trap NB 20

2. Body size

Item-1	:	NB 50
Item-2	:	NB 40
Item-3	:	NB 25
Item-4	:	NB 20

3. Body Rating ; 24 Kg/cm^2(g) at 315°C

4. Trap inlet strainer : 0.5mm Mesh size (500microns) Integral, built in.

5. End Connection : Socket weld
Bottom entry, top outlet in line along axis.

6. Socket Weld Bore :
   a) Item-1 : 61.11 to 61.37mm (To suit NB50 SCH40 Tube)
   b) Item-2 : 48.64 to 48.90mm (To suit NB 40 SCH40 Tube)
   b) Item-3 : 33.8 to 34.15mm (To suit NB 25 SCH40 Tube)
   b) Item-4 : 21.72 to 21.97mm (To suit NB15 SCH40 Tube)

7. Materials :

a)	Body	:	Cast carbon steel
b)	Bucket	:	Stainless steel (AISI 316 / AISI 304)
c)	Valve seat assembly	:	Stainless steel (AISI 316 / AISI 304)
d)	Strainer element	:	Stainless steel (AISI 316 / AISI 304)

	Name	Signature	Date
Prepared	Srinivas Arugula		16.07.07
Checked	M.Anbazhagan		16.07.07
Approved	Md Farooq Basha H		16.07.07

8. Max. operating DP : 17.5 kg/cm^2(g)

9. Normal operating DP : 9.0 kg/cm^2(g)

10. Min. operating DP : 5.0 kg/cm^2(g)

11. Trap capacity at Max. DP :
    a) Item-1 : 8200 kg/hr
    b) Item-2 : 4500 kg/hr
    c) Item-3 : 1500 kg/hr
    d) Item-4 : 600 kg/hr

12. Trap capacity at Normal DP :
    a) Item-1 : 6500 kg/hr
    b) Item-2 : 3500 kg/hr
    c) Item-3 : 1250 kg/hr
    d) Item-4 : 450 kg/hr

13. Trap capacity at min. DP :
    a) Item-1 : 4400 kg/hr
    b) Item-2 : 2250 kg/hr
    c) Item-3 750 kg/hr
    d) Item-4 : 300 kg/hr

14. Certificates and Documents to be furnished by the vendor :
    a) Quality Plan in NTPC format shall be submitted for approval.
    b) IBR certificate in FORM-IIIC.
    c) Body hydraulic test done at 48 kg/cm^2(g).
    d) Certificate of material and dimensional compliance.
    e) DP Vs Discharge performance type test for each lot.
    f) Certificate of chemical composition and mechanical properties of major components.

15. PAINTING

    External surfaces shall be de-rusted, de-greased and epoxy coated.

16. MARKING

    In addition to manufacturer's standard nameplate, name tags carrying item name and BHEL material code shall be permanently affixed to each strainer.

	Name	Signature	Date
Prepared	Srinivas Arugula		16.07.07
Checked	M.Anbazhagan		16.07.07
Approved	Md Farooq Basha H		16.07.07

17. PACKING

All interior surfaces applied with rust preventive, oil Ends firmly capped Bulk supplies packed in wooden boxes with suitable packing material and well protected against ingress of water and transit damages.

18. INWARD INSPECTION

Verification of Name tag, Name plate details and test certificates, Socket bore dimensions and surface finish shall be carried out.

19. Along with quotation vendor shall submit point to point reply to Along with quotation vendor shall submit point wise confirmation to this specification and vendor shall enclose catalogues, sectional drawings, graphs and other relevant details to assess the offer for its technical conformity to this specification.

	Name	Signature	Date
Prepared	Srinivas Arugula		16.07.07
Checked	M.Anbazhagan		16.07.07
Approved	Md Farooq Basha H		16.07.07

SPECIFICATION FOR FO DUPLEX TYPE 6-PORT INTEGRAL CHANGE OVER COCK STRAINER

1. **BINDING DOCUMENTS:**

   This specification TOS:ANG:400 shall form part of the purchase order and be fully complied with.

2. **TECHNICAL REQUIREMENTS:**

   a) For flow parameters, size etc., refer to the sheet 04 of 04 of this specification.

   b) Duplex, basket type of compact design with preferably 6-Port integral changeover cock.

   c) The net Free flow area of filter element shall not be less than six times the specified line size, per section. In case of pleated element design, the foldings shall be properly spaced and guided at the end plates, so that they do not cluster and they do not make the free flow area ineffective.

   d) There shall not be flow interruption while manipulating the changeover cock.

   e) The changeover cock shall offer good seat closure tightness and the idle section shall be serviceable when the other is working.

   f) The changeover cock shall be of single lever and of 90° operation.

   g) The pressure drop shall be less than 0.1 bar for suction strainer and 0.2 bar for the discharge strainer at specified maximum viscosity and flow rate, with clean element.

   h) The above figures shall be less than 0.35 bar and 0.7 bar respectively with 50% clogged element.

   i) Flow across the filter basket shall be from inside to outside and of sturdier construction to accept higher operating differentials.

   j) Body shall be of cast iron or fabricated steel for suction service cast steel or fabricated steel for discharge service.

   k) Filter mesh and support sheet shall be of 321 SS.

   f) HFO strainer shall be with steam jacketing for maintaining the oil flow temperature. Steam operating pressure 16 kg/cm^2. Steam operating temperature 210 °C.

   g) LFO strainer shall be without steam jacketing.

3. **CONNECTIONS**

a) Inlet/Outlet flanges as per ANSI to specified rating and of size equal to the specified line size and arranged on either side of body.
b) Drains - 100mm long 1" SCH40 pipe with plug at the body sides, on the outlet nozzle end.
c) Vents - 100mm long 1/2" SCH40 pipe with plug on the cover top.
d) Pressure taps - Vendors standard tappings with plug.

4. MARKING

a) Stainless steel name plate with the following boldly engraved shall be firmly fixed to the body :

Maker's name and Production Serial No., Service, BHEL Material Code, Tag No., Size and Rating of the Strainer Body, Degree of filtration and maximum allowable DP

f) Inlet/Outlet Nozzles and the diverting cock handle positions shall be legibly identified by metallic labels.

5. PAINTING

a) Following hydraulic test and drying, all the interior surfaces shall be applied with rust preventive oil.
b) All exposed surfaces shall be degreased, derusted and epoxy coated over red oxide primer.

6. PACKING

a) Inlet and Outlet nozzles properly capped to prevent ingress of water and dust and all the openings shall be firmly capped.
b) Assemblies shall be seaworthy packed in wooden grate with sufficient struts and packing materials and with water proof under-cover.

7. INSPECTION & TEST CERTIFICATES :

f) Quality Plan in NTPC format shall be furnished.
g) Check all the dimensions.
c) Pressure drop results for clean and dirty conditions of similar strainers from other sites (two sites) shall be submitted for purchaser's review.
d) Body hydraulic test with 1.5 times the cold working pressure.
e) Witnessing & verifying hydraulic testing.
f) Diverting cock seat leak test done at the operating pressure.

g) Check locations of nozzles, stubs and foot and squares of nozzles & flanges and orientation of flange drillings.

h) Verification of shop records for material and stage inspections.

i) Certificates on Chemical composition and Mechanical properties shall be furnished.

j) Visual Inspection of weld quality and workmanship, welding shall be checked by dye penetrant test

k) Welding shall be carried out by qualified welders with qualified procedures for which records will be shown for verification.

l) Verity main name plate & name tags on all nozzles & stubs.

m) Clearance for painting after ascertaining surface preparation.

8. INWARD INSPECTIONS

a) Verify works inspection reports, workmanship, finish, marking particulars and scope of supply.

b) Watch for damages.

c) Check all the mounting dimensions and terminal connections.

d) Random check on internals.

9. DOCUMENTS TO BE SUBMITTED

a) Along with the quotation the following documents are to be submitted in full for Technical evaluation :

a) Overall dimensional drawing with connection details.

b) Cross sectional drawing with parts and materials identified

c) Pointwise confirmation/deviation to this specification.

d) Details of manufacturing and Inspection facilities available with the vendor.

e) Operation and Maintenance Manuals.

f) Spares quotation for 3 years operation with clear description, part number, identification drawings, break-up price and with six months validity.

NALCO ANGUL

2X120 MW

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01	Service	HFO Discharge		
02	Tag No.	HO27A		
03	BHEL Matl. Code	L015514220010001		
04	Quantity	2(1+1)		
05	Make			
06	Production Sl. No.			
07	Model No.			
08	Line Fluid	HFO		
09	Flow Maximum	165		
10	Pour point	12		
11	Operating Pressure	16		
12	Flow Temperature	135		
13	Flow Sp. gravity	0.98 KG/LIT		
14	Flow viscosity	20 CST		
15	Line size	NB 40		
16	Body size	NB 40		
17	Body rating	ANSI 300LBS		
18	Body material			
19	Cover material			
20	Cock material			
21	Gasket material			
22	Body test pressure			
23	Cock seat test pressure			
24	Cock leak rate			
25	No. of per section			
26	Degree of filtration	250 Microns		
27	Filtering direction	IN TO OUT		
28	Total filter area/section			
29	Net filter area/section			
30	DP when clean			
31	DP at 50% clogged			
32	Max. allowable DP			
33	Mesh material			
34	Support gauze material			
35	Steam Jacketing	Required		
36	Equalising valve			
37	IN / OUT nozzle			
38	Drain	1" SCH 40; 100 mm		
39	Vent	½" SCH 40; 100 mm		
40	Pressure gauge	1" SCH 40		
41	Testing code			
42	Dimensional Drg.			

UNITS: Flow: liquids in LPM; Pressure: Kg/cm^2(g); Temperature:°C

FOR BHEL.

Prepared

Checked

Approved

Date:- 18/08/06

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02	Tag No.	LO01A		
03	BHEL Matl. Code	A015514201001001		
04	Quantity	1		
05	Make			
06	Production Sl. No.			
07	Model No.			
08	Line Fluid	LDO		
09	Flow Maximum	300		
10	Pour point	12		
11	Operating Pressure	6		
12	Flow Temperature	35		
13	Flow Sp. gravity	0.83 KG/LIT		
14	Flow viscosity	2.5-15.7 CST		
15	Line size	NB 150		
16	Body size	NB 150		
17	Body rating	ANSI 150LBS		
18	Body material			
19	Cover material			
20	Cock material			
21	Gasket material			
22	Body test pressure			
23	Cock seat test pressure			
24	Cock leak rate			
25	No. of per section			
26	Degree of filtration	250 Microns		
27	Filtering direction	IN TO OUT		
28	Total filter area/section			
29	Net filter area/section			
30	DP when clean			
31	DP at 50% clogged			
32	Max. allowable DP			
33	Mesh material			
34	Support gauze material			
35	Steam Jacketing	Not Required		
36	Equalising valve			
37	IN / OUT nozzle			
38	Drain			
39	Vent			
40	Pressure gauge			
41	Testing code			
42	Dimensional Drg.			

UNITS: Flow: liquids in LPM; Pressure: Kg/cm^2(g); Temperature:°C

For Bharat Heavy Electricals Limited

Prepared Checked Approved Date 10/04/06.

NALCO ANGUL

2X120 MW

CUST NO:0155,0156

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A/A

01	Service	HFO		
02	Tag No.	HO01A		
03	BHEL Matl. Code	A015514202007001		
04	Quantity	1		
05	Make			
06	Production Sl. No.			
07	Model No.			
08	Line Fluid	HFO		
09	Flow Maximum	400		
10	Pour point	12		
11	Operating Pressure	6		
12	Flow Temperature	50		
13	Flow Sp. gravity	0. 98 KG/LIT		
14	Flow viscosity	170CST-370 CST		
15	Line size	NB 150		
16	Body size	NB 150		
17	Body rating	ANSI 150LBS		
18	Body material			
19	Cover material			
20	Cock material			
21	Gasket material			
22	Body test pressure			
23	Cock seat test pressure			
24	Cock leak rate			
25	No. of per section			
26	Degree of filtration	500 Microns		
27	Filtering direction	IN TO OUT		
28	Total filter area/section			
29	Net filter area/section			
30	DP when clean			
31	DP at 50% clogged			
32	Max. allowable DP			
33	Mesh material			
34	Support gauze material			
35	Steam Jacketing	Required		
36	Equalising valve			
37	IN / OUT nozzle			
38	Drain			
39	Vent			
40	Pressure gauge			
41	Testing code			
42	Dimensional Drg.			

UNITS: Flow: liquids in LPM; Pressure: Kg/cm^2(g); Temperature:°C

For Bharat Heavy Electricals Limited

Prepared Checked Approved Date 18/08/06.

SPECIFICATION FOR CRUDE OIL PUMP- MOTOR ASSY

1. The specification Contains :
   Part I - Standard Requirement , Page : 2 & Data Sheet :1
   Part II A - Vendor check list
   Part II B - Special contract requirements.
2. If the requirement of part II B is differing with part I, the requirement of part II B will be mandatory. Vendor should fill up the Part II after studying Part I and submit along with offer.
3. Vendor should fill up the Part I datasheet if any after placement of order and submit for approval.
4. Vendor offer will be rejected if part II is not filled up and submitted with offer or incomplete submission.

PREPARED BY:	CHECKED BY:	APPROVED BY :	DATE:
S.Gomathinayagam	S.V.Sivaramulu	Dr.R.Sesharajan	09.01.08

REV No.	DETAILS	REVISED BY	APPROVED BY	DATE

PART - I : SPECIFICATION FOR CRUDE OIL PUMP- MOTOR AND BASE FRAME.

1. SCOPE : Design, manufacture, test & supply of pump and motor complete assembly consists of coupling, fasteners, gaskets and base frame as per the specification.

2. APPLICABLE STANDARDS : VDMA 24284 performance testing (Pump).

3. BINDING DOCUMENTS:

This Specification kosti_TOS 1800 and the final vendor check list shall form part of the purchase order, and fully complied with.

4. TECHNICAL REQUIREMENTS:

A. For performance data & others refer to Vendor check lists.
B. Triple screw, hydraulically balanced to eliminate end thrust; pulsation free discharge & low noise level and capable to handle waxy crude oil blend which is having vapour content of 5% max.
C. Cartridge type elements for ease of maintenance & replacement.
D. All materials & construction shall be suitable for specified pumping temperature & to meet all the performance needs.
E. Horizontal execution - axial suction nozzles through the end cover & top vertical discharge nozzle – flanged to ANSI 150 Lbs & 300 Lbs respectively.
F. Provide steam heating with full jacketing.
G. Screws of nitrided & hardened steel; inner casing & bushes of cast steel; welded steel / cast steel body.
H. The pump selection criteria should include consideration of oil vapour pressure, abrasive and corrosive contaminants, mechanical shaft seals to minimise leakage and lubricity of the oils.
I. Double acting mechanical seal, with Viton o-ring. Steam seal injection supplement to the mechanical seal should be considered with ½" NPT port connection with plug in the pump design.
J. Externally mounted adequately sized bearing with grease nipple for lubrication.
K. Built - in safety valve - spring adjustable over a range of plus minus 50% of the specified discharge pressure - over pressure within 10% of set value for relieving pump's maximum capacity - mounted on left side of the pump body as seen from motor end.
L. Include adequately sized Pin Type Flexible coupling of three piece construction - Flender N - Eupex series A or equivalent.
M. The noise level shall be limited to 85 dBA, measured at 1 meter distance.

5. **DRIVE MOTOR : Refer Specification TCI 141 and CO:TOS :802.**

BASE FRAME : Base frame shall be such that, it accommodate pump, motor, suitable coupling with coupling guard. All components shall be within the base frame. None of the component shall exceed base frame edges.

6. MARKING:

A. Stainless steel nameplates with 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 and speed corresponding to the maximum operating viscosity; body rating and safety valve set pressure range.
For motors refer Specification TCI 141 and TOS :802
B. Each spare shall be individually tagged with part name, makers name & spare code and BHEL code .

7. PAINTING

A. All interior surfaces applied with rust preventive oil, following hydraulic test, drying or performance test.
B. All exposed surfaces degreased, dressed and epoxy coated. (Ref. Special contract requirement-page 7/7)

8. PACKING

A. All opening shall be firmly capped against ingress of water or dust.
B. Shall be seaworthy, and long storage packed in wooden boxes with water proof under cover.
C. Liberal packing material & struts shall be used to arrest rolling & to protect from transit damages.

9. TEST CERTIFICATES:

Following Works TCs shall be submitted along with the supplies; Refer to column on special contract requirements for any Third Party witnessing requirements.
A. Body hydraulic test done at 1.5 times the relief Valve Set pressure.
B Performance test on each of pump and spare cartridge assy. on standard (crude) oil over the entire operating range, with the curves extrapolated for the specified oil.
C. Material certificate for body, inner casing & Screws.
D. As inspected data on hardness and clearances between screws and inner casing.
E. Dimensional certificate for overall dimensions and all terminal connections.

F. All tests envisaged in the standard quality plan should be carried out.

10. INWARD INSPECTION:

A. Verify the works test certificates, marking particulars and the scope of supply
B. Watch for damages.
C. Perform random check on all mounting dimensions and terminal connections and coupling details.

11. OPERATING & INSTRUCTIONAL MANUALS:

Minimum of 3 sets comprising of documents listed under 12a, 12b, 12d & 12f below shall be furnished within 15 days from the date of purchase order along with soft copy.
Hydro test certificates, Operating instructions and Spares identification drawings.

12. Along with the Quotation, submit following documents in full for Technical Evaluation:

A. Completely filled-in Vendor check list.
B. Pr. Vs Flow and Pr Vs BHP curves at min. cst and max cst.
C. Full pump designation with description of the designation codes.
D. **All** documents refereed under 'Reference Documents' part-of the Vendor check list (Over all dimensional drg; performance curves; catalogues, drg and O&M manuals of the pump cartridge and all mountings)
E. Lubricant grade, quantity per fill and frequency of filling for the bearings;
F. NPSH requirements of the pump at min./max. cst , with curves for Crude Oil pump.
G. Relief valve capacity curve as Plotted against set pressure and over pressure.
H. Spares quotation for 3 yrs operation with clear description, part number, identification drawings break up price with 6 months validity.

PART-I: PUMP DATA SHEET (Crude oil)

Material code : A015714202002001, A015914202002001

A.PERFORMANCE DATA			F. MECHANICAL SEAL		
1. OIL GRADE	Crude Oil Blend (vapour content 5% max)		1.ACTION	DOUBLE WITH STEAM FLUSHING	
2. OIL POUR POINT	+39 °C		2.MAKE		
3. SP.GRAVITY AT 15°C	0.91		3.MODEL No.& SIZE		
4.PUMPING TEMP.	60 °C		4.O RING SPRING MATL.		
5. OIL VISCOSITY min/max	20 CST	163 CST	5.ROTARY RING MATL.		
6.CAPACITY AT min.CST	685 LPM		6.STATIONARY RING MATL.		
7.CAPACITY AT max. CST	Vendor to specify LPM		7.SUCTION PRESS. MAX.	Kg/Cm² (g)	
8.SUCTION PRESSURE	- 0.5 Kg/Cm² (g)		8. PORT CONN. DETAIL		
9.DELIVERY PRESSURE	30 Kg/Cm² (g)		G.SAFETY RELIEF VALVE - INTEGRAL		
10.NPSH REQUIRED	<5 METERS WC AT MAX.CST		1.MAKE		
11.RPM	1500		2.MODEL No.& SIZE		
12.SENSE OF ROTATION	CW AS SEEN FROM MOTOR END		3.CAPACITY		
13.BHP AT min.CST	Vendor to specify KW		4.SET PRESSURE	5 Kg/Cm² (g) above delivery press	
14.BHP AT max. CST	Vendor to specify KW		5.OVER PRESSURE		
15. PUMP EFFICIENCY	% @ MIN. cst.		6.SPRING ADJUST RANGE	Kg/Cm² (g) TO	Kg/Cm² (g)
			7.RELIEF OUTLET	INTERNAL OR EXTERNAL	
B.PERFORMANCE GRAPHS			8. RELIEF OUTLET CONN.	INCH, 350LBS FLANGED	
1.PRESS.VS FLOW & BHP			9.HANDWHEEL		
2.CST VS NPSH REQD.					
3.SPEED VS TORQUE			H.STEAM JACKET	Required (Cl. 4F)	
			1.STYLE	FULL JACKET	
C.PUMP CONSTRUCTION DETAILS			2.PRESS. DESIGN/TEST	Kg/Cm² (g)	Kg/Cm² (g)
1.MOUNTING	Vertical / Horizontal / Flange / Foot		3.CONNECTION IN / OUT	Inch npt(f)	Inch npt(f)
2.PITCH & ROTOR DIA	mm	mm			
3.PUMP GD²	Kg / Cm²		I.DRIVE MOTOR		
4.NOZZLES IN	INCH 150 LBS FLANGED		1.MAKE OR FRAME SIZE		
5.NOZZLES OUT	INCH 300 LBS FLANGED		2.KW,V,PHASE& HZ		
6.INLET NOZZLE POSITION	Horizontal axial thru end cover		3.DIMENSIONAL DRG.		
7.OUTLET NOZZLE POSIT.	Vertical Top		4.DATA SHEET REF.		
8.BODY & COVER MATL.					
9.INSERT MATL.			J.PERFORMANCE GUARANTEE		
10.ROTOR SHAFT MATL			1.PER VDMA 24284 GROUP-II and Ref Special requirements.		
11.IDLERS MATL					
12.BEARING BUSH MATL.					
13.BASE FRAME MATL			K.TEST CERTIFICATES & INSPECTION		
14.BODY DESIGN /TEST PR.	Kg/Cm² (g)	Kg/Cm² (g)	1.BODY HYDRO TEST ;		
			2. PERFORMANCE TEST ON EACH CARTRIDGE		
D.BEARINGS			3.RELIEF VALVE OVER PRESSURE TEST		
1.TYPE AND NUMBER OFF					
2.POSITION	EXTERNAL		L. O & M REFF. DOCUMENTS (fill compulsorily)		
3.ISO No. & CLEARANCE			1.PUMP DESIGNATION SHEET :		
4.LUBRICANT GRADE			2.PERFORMANCE GRAPHS : AS UNDER SECTION - B		
5.QTY. & FILLING FREQ.			3.DIMENSIONAL DRAWINGS :		
			PUMP – MOTOR, FRAME ASSY.		
E.COUPLING (3PIECE, PIN - PUSH)			PUMP :	CARTRIDGE:	
1.MAKE			RLF. VALVE :	COUPLING :	
2.MODEL No. & SIZE			4.SECTIONAL DRGS. WITH SPARES IDENTIFICATION :		
3.GD²	Kg / Cm²		PUMP BODY :	CARTRIDGE :	
4.DOUBLE PIECE SIDE			RLF. VALVE :	SEAL :	
5.SINGLE PIECE			5. O&M INSTRUCTIONS :		
			PUMP ;		
			COUPLING :	SEAL :	

PREPARED BY (VENDOR)	DATE	APPROVED BY (BHEL)	DATE

PART - II : VENDOR CHECK LIST FOR FO SCREW PUMP (Crude oil)

BHEL MATERIAL CODE: A015714202002001, A015914202002001 ENQUIRY No.

IIA	BHEL SPECIFICATION		VENDOR CONFIRMATION	
A.PERFORMANCE DATA				
1.Oil Grade	CRUDE OIL BLEND (vapour content 5% max)			
2.Oil Pour Point	39 ^{0}c			
3.SP Gravirty at 15 ^{0} C	0.91			
4.Pumping temp.	60 ^{0}c			
5.Oil viscosity at Min./ Max	20 CST	163 CST		
6.Capacity at minimum cst	685 LPM			
7. Capacity at maximum cst	Vendor to specify			
8.Suction Pr.	-0.5 kg/cm^2 (g)			
9.Delivery pressure	30 kg/cm^2 (g)			
10. NPSH required	< 5 Meters Wc at max.CST			
11. RPM	1500			
12. Sense of rotation	CW as seen from motor end			
13. BHP at min. CST	Kw			
14. BHP at max. CST	Kw			
15. Motor Efficiency	% @ Min. cst			
B. PERFORMANCE GRAPHS				
1.Press. vs Flow & BHP				
2. CST vs NPSH required				
3. Speed vs Torque				
C.PUMP CONSTRUCTION DETAILS				
1.Mounting	Vertical/Horizontal/Flanged/Foot			
2. Pitch & Rotor dia.	mm	mm		
3. Pump GD^2	Kg/cm^2			
4. Nozzle In	inch 150LBS Flanged			
5. Nozzle out	inch 300 LBS Flanged			
6. Inlet nozzle position	Horizontal axial thru end cover			
7. Outlet nozzle position	Vertical Top			
8. Body & Cover Matl	ASTM 216WCB/ A106GrB/ 515Gr70			
9. Insert Matl	Cast steel			
10.Rotor shaft Matl	Nitrided Steel			
11.Idlers Matl	Nitrided Steel			
12. Bearing Bush Matl.	Cast steel			
13. Base frame Matl.				
14. Body Design / Test Pr.	kg/cm^2 (g)	kg/cm^2 (g)		
D. BEARINGS				
1.Type & Number off				
2. Position	External			
3. ISO No. & Clearance				
4. Lubricant Grade				
5. Qty. & Filling Frequency				
E. COUPLING (3 PIECE, PIN - PUSH)			**2 Piece is not acceptable**	
1.Make				
2.Model no. & Size				
3. GD^2	kg / cm^2			
4. Double Piece side				
5. Single piece				

BHEL			VENDOR		
PREPARED BY	APPROVED BY	DATE	PREPARED BY	APPROVED BY	DATE
Bhagat		2/8/08			

PART - II VENDOR CHECK LIST FOR FO SCREW PUMP **(Crude oil)**

BHEL MATERIAL CODE: A015714202002001, A015914202002001 ENQUIRY No.

II A	BHEL SPECIFICATION		VENDOR CONFIRMATION
F. MECHANICAL SEAL			
1. Action	Double with steam flushing		
2. Make			
3. Model no. & size			
4. O Ring Spring Matl.			
5.Rotary Ring Matl.			
6. Stationary Ring Matl			
7.Suction Press. Max.	Kg/ cm^2 (g)		
G. SAFETY RELIEF VALVE - INTEGRAL			
1.Make			
2.Model no. & size			
3. capacity			
4.Set pressure	5 Kg/ cm^2 (g) above delivery pr.		
5. Over pressure			
6.Spring adjust range	Kg/ cm^2 (g) to Kg/ cm^2 (g)		
7. Relief outlet	Internal or External ?		
8. Relief outlet connection	inch ,300LBS ,Flanged		
9. Handwheel			
H. STEAM JACKET	**REQUIRED**		
1.Style	Full jacket		
2.Press. Design / Test	16 kg/ cm^2 (g)	24 Kg/ cm^2 (g)	
3. Connection In / Out	0.5" NPT (F)	0.5" NPT (F)	
I. DRIVE MOTOR :			
1. Make & Frame Size			
2. Kw,V,Phase & Hz			
3. Dimentional Drawing			
4. Data Sheet ref.			
J .PERFORMANCE GAURANTEE			
1. Per VDMA 24284 Group - II			
K. TEST CERTIFICATES & INSPECTION			
1. Body hydro test			
2. Performance test			
3. Relief valve over pressure test			
4 Third perty inspection	Specify		
L.O&M REFERENCE DOCUMENTS (fill compelsorily)			
1. Pump Designation Sheet			
2.Performance Graphs	As under section - B		
3. Dimentional Drawings			
3.1 Pump, motor & Base frame Assy			
3.2 Pump			
3.3 Cartridge			
3.4 Relief Valve			
3.5 Coupling			
3.6 Motor			
4. Sectional Drawings with Spares identification			
4.1 Pump body			
4.2 Cartride			
4.3 Relief valve			
4.4. Seal			
4.5 Motor			

BHEL			VENDOR		
PREPARED BY	**APPROVED BY**	**DATE**	**PREPARED BY**	**APPROVED BY**	**DATE**
		7/8/08			

PART - II : VENDOR CHECK LIST FOR FO SCREW PUMP **(Crude oil)**

BHEL MATERIAL CODE: A015714202002001, A015914202002001 ENQUIRY No.

IIA	BHEL SPECIFICATION	VENDOR CONFIRMATION
L.MARKING		
1.Stainless Steel Name Plate		
2.Spares shall be individual tagged		
M. PAINTING		
1.Epoxy Ref. Enclosed spec. for this.		
N. PACKING		
1. Openings Firmly Capped		
2. Seaworthy		

IIB	SPECIAL CONTRACT REQUIREMENT,IF ANY	
	1.0 Steam injection supplement to the mechanical seal should be considered in the pump design. 2.0 Read Crude oil in place of HFO in the specification and drawings. 3.0 Base frame, motor, required fasteners and gaskets are in the scope of vendor. (USE AN ANNEXURE IF THIS SPACE IS INDEQUATE)	

BHEL			VENDOR		
PREPARED BY	APPROVED BY	DATE	PREPARED BY	APPROVED BY	DATE
		7/8/09			

SPECIFICATION FOR GAS OIL PUMP- MOTOR ASSEMBLY

1. The specification Contains :
   Part I - Standard Requirement , Page : 2 & Data Sheet :1
   Part II A - Vendor check list
   Part II B - Special contract requirements.
2. If the requirement of part II B is differing with part I, the requirement of part II B will be mandatory. Vendor should fill up the Part II after studying Part I and submit along with offer.
3. Vendor should fill up the Part I datasheet if any after placement of order and submit for approval.
4. Vendor offer will be rejected if part II is not filled up and submitted with offer or incomplete submission.

PREPARED BY: S.Gomathinayagam	CHECKED BY: S.V.Sivaramulu	APPROVED BY : Dr.R.Sesharajan	DATE: 09.01.08

REV No.	DETAILS	REVISED BY	APPROVED BY	DATE

PART - I : SPECIFICATION FOR GAS OIL PUMP-MOTOR AND BASE FRAME.

1. **SCOPE :** Design, manufacture, test & supply of pump and motor complete assembly consists of coupling, fasteners, gaskets and base frame as per the specification.

2. **APPLICABLE STANDARDS :** VDMA 24284 performance testing.

3. **BINDING DOCUMENTS:**
   This Specification kosti_TOS 1800 and the final vendor check list shall form part of the purchase order, and fully complied with.

4. **TECHNICAL REQUIREMENTS:**
   A. For performance data & others refer to Vendor check lists.
   B. Triple screw, hydraulically balanced to eliminate end thrust; pulsation free discharge & low noise level.
   C. Cartridge type elements for ease of maintenance & replacement.
   D. All materials & construction shall be suitable for specified pumping temperature & to meet all the performance needs.
   E. Horizontal execution - axial suction nozzles through the end cover & top vertical discharge nozzle – flanged to ANSI 150 Lbs & 300 Lbs respectively.
   F. Screws of nitrided & hardened steel; inner casing & bushes of aluminium alloy and welded steel / cast steel body.
   G. Double acting mechanical seal, with Viton o-ring.
   H. Externally mounted adequately sized bearing with grease nipple for lubrication.
   I. Built - in safety valve - spring adjustable over a range of plus minus 50% of the specified discharge pressure - over pressure within 10% of set value for relieving pump's maximum capacity - mounted on left side of the pump body as seen from motor end.
   J. Include adequately sized Pin Type Flexible coupling of three piece construction - Flender N - Eupex series A or equivalent.
   K. The noise level shall be limited to 85 dBA, measured at 1 meter distance.

5. **DRIVE MOTOR : Refer Specification TCI 141 and GO:TOS :802.**

   BASE FRAME : Base frame shall be such that, it accommodate pump, motor, suitable coupling with coupling guard. All components shall be within the base frame. None of the component shall exceed base frame edges.

6. **MARKING:**
   A. Stainless steel nameplates with 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 and speed corresponding to the maximum operating viscosity; body rating and safety valve set pressure range.
   For motors refer Specification TCI 141 and TOS :802
   B. Each spare shall be individually tagged with part name, makers name & spare code and BHEL code .

7. **PAINTING**
   A. All interior surfaces applied with rust preventive oil, following hydraulic test, drying or performance test.
   B. All exposed surfaces degreased. dressed and epoxy coated. (Ref. Special contract requirement-page 7/7)

8. **PACKING**
   A. All opening shall be firmly capped against ingress of water or dust.
   B. Shall be seaworthy, and long storage packed in wooden boxes with water- proof under cover.
   C. Liberal packing material & struts shall be used to arrest rolling & to protect from transit damages.

9. **TEST CERTIFICATES:**
   Following Works TCs shall be submitted along with the supplies; Refer to column on special contract requirements for any Third Party witnessing requirements.
   A. Body hydraulic test done at 1.5 times the relief Valve Set pressure.
   B. Performance test on each of pump and spare cartridge assy. on standard (Gas) oil over the entire operating range, with the curves extrapolated for the specified oil.
   C. Material certificate for body, inner casing & Screws.
   D. As inspected data on hardness and clearances between screws and inner casing.
   E. Dimensional certificate for overall dimensions and all terminal connections.
   F. All tests envisaged in the standard quality plan should be carried out.

10. INWARD INSPECTION:

A. Verify the works test certificates, marking particulars and the scope of supply
B. Watch for damages.
C. Perform random check on all mounting dimensions and terminal connections and coupling details.

11. OPERATING & INSTRUCTIONAL MANUALS:

Minimum of 3 sets comprising of documents listed under 12a, 12b, 12d & 12f below shall be furnished within 15 days from the date of purchase order along with soft copy.
Hydro test certificates, Operating instructions and Spares identification drawings.

12. Along with the Quotation, submit following documents in full for Technical Evaluation:

A. Completely filled-in Vendor check list.
B. Pr. Vs Flow and Pr Vs BHP curves at min. cst and max cst.
C. Full pump designation with description of the designation codes.
D. **All** documents refereed under 'Reference Documents' part-of the Vendor check list (Over all dimensional drg; performance curves; catalogues, drg and O&M manuals of the pump cartridge and all mountings)
E. Lubricant grade, quantity per fill and frequency of filling for the bearings;
F. NPSH requirements of the pump at min./max. cst , with curves for Gas Oil pump.
G. Relief valve capacity curve as Plotted against set pressure and over pressure.
H. Spares quotation for 3 yrs operation with clear description, part number, identification drawings break up price with 6 months validity.

PART-I: PUMP DATA SHEET (Gas oil)

Material code : A015714202002001

A.PERFORMANCE DATA		
1. OIL GRADE	Gas oil	
2. OIL POUR POINT	+40 ^{0}C	
3. SP.GRAVITY AT 15^{0}C	0.8700	
4.PUMPING TEMP.	40 ^{0}C	
5. OIL VISCOSITY min/max	2 CST	15 CST
6.CAPACITY AT min.CST	145 LPM	
7.CAPACITY AT max. CST	Vendor to specify LPM	
8.SUCTION PRESSURE	- 0.5 Kg/Cm^2 (g)	
9.DELIVERY PRESSURE	20 Kg/Cm^2 (g)	
10.NPSH REQUIRED	<5 METERS WC AT MAX.CST	
11.RPM	2920	
12.SENSE OF ROTATION	CW AS SEEN FROM MOTOR END	
13.BHP AT min.CST	Vendor to specify KW	
14.BHP AT max. CST	Vendor to specify KW	
15. PUMP EFFICIENCY	% @ MIN. cst.	

B.PERFORMANCE GRAPHS	
1.PRESS.VS FLOW & BHP	
2.CST VS NPSH REQD.	
3.SPEED VS TORQUE	

C.PUMP CONSTRUCTION DETAILS		
1.MOUNTING	Vertical / Horizontal / Flange / Foot	
2.PITCH & ROTOR DIA	mm	mm
3.PUMP GD^2	Kg / Cm^2	
4.NOZZLES IN	INCH 150 LBS FLANGED	
5.NOZZLES OUT	INCH 300 LBS FLANGED	
6.INLET NOZZLE POSITION	Horizontal axial thru end cover	
7.OUTLET NOZZLE POSIT.	Vertical Top	
8.BODY & COVER MATL.		
9.INSERT MATL.		
10.ROTOR SHAFT MATL		
11.IDLERS MATL		
12.BEARING BUSH MATL.		
13.BASE FRAME MATL		
14.BODY DESIGN /TEST PR.	Kg/Cm^2 (g)	Kg/Cm^2 (g)

D.BEARINGS	
1.TYPE AND NUMBER OFF	
2.POSITION	EXTERNAL
3.ISO No. & CLEARANCE	
4.LUBRICANT GRADE	
5.QTY. & FILLING FREQ.	

E.COUPLING (3PIECE, PIN - PUSH)	
1.MAKE	
2.MODEL No. & SIZE	
3.GD^2	Kg / Cm^2
4.DOUBLE PIECE SIDE	
5.SINGLE PIECE	

F. MECHANICAL SEAL		
1.ACTION	DOUBLE WITH STEAM FLUSHING	
2.MAKE		
3.MODEL No.& SIZE		
4.O RING SPRING MATL.		
5.ROTARY RING MATL.		
6.STATIONARY RING MATL.		
7.SUCTION PRESS. MAX.	Kg/Cm^2 (g)	
8. PORT CONN. DETAIL		

G.SAFETY RELIEF VALVE - INTEGRAL	
1.MAKE	
2.MODEL No.& SIZE	
3.CAPACITY	
4.SET PRESSURE	5 Kg/Cm^2 (g) above delivery press
5.OVER PRESSURE	
6.SPRING ADJUST RANGE	Kg/Cm^2 (g) TO Kg/Cm^2 (g)
7.RELIEF OUTLET	INTERNAL OR EXTERNAL
8. RELIEF OUTLET CONN.	INCH, 350LBS FLANGED
9.HANDWHEEL	

H.STEAM JACKET	Not Required	
1.STYLE		
2.PRESS. DESIGN/TEST	Kg/Cm^2 (g)	Kg/Cm^2 (g)
3.CONNECTION IN / OUT	Inch npt(f)	Inch npt(f)

I.DRIVE MOTOR	
1.MAKE OR FRAME SIZE	
2.KW,V,PHASE& HZ	
3.DIMENSIONAL DRG.	
4.DATA SHEET REF.	

J.PERFORMANCE GUARANTEE
1.PER VDMA 24284 GROUP-II and Ref Special requirements.

K.TEST CERTIFICATES & INSPECTION
1.BODY HYDRO TEST ;
2. PERFORMANCE TEST ON EACH CARTRIDGE
3.RELIEF VALVE OVER PRESSURE TEST

L. O & M REFF. DOCUMENTS (fill compulsorily)	
1.PUMP DESIGNATION SHEET :	
2.PERFORMANCE GRAPHS : AS UNDER SECTION - B	
3.DIMENSIONAL DRAWINGS :	
PUMP – MOTOR, FRAME ASSY.	
PUMP :	CARTRIDGE:
RLF. VALVE :	COUPLING :
4.SECTIONAL DRGS. WITH SPARES IDENTIFICATION :	
PUMP BODY :	CARTRIDGE :
RLF. VALVE :	SEAL :
5. O&M INSTRUCTIONS :	
PUMP ;	
COUPLING :	SEAL :

PREPARED BY (VENDOR)	DATE	APPROVED BY (BHEL)	DATE

PART - II : VENDOR CHECK LIST FOR GAS OIL PUMP-MOTOR

BHEL MATERIAL CODE: A015714202002001 **ENQUIRY No.**

IIA	BHEL SPECIFICATION		VENDOR CONFIRMATION
A.PERFORMANCE DATA			
1.Oil Grade	GAS OIL		
2.Oil Pour Point	40 ^{0}c		
3.SP Gravirty at 15 ^{0} C	0.87		
4.Pumping temp.	40 ^{0}c		
5.Oil viscosity at Min./ Max	2 CST	15 CST	
6.Capacity at minimum cst	145 LPM		
7. Capacity at maximum cst	Vendor to specify		
8.Suction Pr.	-0.5 kg/cm^2 (g)		
9.Delivery pressure	20 kg/cm^2 (g)		
10. NPSH required	< 5 Meters Wc at max.CST		
11. RPM	2920		
12. Sense of rotation	CW as seen from motor end		
13. BHP at min. CST	Kw		
14. BHP at max. CST	Kw		
15. Motor Efficiency	% @ Min. cst		
B. PERFORMANCE GRAPHS			
1.Press. vs Flow & BHP			
2. CST vs NPSH required			
3. Speed vs Torque			
C.PUMP CONSTRUCTION DETAILS			
1.Mounting	Vertical/Horizontal/Flanged/Foot		
2. Pitch & Rotor dia.	mm	mm	
3. Pump GD^2	Kg/cm^2		
4. Nozzle In	inch 150LBS Flanged		
5. Nozzle out	inch 300 LBS Flanged		
6. Inlet nozzle position	Horizontal axial thru end cover		
7. Outlet nozzle position	Vertical Top		
8. Body & Cover Matl	ASTM 216WCB/ A106GrB/ 515Gr70		
9. Insert Matl	Cast steel		
10.Rotor shaft Matl	Nitrided Steel		
11.Idlers Matl	Nitrided Steel		
12. Bearing Bush Matl.	Cast steel		
13. Base frame Matl.			
14. Body Design / Test Pr.	kg/cm^2 (g)	kg/cm^2 (g)	
D. BEARINGS			
1.Type & Number off			
2. Position	External		
3. ISO No. & Clearance			
4. Lubricant Grade			
5. Qty. & Filling Frequency			
E. COUPLING (3 PIECE, PIN - PUSH)			**2 Piece is not acceptable**
1.Make			
2.Model no. & Size			
3. GD^2	kg / cm^2		
4. Double Piece side			
5. Single piece			

BHEL			VENDOR		
PREPARED BY	APPROVED BY	DATE	PREPARED BY	APPROVED BY	DATE
		9/3/08			

PART - II VENDOR CHECK LIST FOR GAS OIL PUMP-MOTOR

BHEL MATERIAL CODE: A015714202002001 **ENQUIRY No.**

II A	BHEL SPECIFICATION		VENDOR CONFIRMATION
F. MECHANICAL SEAL			
1. Action		Double with steam flushing	
2. Make			
3. Model no. & size			
4. O Ring Spring Matl.			
5.Rotary Ring Matl.			
6. Stationary Ring Matl			
7.Suction Press. Max.		Kg/ cm^2 (g)	
G. SAFETY RELIEF VALVE - INTEGRAL			
1.Make			
2.Model no. & size			
3. capacity			
4.Set pressure		5 Kg/ cm^2 (g) above delivery pr.	
5. Over pressure			
6.Spring adjust range		Kg/ cm^2 (g) to Kg/ cm^2 (g)	
7. Relief outlet		Internal or External ?	
8. Relief outlet connection		inch ,300LBS ,Flanged	
9. Handwheel			
H. STEAM JACKET		**NOT REQUIRED**	
1.Style			
2.Press. Design / Test			
3. Connection In / Out			
I. DRIVE MOTOR :			
1. Make & Frame Size			
2. Kw,V,Phase & Hz			
3. Dimentional Drawing			
4. Data Sheet ref.			
J .PERFORMANCE GAURANTEE			
1. Per VDMA 24284 Group - II			
K. TEST CERTIFICATES & INSPECTION			
1. Body hydro test			
2. Performance test			
3. Relief valve over pressure test			
4.Third perty inspection		Specify	
L.O&M REFERENCE DOCUMENTS (fill compelsorily)			
1. Pump Designation Sheet			
2:Performance Graphs		As under section - B	
3. Dimentional Drawings			
3.1 Pump, motor & Base frame Assy			
3.2 Pump			
3.3 Cartridge			
3.4 Relief Valve			
3.5 Coupling			
3.6 Motor			
4. Sectional Drawings with Spares identification			
4.1 Pump body			
4.2 Cartride			
4.3 Relief valve			
4.4. Seal			
4.5 Motor			

BHEL			VENDOR		
PREPARED BY	**APPROVED BY**	**DATE**	**PREPARED BY**	**APPROVED BY**	**DATE**
		7/3/08			

PART - II : VENDOR CHECK LIST FOR GAS OIL PUMP-MOTOR

BHEL MATERIAL CODE: A015714202002001 **ENQUIRY No.**

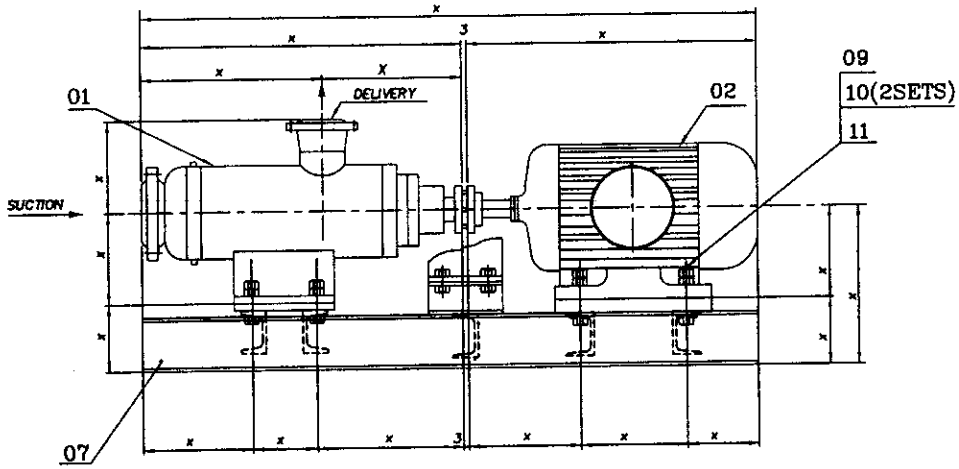
IIA	BHEL SPECIFICATION	VENDOR CONFIRMATION
L.MARKING		
1.Stainless Steel Name Plate		
2.Spares shall be individual tagged		
M. PAINTING		
1.Epoxy Ref. Enclosed spec. for this.		
N. PACKING		
1. Openings Firmly Capped		
2. Seaworthy		

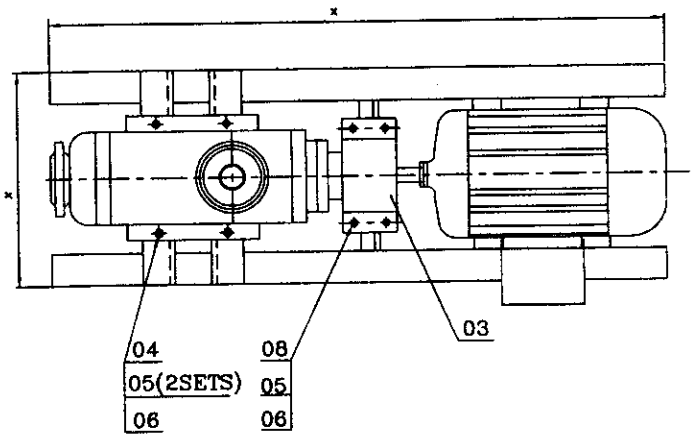
IIB	SPECIAL CONTRACT REQUIREMENT,IF ANY	
	1.0 Read Gas oil in place of LDO/LFO in the specification and drawings. 2.0 Base frame, motor, required fasteners and gaskets are in the scope of vendor. (USE AN ANNEXURE IF THIS SPACE IS INDEQUATE)	

BHEL			VENDOR		
PREPARED BY	APPROVED BY	DATE	PREPARED BY	APPROVED BY	DATE
		9/3/08			

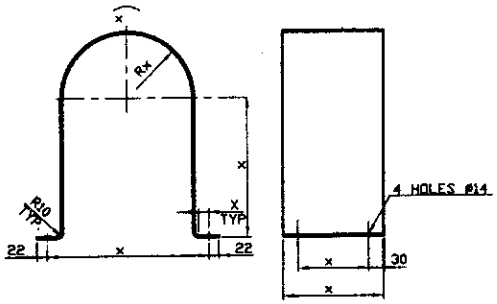
DRAWING NO. KOST-SD-001

ALL DIMENSIONS ARE IN MM
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP





DETAIL OF ITEM-03



NOTE:

DIMENSIONS "X" SHALL BE FILLED BY THE VENDOR.
WEIGHTS SHALL BE FILLED BY THE VENDOR IN THE BOM COLUMN.
COUPLING MAXIMUM AXIAL MISALIGNMENT = 0.8MM.
COUPLING MAXIMUM ANGULAR DISPLACEMENT = 1DEGREE.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C / D1	UNIT	UNIT WEIGHT / QUANTITY	QS	ZONE
	11	TAPER WASHER M						NO	4		
	10	HEX NUT M						NO	8		
	09	HEX HD BOLT M X L						NO	4		
	08	HEX HD SCRU M X L						NO	4		
	07	PUMP-MOTOR FRAME						NO	1		
	06	TAPER WASHER M						NO	8		
	05	HEX NUT Gr.C M						NO	12		
	04	HEX HD BOLT M X L						NO	4		
	03	COUPLING COVER						NO	1		
	02	PUMP MOTOR (xKW)						NO	1		
	01	PUMP						NO	1		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	S.G.N.M	-Sd-	28.12.07	-
CHD	M.T.P	-Sd-	28.12.07	
APPD	S.V.S	-Sd-	28.12.07	

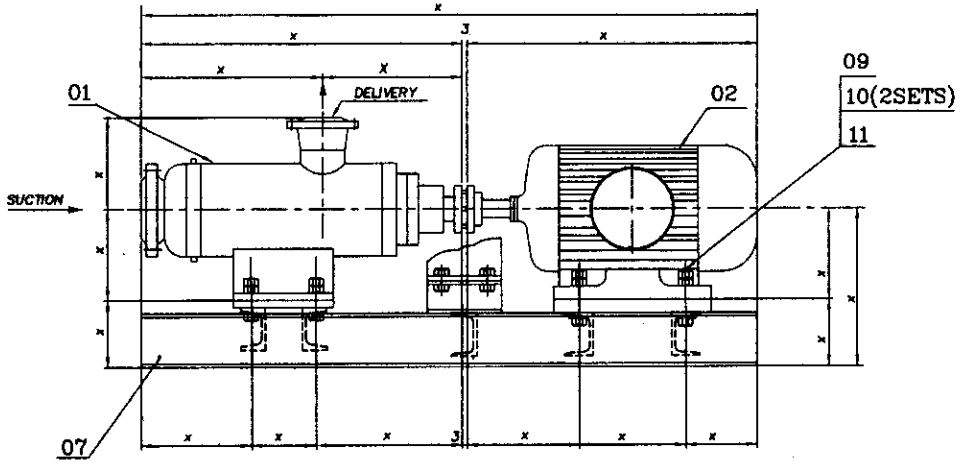
REV	DATE	ALTERED :
01		CHD & APPD:

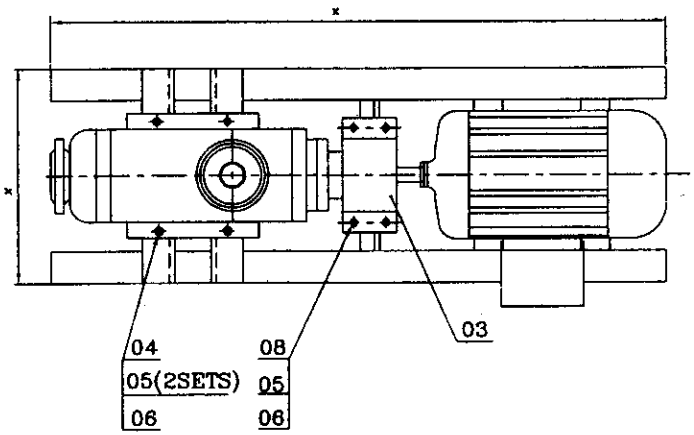
SHEET FS | SHEET 129 | SCALE N.T.S. | WEIGHT (Kg) | REF TO ASSY / OLD DWG | ITEM NO - | No. OF ITEMS -

TITLE: TYPICAL PUMP-MOTOR ASSY | CARD CODE U 01 | DRAWING NO : KOST-SD-001 | REV 00

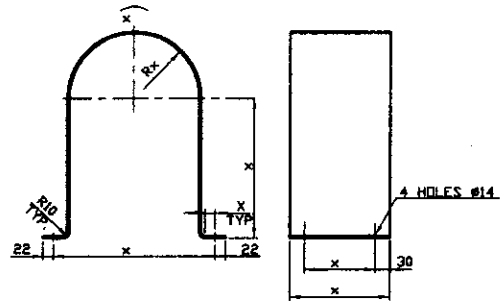
DRAWING NO. KOST-SD-001

ALL DIMENSIONS ARE IN MM.
FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP





DETAIL OF ITEM-03



NOTE:

DIMENSIONS "X" SHALL BE FILLED BY THE VENDOR.
WEIGHTS SHALL BE FILLED BY THE VENDOR IN THE BOM COLUMN.
COUPLING MAXIMUM AXIAL MISALIGNMENT = 0.80MM.
COUPLING MAXIMUM ANGULAR DISPLACEMENT = 1DEGREE.

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	STD	DRAWING NUMBER	ITEM NO / VAR NO	MATERIAL CODE / MATERIAL SPECN	A/C	UNIT / 01	UNIT WEIGHT / QUANTITY	GS	ZONE
	11	TAPER WASHER M						NO	4		
	10	HEX NUT M						NO	8		
	09	HEX HD BOLT M X L						NO	4		
	08	HEX HD SCRU M X L						NO	4		
	07	PUMP-MOTOR FRAME						NO	1		
	06	TAPER WASHER M						NO	8		
	05	HEX NUT Gr.C M						NO	12		
	04	HEX HD BOLT M X L						NO	4		
	03	COUPLING COVER						NO	1		
	02	PUMP MOTOR (xKW)						NO	1		
	01	PUMP						NO	1		

REV	DATE	ALTERED :
01		CHD & APPD:
ZONE		

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPALLI - 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN	S.G.N.M	-Sd-	28.12.07	-
CHD	M.T.P	-Sd-	28.12.07	
APPD	S.V.S	-Sd-	28.12.07	

DEPT FS | CODE 129 | SCALE N.T.S. | WEIGHT (Kg) | REF TO ASST / OLD DWG | ITEM NO - | NO. OF ITEMS -

TITLE: TYPICAL PUMP-MOTOR ASSY

CUSTOMER CODE: U 01

DRAWING NO: KOST-SD-001

REV: 00

CEF140051 after

17

Bharat Heavy Electricals Limited

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI 620 014.

TECHNICAL DELIVERY CONDITIONS

FOR SUB - DELIVERY COMPONENTS OF

CONTROLS AND INSTRUMENTATION

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LT MOTOR (AC) STANDARD (FLAME PROOF)

Rev No.	DATE	DESCRIPTION	PREPARED	REVIEWED	APPROVED ENGG	APPROVED QAC
01,02 03,04 05,06	----	General Revisions	Sd/-	Sd/-	Sd/-	Sd/-
07	29/04/99	Revised for special improvement project	Sd/-	Sd/-	Sd/-	Sd/-
08	22.12.03	Revised after Revisit				

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
1.0	SITE CONDITIONS		
1.1	Altitude above mean sea level	550 m.	
1.2	Ambient temperature condition	50°C.	
1.3	Relative humidity	100 %	
1.4	Atmosphere	Tropical , Dusty, salty, corrosive & highly polluted.	
2.0	GENERAL		
2.1	Reference standards	IS 325, IS 2148 (II A &B), IS 1231, IS 4722, IS 6362, IS 2253, IS 12065, IS 12075.	
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)	i. One hot start from hot condition ii. Two successive starts from cold condition iii. Three equally spread start per hour.	
2.8	High speed bus transfer withstand capability	Suitable to withstand 150 % of rated voltage	
2.9	Type of balancing for rotor	Dynamic balancing	
2.10	Direction of rotation	Suitable for both direction with minor site modifications	
2.11	Direction of rotation indication	Refer data sheet	
2.12	Direction of cooling air	Non-drive end to driving end	
2.13	Class of insulation	Class B 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 motor in hot humid & tropical climate.	
2.15	Allowed temperature rise at continuous full load	60°C by thermometer method & 70°C by resistance method	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
2.16	Starting current	Less than or equal to 600% full load current, subject to tolerance as per IS.	
2.17	Starting time & locked rotor withstand time	The locked rotor withstand time at 110% rated voltage under hot condition shall be at least 3 sec more than the starting time (at 80% of rated voltage)	
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 suitable for IIA & IIB locations.	
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, capable of being turned through 360° in steps of 90°(flame proof type).	
2.24.2	Cable gland	Double compression type(Flame proof type, of reputed make)	
2.24.3	Cable entry	Suitable for both top & bottom entry	
2.24.4	Type of terminals	Stud type with plain washers, spring washers / checknuts & lugs	
2.25	Fault level	50 KA for 1 Sec	
2.26	Painting	Epoxy based paint	
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	

CL NO.	CHARACTERISTICS	REQUIREMENT	VENDOR COMPLIANCE (Refer Note: 2)
		main terminal box	
2.27.4	Thermister for bearing / winding	Refer enquiry for application	
2.28	Lifting Device	Eye bolt or lugs to facilitate safe lifting	
3.0	INSPECTION & TESTING	As per applicable quality plan.QA:CI:STD:QP:24	
4.0	DOCUMENTS		
	a) Along with offer:	3 sets of technical data sheet as per the enclosed format.	
	b) After placement of order	6 sets of the following: 1. 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.	
5.0	PACKING	Shall be as per Packing Procedure QA:CI:STD:PR:03 or as per Manufacturer's Standard Practice. The packing shall meet the Transport, environment and Storage hazards.	

NOTE:

1. Refer current valid list for revision status of Quality Plan & Packing Procedure.
2. In 'Vendor compliance' column Vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE'.

DATA SHEET

CL. NO	CHARACTERISTICS	REQUIREMENT
1.0	Application	
1.1	Tag Number	
2.0	Manufacturer	
3.0	Type and Frame size and degree of protection	
4.0	Rated output in KW & rated speed	
5.0	Rated Voltage, frequency & Phases	
6.0	Full Load current	
7.0	Full load efficiency & Power factor	
8.0	Duty Cycle	
9.0	Rated Torque	
10.0	Starting Current	
11.0	Starting torque in % of full load torque	
12.0	Pull up torque % of full load torque	
13.0	Pull out torque in % of full load torque	
14.0	No load starting time	
15.0	Locked rotor withstand time at rated voltage	a. Hot b. Cold
16.0	Locked rotor withstand time at minimum starting voltage	a. Hot b. Cold
17.0	Locked rotor withstand time at 110% rated voltage	a. Hot b. Cold
18.0	Starting time at minimum starting voltage with mechnism coupled	
19.0	Starting time at rated voltage with mechnism coupled	
20.0	Maximum permissible starting time	
21.0	Stator thermal time constant	
22.0	Stator winding connection	
23.0	Class of insulation & temperature rise	
24.0	Type & number of terminals broughtout	
25.0	Resistance per phase	
26.0	Quantity and power consumption of space heater	
27.0	Direction of rotation	

CL. NO	CHARCTERISTICS	REQUIREMENTS
28.0	Bearing make & type	a) Drive End: b) Non Drive End:
29.0	Lubricant quantity , grade & recommended interval of lubrication	
30.0	Type of mounting & shaft orientation	
31.0	Terminal Box	
31.1	Location & angle of rotation	
31.2	Gland size for stator winding	
31.3	Gland size for space heater	
31.4	Cable entry	
32.0	GD² of motor (kg-m²)	
33.0	Total weight of motor (in kg)	
34.0	Anticipated bearing life	
35.0	Method of connection to driven equipment	
36.0	Limiting rotor temperature for determining safe stall time.	
37.0	Thermister for bearing / winding	Applicable ☐ YES ☐ NO Details:

GO:TOS: 802/Rev.00

FO PUMP - MOTOR ENQUIRY DATA SHEET
FUEL SYSTEMS / PE(BOILERS)

PROJECT	KOSTI-SUDAN 4x125MW
CUSTOMER NO	0157
SERVICE	Gas oil Pump
BHEL MATL. CODE	
QUANTITY	2 Nos (Common for 4 units)

MOTOR DETAILS:

POWER OUTPUT REQD.	KW	*			
POWER SOURCE		415V ± 10%; 50 HZ ± 5%; COMBINED ± 10 %; 3 PHASE			
TYPE		TEFC SQUIRREL CAGE INDUCTION MOTOR			
ENCLOSURE		IP 55; FLAME PROOF			
DUTY		CONTINOUS			
DIRECTION OF ROTATION		ANTI CLOCK WISE SEEN FROM PUMP END			
METHOD OF STARTING		DIRECT ON LINE (DOL)			
MOUNTING		HORIZONTAL FOOT			

LOAD DATA:

DRIVEN PUMP TYPE		TRIPLE SCREW POSITIVE DISPLACEMENT			
COUPLING TYPE		PIN TYPE FLEXIBLE COUPLING			
PUMP SPEED	RPM	2920	2920		
PUMP GD^2	$KG.M^2$				
COUPLING GD^2	$KG.M^2$				
GD^2 TOTAL	$KG.M^2$				
TORQUE AT ZERO SPEED	KG. M				
TORQUE AT 5 % SPEED	KG. M				
TORQUE AT RATED SPEED	KG. M				
TORQUE VARIES LINEARLY WITH SPEED BETWEEN VALUES INDICATED ABOVE					
LT MOTOR SPEC. NO & DATA SHEET NO.		TCI 141 / Rev.08	TCI 141 / Rev.08		

PREPARED	DATE	APPROVED	DATE
S.Gomathinayagam	09.01.08	S.V.Sivaramulu	09.01.08

- **Requirement based on Pump delivery + relief valve set pressure + over pressure + margin to be considered.**

CO:TOS: 802/Rev.00

FO PUMP - MOTOR ENQUIRY DATA SHEET
FUEL SYSTEMS / PE(BOILERS)

PROJECT	KOSTI-SUDAN 4x125MW
CUSTOMER NO	0157 & 0159
SERVICE	Crude oil Pump
BHEL MATL. CODE	
QUANTITY	3 + 3 Nos (0157 & 0159)

MOTOR DETAILS:

POWER OUTPUT REQD.	KW	*			
POWER SOURCE		415V ± 10%; 50 HZ ± 5%; COMBINED ± 10 %; 3 PHASE			
TYPE		TEFC SQUIRREL CAGE INDUCTION MOTOR			
ENCLOSURE		IP 55; FLAME PROOF			
DUTY		CONTINOUS			
DIRECTION OF ROTATION		ANTI CLOCK WISE SEEN FROM PUMP END			
METHOD OF STARTING		DIRECT ON LINE (DOL)			
MOUNTING		HORIZONTAL FOOT			

LOAD DATA

DRIVEN PUMP TYPE		TRIPLE SCREW POSITIVE DISPLACEMENT			
COUPLING TYPE		PIN TYPE FLEXIBLE COUPLING			
PUMP SPEED	RPM	1450	1450		
PUMP GD^2	$KG.M^2$				
COUPLING GD^2	$KG.M^2$				
GD^2 TOTAL	$KG.M^2$				
TORQUE AT ZERO SPEED	KG. M				
TORQUE AT 5 % SPEED	KG. M				
TORQUE AT RATED SPEED	KG. M				
TORQUE VARIES LINEARLY WITH SPEED BETWEEN VALUES INDICATED ABOVE					
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