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Tabulation of Revised Pages

SHEET	REVISIONS									SHEET	REVISIONS										
	D0	D1	D2	D3																	
1	X	X	X	X						51											
2	X	X	X	X						52											
3	X	X	X							53											
4	X									54											
5	X			X						55											
6	X		X							56											
7	X									57											
8	X	X	X							58											
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	Note							Rev
1		APPLICABLE TO:	PROPOSAL	APPLICABLE NTL/INTNTL STANDARD:	API-610			
2		FOR	OIEC	UNIT	400			
3		SITE	CHESHMEH KOSH	SERVICE	DEMETHANIZER PUMPS			
4		NO. REQ	3 (2+1)	PUMP SIZE		TYPE	CENTRIFUGAL	No. STAGES	
5		MANUFACTURER		MODEL		SERIAL NO.		

LIQUID CHARACTERISTICS "SUMMER CASE"

	Note		Units	Minimum	Normal	Maximum
6	28					
7			Units	Minimum	Normal	Maximum
8		LIQUID TYPE OR NAME :	C2+ LIQUID			
9		VAPOR PRESSURE:	bar a		20,4	
10		RELATIVE DENSITY :		0,477		0,477
11		SPECIFIC HEAT:	kJ/(kg-K)			
12	17	VISCOSITY:	cP		0,0916	

OPERATING CONDITIONS (6.1.2) "SUMMER CASE"

	Note		Units	Maximum	Rated	Normal	Minimum
13	29,11						
14			Units	Maximum	Rated	Normal	Minimum
15		NPSHa Datum:		C.L. Impeller			
16		PUMPING TEMPERATURE:	°C		20		
17	13,14	FLOW :	m³/h		155,3	141,2	
18		DISCHARGE PRESSURE: (6.3.2)	barg		45,8		
19		SUCTION PRESSURE :	barg	25,7	19,7		19,7
20		DIFFERENTIAL PRESSURE :	bar		26,1		
21		DIFFERENTIAL HEAD :	m		559		
22	8	$NPSH_A$:	m		5,5		
23		HYDRAULIC POWER :	kW		113,0		

SERVICE :	CONTINUOUS	
• IF INTERMITTENT NO. OF STARTS :		
PUMPS OPERATE IN:	PARALLEL	
CORROSION DUE TO : (6.12.1.9)		
EROSION DUE TO : (6.12.1.9)		
H2S CONCENTRATION (ppm) : (6.12.1.12)	see note	
CHLORIDE CONCENTRATION (ppm) :		
PARTICULATE SIZE (DIA IN MICRONS)		
PARTICULATE CONCENTRATION (PPM)		
CONTAMINATION OF LIQUID HANDLED		
ALLOWED (with compatible fluid):	YES	
AIR ENTRAINMENT ALLOWED	NO	
LEAKS ALLOWED	NO	
ANTIFREEZING PROTECTION	NO	
HAZARDOUS	YES	
FLAMMABLE	YES	
Pump Configuration: 1 Operating, 1 Spare		

SITE AND UTILITY DATA

	Note					
25	26	**LOCATION:**				
26		OUTDOOR	UNHEATED			
27		**MOUNTED AT :**		○ TROPICALISATION REQD		
28	16	**ELECTRIC AREA CLASSIFICATION:**		6.1.22	ZONE	2
29		GROUP	II	B	TEMP CLASS	T3
30		**SITE DATA :**				
31	1	**ELEVATION (MSL) :**	153 m	**BAROMETER :**	960-965	mbar
32		RANGE OF AMBIENT TEMPS:MIN / MAX	-1	/	51	°C
33		RELATIVE HUMIDITY: MIN / MAX	7	/	90	%
34	30	**UNUSUAL CONDITIONS:**	DUST			
35						
36		**UTILITY CONDITIONS :**				

		DRIVERS	HEATING	CONTROL	SHUTDOWN
37	**ELECTRICITY :**				
38	VOLTAGE	6000		230	
39	PHASE	3		1	
40	HERTZ	50		50	

COOLING WATER :

		INLET	RETURN	DESIGN
TEMP	°K		MAX	
PRESS.	kPa		MIN	

SOURCE

COOLING WATER CHLORIDE CONCENTRATION: ppm

INSTRUMENT AIR : MAX kPa MIN kPa

STEAM

		DRIVERS	HEATING
TEMP °K	Max		
	Min		
PRESS. kPa	Max		
	Min		

PERFORMANCE

	Note					
41	25	**PERFORMANCE**				
42	2	PROPOSAL CURVE NO.		RPM		
43		As Tested Curve No.				
44		IMPELLER DIA.: RATED	MAX.	MIN.		mm
45		RATED POWER	kW	EFFICIENCY		(%)
46		RATED CURVE BEP FLOW (at rated impeller dia)				m³/h
47		MIN FLOW : THERMAL	m³/s	STABLE		m³/h
48		PREFERRED OPERATING REGION (6.1.11)		to		m³/h
49		ALLOWABLE OPERATING REGION		to		m³/h
50	28	MAX HEAD @ RATED IMPELLER				m
51		MAX POWER @ RATED IMPELLER	(6.8.9)			kW
52		NPSH3 AT RATED FLOW :				m
53		CL PUMP TO U/S BASEPLATE				m
54	8	NPSH MARGIN AT RATED FLOW :				m
55		SPECIFIC SPEED (6.1.9)		m3/s, rpm, m		
56		SUCTION SPECIFIC SPEED LIMIT			230	
57	22, 7	SUCTION SPECIFIC SPEED		m3/s, rpm, m		
58		MAX. ALLOW. SOUND PRESS. LEVEL REQD (6.1.14)			85	(dBA)
59		EST MAX SOUND PRESS. LEVEL				(dBA)
60		MAX. SOUND POWER LEVEL REQ'D (6.1.14)				
61		EST MAX SOUND POWER LEVEL				
62						

DRIVER (7.1.5)

Driver Type	MOTOR
GEAR	
VARIABLE SPEED REQUIRED	NO
SOURCE OF VARIABLE SPEED	
OTHER	
MANUFACTURER	
NAMEPLATE POWER	kW
Nominal RPM	
RATED LOAD RPM	
FRAME OR MODEL	
ORIENTATION	HORIZONTAL
LUBE	
BEARING TYPE:	
RADIAL	/
THRUST	/
STARTING METHOD	Open Valve (Fully-Loaded)
SEE DRIVER DATA SHEET	

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CONSTRUCTION

API PUMP TYPE: BB5 [Based on API 610 definitions]

NOZZLE CONNECTIONS: (6.5.5)

	Size	Facing	Rating	Position
SUCTION		RF	600	TOP
DISCHARGE		RF	600	TOP

PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2)

	No.	Size	Type	Facing	Rating	Posn.
BALANCE/LEAK OFF						
DRAIN	1	3/4"		RF	600	
VENT	1			RF		
PRESSURE GAGE						
TEMP GAGE						
WARM-UP LINE						

Drain Valve Supplied By	SUPPLIER
DRAINS MANIFOLDED	YES
VENT Valve Supplied By	SUPPLIER
VENTS MANIFOLDED	YES
THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2)	
SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3)	
CYLINDRICAL THREADS REQUIRED (6.4.3.8)	
GUSSET SUPPORT REQUIRED	
MACHINED AND STUDDED CONNECTIONS (6.4.3.12)	
VS 6 DRAIN	
DRAIN TO SKID EDGE	YES

MATERIAL (6.12.1.1)

APPENDIX H CLASS	A-7
MIN DESIGN METAL TEMP (6.12.4.1)	°C
REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1)	
Applicable Hardness Standard (6.12.1.12.3)	
BARREL :	
CASE :	
DIFFUSERS	
IMPELLER :	
IMPELLER WEAR RING :	
CASE WEAR RING :	
SHAFT:	
SHAFT SLEEVE:	
Inspection Class	Level 3

BEARINGS AND LUBRICATION (6.10.1.1)

BEARING (TYPE / NUMBER): (6.11.4)

RADIAL	SLEEVE	/	
THRUST	BALL	/	

REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)

LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)	RING OIL
PRESSURE LUBE SYSTEM TO ISO 10438- (9.2.6.5)	
ISO 10438 DATA SHEETS ATTACHED	
Pressurized Lube Oil System mtd on pump baseplate	
Location of Pressurized Lube Oil System mounted on baseplate :	
INTERCONNECTING PIPING PROVIDED BY	
OIL VISC. ISO GRADE VG	
CONSTANT LEVEL OILER :	REQUIRED

CASING MOUNTING:	CENTERLINE
CASING TYPE: (6.3.10)	RADIAL
OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)	

CASE PRESSURE RATING:

MAWP : (6.3.6)		bar g	@ 80	°C
HYDROTEST : 1.5 x MAWP		bar g	@	°C

HYDROTEST OH PUMP AS ASSEMBLY	
SUCT'N PRESS. REGIONS DESIGNED FOR MAWP	YES
ROTATION: (VIEWED FROM COUPLING END)	CW
• IMPELLERS INDIVIDUALLY SECURED :	
• BOLT OH 3/4/5 PUMP TO PAD / FOUNDATION :	
• PROVIDE SOLEPLATE FOR OH 3/4/5 PUMPS	
ROTOR:	
SHAFT FLEXIBILITY INDEX (SFI) (9.1.1.3)	
First Critical Speed Wet (Multi stage pumps only)	
COMPONENT BALANCE TO ISO 1940 G1.0	YES
SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)	

COUPLING:(7.2.3) (7.2.13.f)	
MANUFACTURER	
MODEL	Flexible with spacer
RATING (POWER/100 RPM)	
SPACER LENGTH	mm
SERVICE FACTOR	MIN 1.5
RIGID	
COUPLING WITH HYDRAULIC FIT (7.2.10)	
COUPLING BALANCED TO ISO 1940-1 G6.3 (7.2.3)	YES
COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11)	
COUPLING IN COMPLIANCE WITH (7.2.4)	API 610 compliant
COUPLING GUARD STANDARD PER (7.2.13.a)	
Window on Coupling Guard	

BASEPLATE

API BASEPLATE NUMBER :	
BASEPLATE CONSTRUCTION (7.3.14)	FULL TOP DECKING
BASEPLATE DRAINAGE (7.3.1)	Entire Baseplate Drain Pan or Rim
MOUNTING :	GROUTED
NON-GROUT CONSTRUCTION : (7.3.13)	
VERTICAL LEVELING SCREWS :	REQUIRED
LONGITUDINAL DRIVER POSITIONING SCREWS :	REQUIRED
SUPPLIED WITH : • GROUT AND VENT HOLES	YES
• DRAIN CONNECTION	YES
MOUNTING PADS SIZED FOR BASEPLATE LEVELING (7.3.5)	YES
MOUNTING PADS TO BE MACHINED (7.3.6)	YES
PROVIDE SPACER PLATE UNDER ALL EQUIPMENT FEET	
OTHER	

REMARKS :

	Note	INSTRUMENTATION		SEAL SUPPORT SYSTEM MOUNTING		Rev
2		SEE ATTACHED API-670 DATA SHEET		SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE (7.5.1.4)	YES	
3	19	ACCELEROMETER (7.4.2.1)		IDENTIFY LOCATION ON BASEPLATE		
4		Number of Accelerometers				
5		Mounting Location of Accelerometers		INTERCONNECTING PIPING BY	Supplier	
6						
7		PROVISION FOR MTG ONLY (6.10.2.10)		**MECHANICAL SEAL (6.8.1)**		
8	3,6	Number of Accelerometers		SEE ATTACHED ISO 21049/API 682 DATA SHEET		
9		Mounting Location of Accelerometers		ADDITIONAL CENTRAL FLUSH PORT (6.8.9)		
10				HEATING JACKET REQ'D. (6.8.11)		
11		FLAT SURFACE REQUIRED (6.10.2.11)		MECHANICAL SEAL AS PER API 682		
12	23	Number of Accelerometers		PLAN 11/53B CATEGORY 2 ARRANGMENT 3 TYPE A		
13	3	Mounting Location of Accelerometers				
14				**HEATING AND COOLING (6.1.17)**		
15				COOLING REQ'D		
16	26			COOLING WATER PIPING PLAN		
17	19	VIBRATION PROBES (7.4.2.2)		COOLING WATER PIPING		D3
18		PROVISIONS FOR VIB. PROBES	YES	FITTINGS		D3
19		NUMBER PER RADIAL BEARING	2	COOLING WATER PIPING MATERIALS		
20		NUMBER PER AXIAL BEARING		COOLING WATER REQUIREMENTS:		
21				BEARING HOUSING	m³/s	
22		MONITORS AND CABLES SUPPLIED BY (7.4.2.4)		HEAT EXCHANGER	m³/s	
23				TOTAL COOLING WATER	m³/s	
24	18,19	TEMPERATURE (7.4.2.3)		HEATING MEDIUM		
25		PROVISIONS FOR TEMP PROBES		OTHER		
26		RADIAL BEARING TEMP.		HEATING PIPING		
27		NUMBER PER RADIAL BEARING				
28		THRUST BEARING TEMP.		**PIPING & APPURTENANCES**		
29		NUMBER PER THRUST BEARING ACTIVE SIDE		MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6)		
30		NUMBER PER THRUST BEARING INACTIVE SIDE		VENT	YES	
31		TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6)		DRAIN	YES	
32		PRESSURE GAUGE TYPE		COOLING WATER	N / A	
33		**Remarks**		TAG ALL ORIFICES (7.5.2.4)		
34		INSTRUMENTATION SHALL BE IN ACCORDANCE WITH		SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)		
35		"TECHNICAL SPECIFICATION FOR PROCESS CENTRIFUGAL				
36		PUMPS" DOC. No. NGL-CT-1-0000-ME-SP-2001, PAR. 7.4.				
37						
38		***5 (five) RTDs for pump bearings***				D3
39		***(2 single type for each radial bearing,***				D3
40		***1dual type for thrust bearing) output (4~20mA).***				D3
41		***4 (four) vibration probe***				D3
42		***(noncontact (proximity) type, 2 for each bearing)***				D3
43		***output (4~20mA)***				D3
44						
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No	Note	SURFACE PREPARATION AND PAINT		TEST		Rev
2	21	MANUFACTURER'S STANDARD	NO	SHOP INSPECTION (8.1.1)	Yes	
3		OTHER (SEE BELOW)	YES	PERFORMANCE CURVE		
4		SPECIFICATION NO.	NGL-CT-1-0000-PI-SP-2016	& DATA APPROVAL PRIOR TO SHIPMENT.	YES	
5				TEST WITH SUBSTITUTE SEAL (8.3.3.2.b)	NO	
6		**PUMP:**		MATERIAL CERTIFICATION REQUIRED CASING	YES	
7		PUMP SURFACE PREPARATION	YES	(6.12.1.8) IMPELLER	YES	
8		PRIMER	YES	SHAFT	YES	
9		FINISH COAT	YES	OTHER (Shaft sleeve & Wear rings)	YES	
10				CASTING REPAIR WELD PROCEDURE APPR REQD	YES	
11		**BASEPLATE:**		(6.12.2.5) (6.12.3.1)		
12		BASEPLATE SURFACE PREPARATION	YES	INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d)		
13		PRIMER:	YES	(6.12.3.4.e) MAG PARTICLE 100%	YES	
14	16	FINISH COAT	YES	RADIOGRAPHY 100%	YES	
15		DETAILS OF LIFTING DEVICES		LIQUID PENETRANT	YES	
16				ULTRASONIC		
17		**SHIPMENT: (8.4.1)**	EXPORT	INSPECTION REQUIRED FOR CASTINGS		
18		EXPORT BOXING REQUIRED	YES	MAG PARTICLE	YES	
19		OUTDOOR STORAGE MORE THAN 6 MONTHS	YES	RADIOGRAPHY	YES	
20				LIQUID PENETRANT	YES	
21		**SPARE ROTOR ASSEMBLY PACKAGED FOR:**		ULTRASONIC		
22		ROTOR STORAGE ORIENTATION (9.2.8.2)		HARDNESS TEST REQUIRED (8.2.2.7) (If Required)	YES	
23		SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3)		ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3)	YES	
24				FOR	SHAFT	
25		N2 PURGE (9.2.8.4)		METHOD	UT	
26	9	**SPARE PARTS**		PMI TESTING REQUIRED (8.2.2.8)	YES	
27		START-UP	YES	COMPONENTS TO BE TESTED		
28		NORMAL MAINTENANCE	YES			
29		**WEIGHTS** kg		RESIDUAL UNBALANCE TEST (J.4.1.2)		
30		ITEM No / PUMP / DRIVER / GEAR / BASE / TOTAL		NOTIFICATION OF SUCCESSFUL SHOP		
31				PERFORMANCE TEST (8.1.1.c) (8.3.3.5)	YES	
32				BASEPLATE TEST (7.3.21)		
33				HYDROSTATIC	WIT	
34				HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2)		
35		OTHER PURCHASER REQUIREMENTS		PERFORMANCE TEST	WIT	
36		COORDINATION MEETING REQUIRED (10.1.3)	YES	TEST IN COMPLIANCE WITH (8.3.3.2)	8.3.3.2	
37	24	MAXIMUM DISCHARGE PRESSURE TO INCLUDE		TEST DATA POINTS TO (8.3.3.3)	8.3.3.3	
38		MAX RELATIVE DENSITY	YES	TEST TOLERANCES TO (8.3.3.4)	Table 16	
39		OPERATION TO TRIP SPEED		NPSH (8.3.4.3.1) (8.3.4.3.4) (If Required)	WIT	
40		MAX DIA. IMPELLERS AND/OR NO OF STAGES	YES	NPSH-1ST STG ONLY (8.3.4.3.2)		
41		CONNECTION DESIGN APPROVAL (9.2.1.4)		NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3)		
42	8	TORSIONAL ANALYSIS / REPORT (6.9.2.10)		TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6)		
43		PROGRESS REPORTS	YES	RETEST ON SEAL LEAKAGE (8.3.3.2.d)	OBSERVE	
44		OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5)		RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b)	WIT	
45		ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1)		COMPLETE UNIT TEST (8.3.4.4.1)	WIT	
46				SOUND LEVEL TEST (8.3.4.5)	NON-WIT	
47		LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3)	YES	CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6)	NON-WIT	
48		MODAL ANALYSIS REQUIRED (9.3.9.2)		LOCATION OF CLEANLINESS INSPECTION		
49		DYNAMIC BALANCE ROTOR (6.9.4.4)	YES	NOZZLE LOAD TEST		
50		INSTALLATION LIST IN PROPOSAL (10.2.3.l)		CHECK FOR CO-PLANAR MOUNTING PAD SURFACES		
51		VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3)		MECHANICAL RUN TEST UNTIL OIL TEMP STABLE		
52				4 HR. MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1)	WIT	
53		TRANSIENT TORSIONAL RESPONSE (6.9.2.4)		4 HR. MECH RUN TEST (8.3.4.2.2)		
54		BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6)	YES			
55		IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e)		BRG HSG RESONANCE TEST (8.3.4.7)		
56		CASING RETIREMENT THICKNESS DRAWING (10.3.2.3)		STRUCTURAL RESONANCE TEST (9.3.9.2)		
57		FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8)		REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST		
58		INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3)	YES	(9.2.7.5)		
59		CONNECTION BOLTING (7.5.1.7)		AUXILIARY EQUIPMENT TEST (8.3.4.6)	OBSERVE	
60		CADMIUM PLATED BOLTS PROHIBITED		EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS		
61		VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c)	YES			
62		VENDOR SUBMIT TEST PROCEDURES (8.3.1.1)	YES	LOCATION OF AUXILIARY EQUIPENT TEST		
63		SUBMIT INSPECTION CHECK LIST (8.1.5)	YES			
64				IMPACT TEST (6.12.4.3) PER EN 13445		
65				PER ASME SECTION VIII	NON-WIT	
66				REMOVE CASING AFTER TEST		

	Note		Rev
1		**PRESSURE VESSEL DESIGN CODE REFERENCES**	
2		THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER	
3		CASTING FACTORS USED IN DESIGN (TABLE 3)	
4		SOURCE OF MATERIAL PROPERTIES	
5			
6		**WELDING AND REPAIRS**	
7		THESE REFERENCES MUST BE LISTED BY THE PURCHASER. (DEFAULT TO TABLE 11 IF NO PURCHASER PREFERENCE IS STATED)	
8		ALTERNATE WELDING CODES AND STANDARDS	
9		WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD) — **DEFAULT TO TABLE 11**	
10		WELDER/OPERATOR QUALIFICATION — **DEFAULT TO TABLE 11**	
11		WELDING PROCEDURE QUALIFICATION — **DEFAULT TO TABLE 11**	
12		NON-PRESSURE RETAINING STRUCTURAL WELDING SUCH AS BASEPLATES OR SUPPORTS — **DEFAULT TO TABLE 11**	
13		MAGNETIC PARTICLE OR LIQUID PENETRANT EXAMINATION OF PLATE EDGES — **DEFAULT TO TABLE 11**	
14		POSTWELD HEAT TREATMENT — **DEFAULT TO TABLE 11**	
15		POSTWELD HEAT TREATMENT OF CASING FABRICATION WELDS — **DEFAULT TO TABLE 11**	
16			
17		**MATERIAL INSPECTION**	
18		THESE REFERENCES MUST BE LISTED BY THE PURCHASER — DEFAULT TO TABLE 15 — **YES**	
19		ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 15) (8.2.2.5)	

TYPE OF INSPECTION	METHOD	FOR FABRICATIONS	FOR CASTINGS
RADIOGRAPHY			
ULTRASONIC INSPECTION			
MAGNETIC PARTICLE INSPECTION			
LIQUID PENETRANT INSPECTION			
VISUAL INSPECTION (all surfaces)			

REMARKS :

Note | Rev

Note 1: REFER TO SITE CONDITION ON "DESIGN BASIS" DOC No. NGL-CT-1-0000-PR-DB-2001.

Note 2: ELECTRIC MOTORS SHALL BE GOVERNED BY "SPECIFICATION FOR MV MOTORS", DOC. NO. NGL-CT-1-0000-EL-SP-2006. ALSO ELECTRICAL DATA SHEET FOR MV MOTORS SHALL BE FILLED BY VENDOR.

Note 3: TO BE REVIEWED AND CONFIRMED BY PUMP VENDOR.

Note 4: ALLOWABLE LOADS ON FLANGES SHALL BE AT LEAST TWICE OF THE VALUES SPECIFIED IN TABLE 5 OF API 610 (11th EDITION).

Note 5: DRY, FLEXIBLE, SPACER TYPE COUPLING WITH NON SPARK GUARD SHALL BE USED.

Note 6: MECHANICAL SEAL SHALL BE AS PER API 682 AND VENDOR SHALL FILL OUT MECHANICAL SEAL DATA SHEET OF API 682 DURING DETAIL ENGINEERING PHASE. ALSO SPECIFIED SEAL SPECIFICATIONS IN THIS DATA SHEET SHALL BE REVIEWED AND VERIFIED BY PUMP AND SEAL VENDORS.

Note 7: AUTOMATIC START TO BE PROVIDED FOR PUMPS.

Note 8: MARGIN BETWEEN NPSHR AND NPSHA SHALL BE 0,6 METER OR ABOVE FROM MINIMUM CONTINUOS STABLE FLOW UP TO AND INCLUDING THE RATED FLOW, AND 0,3 METER AT THE LESSER OF MAXIMUM ALLOWABLE FLOW. NPSH TEST SHALL BE PERFORMED WHEN NPSHA - NPSHR < 1 METER.

Note 9: FOR COMMISSIONING AND 2 YEARS OPERATING SPARE PART LIST, REFER TO NGL-CT-1-0000-ME-LI-2001.

Note 10: SUCTION LINE 10", DISCHARGE LINE 6".

Note 11: VENDOR MUST TAKE INTO ACCOUNT THAT PUMPED LIQUID IS AT BOILING POINT. ALL NECESSARY ANCILLARIES TO AVOID FLUID EVAPORATION AND CAVITATION MUST BE INCLUDED IN THE SUPPLY OF THE PUMPS.

Note 12: PWHT IS REQUIRED FOR CS PARTS IN CONTACT WITH PROCESS FLUID.

Note 13: MINIMUM TURNDOWN REQUIRED 30% REFERRED TO NORMAL CAPACITY.

Note 14: MINIMUM AND MAXIMUM FLOWRATES WILL BE SPECIFIED BY PUMP VENDOR.

Note 15: TO AVOID COPPER OR COPPER ALLOY.

Note 16: AREA CLASSIFICATION IS PRELIMINARY. PLEASE SEE NGL-CT-1-0000-FA-LY-8004.

Note 17: H2S / CO2 CONTENT CAN VARY FROM 9 / 7 ppm TO 50 / 42 ppm mole. MAX MERCAPTANE CONTENT IS 158 ppm mole.

Note 18: FOR PUMP INSTRUMENTATION, THE RELEVANT CLAUSE OF SPECIFICATION FOR PROCESS CENTRIFUGAL PUMPS "NGL-CT-1-0000-ME-SP-2001" SHALL BE FOLLOWED.

Note 19: INSTRUMENTATION FOR MV MOTOR SHALL BE PROVIDED AS PER "SPECIFICATION FOR MV MOTORS", DOC. NO. NGL-CT-1-0000-EL-SP-2006.

Note 20: PUMP DESIGN PRESSURE 57 barg. PUMP DESIGN TEMP. -86°C (ACCORDING TO DEPRESSURIZZATION CALCULATION) / +80 °C. MAWP TO SPECIFIED @ MAX DESIGN TEMPERATURE.

Note 21: SEE ITP FOR MACHINERY, DOC. No. NGL-CT-1-0000-ME-PR-2001.

Note 22: SUCTION SPECIFIC SPEED SHALL BE CALCULATED ACCORDING TO API 610 ANNEX A.

Note 23: ALL MECHANICAL SEAL INSTRUMENTS ACCORDING TO API 682 SHALL BE SUPPLIED BY VENDOR.

Note 24: IN ACCORDANCE WITH PAR. 8.3.3.3 OF PROJECT SPECIFICATION DOC. No. NGL-CT-1-0000-ME-SP-2001.

Note 25: ACCORDING TO SPECIFICATION FOR MV MOTOR, SUNSHADE/CANOPY SHALL BE PROVIDED ON EXPOSED MOTORS TO PROTECT AGAINST SOLAR GAIN.

Note 26: COOLING WATER IS NOT AVAILABLE AND AIR FINNED COOLERS SHALL BE USED FOR COOLING PURPOSE.

Note 27: BEARING TYPE AND ARRANGEMENT SHALL BE SELECTED IN ACCORDANCE WITH TABLE 10 OF API 610 (11^{th} EDITION). THE NECESSITY OF PRESSURIZED LUBE OIL SYSTEM SHALL BE CHECKED BY VENDOR.

Note 28: SHUT-OFF PRESSURE SHALL BE SPECIFIED BY VENDOR.

Note 29: LIQUID CHARACTERISTICS AND OPERATING CONDITIONS ARE REFERRED TO "SUMMER CASE". PLEASE CONSIDER ALSO "SUMMER-JT CASE" WITH BELOW DATA:

LIQUID CHARACTERISTICS "SUMMER-JT CASE"

	Units	Minimum	Normal	Maximum
LIQUID TYPE OR NAME :	**C2+ LIQUID**			
VAPOR PRESSURE:	bar a			**23,4**
RELATIVE DENSITY :		**0,466**		**0,466**
SPECIFIC HEAT:	kJ/(kg-K)			
VISCOSITY:	cP		**0,0848**	

OPERATING CONDITIONS (6.1.2) "SUMMER-JT CASE"

	Units	Maximum	Rated	Normal	Minimum
NPSHa Datum:			**C.L. Impeller**		
PUMPING TEMPERATURE:	°C		**29**		
FLOW :	m³/h		**151,5**	**137,9**	
DISCHARGE PRESSURE: (6.3.2)	barg		**45,8**		
SUCTION PRESSURE :	barg	**25,7**	**22,7**		**22,7**
DIFFERENTIAL PRESSURE :	bar		**23,1**		
DIFFERENTIAL HEAD :	m		**...**		
$NPSH_A$:	m		**5,5**		
HYDRAULIC POWER :	kW		**..**		

Note 30: THE NUMBER OF DAYS WITH DUST SHALL BE ASSUMED 103 DAYS/YEAR (SEE ALSO NOTE 1).