

1	Data/requisition sheet for				Issued for Firm Proposals (based on final process data)					Revision
2	CENTRIFUGAL PUMP NUMBER(S) remark 1)									
3	Applicable units of measurement : SI units									
4	Customer's reference : 36026-519-01				Pump manufacturer : Flowserve					
5	Location : Peace river (Canada)				Pump type/size : 12EJH					
6	Number required : 6				Manufacturers ref. # : 282423137/WYN-JC-4049					
7	OPERATING DATA									
8	Pumped Liquid : Boiler drain water / water from drain system				Pumping temperature (Normal) Remark 2 : 35.0 deg C					
9	H ₂ S content : 10.0 PPM				Pumping temperature (Minimum) Remark 2 : 20.0 deg C					
10	Liquid Type : Non-abrasive Non-corrosive				Pumping temperature (Maximum) Remark 2 : 95.0 deg C					
11	: Non-hazardous Dissolved gases				Density at normal pumping temperature : 983.00 kg/m3					
12	:				Viscosity at normal pumping temperature : 0.73 mm2/s					
13	:				Vapour pressure at normal pumping temperatu : 20.00 kPaa					
14	NACE applicable : MR0175				Pressure in suction vessel : 94.10 kPaa					
15	Normal process Flow : - m3/h				Pressure in discharge vessel : 94.10 kPaa					
16	Rated process Flow : 170.00 m3/h				Highest possible pressure in suction vessel : 94.10 kPaa					
17	Minimum process flow : - m3/h				Specific process conditions during start/stop/transients :					
18	Single / Parallel Operation : Single									
19	Continuous / Intermittent : Intermittent remark 3									
20	Service category : Spared Essential									
21	Direction of rotation : Anti-clockwise (facing pump drive end)									
22	PUMPING DATA									
23	Head in suction vessel : 9.76 m liq.abs.				Head in discharge vessel : 9.76 m liq.abs.					
24	Height of liquid in suction vessel		Max.	2.51 m	Max. height of liquid level in discharge vessel		8.00 m			
25	above pump centre line (minus if below)		Min.	0.61 m	above pump centre line (minus if below)					
26	Total head loss in suction line between suction vessel and pump : 0.00 m liq.				Total head loss in discharge line between pump and discharge vessel : 11.70 m liq.					
27	Total minimum suction head : 10.37 m liq.abs.				Total maximum discharge head : 29.46 m liq.abs.					
28	Head of vapour pressure : 2.07 m liq.abs.				Differential head at Rated flow : 19.09 m liq.					
29	Minimum available NPSH : 8.30 m liq.				Estimated efficiency : 72.90 %					
30	SITE CONDITIONS					PUMP DRIVER				
31	Ambient temperature (minimum) : -29 deg C				Pump power at estimated efficiency : 14.1 kW					
32	Ambient temperature (maximum) : 37 deg C				Type : Electric Motor					
33	Winterisation / Tropicalisation required : Winterisation				Fixed / Variable Speed : Fixed speed					
34	Area classification : Zone 2, IIB, T3				Transmission : Direct drive					
35	Upgraded materials due to atmospheric chlorides : No									
36	Local Authority requirements : Design shall meet the Canadian Regulations				Estimated installed power (+25%) : 18.6 kW					
37	like CRN for flanges and fittings and CSA for electrical apparatus				Remote starting : Yes					
38	COOLING WATER					STEAM HEATING Not available				
39	Chloride content : N.A PPM				:					
40	Maximum inlet temperature : N.A deg C				:					
41	Maximum allowable outlet temperature : N.A deg C				ELECTRICAL SUPPLIES					
42	Supply pressure : N.A kPaa				Electrical frequency : 60 Hz					
43	Return pressure : N.A kPaa				Voltage Motors : 575 Heaters : 120 Volts					
44	Fouling coefficient : N.A W/m2.K				Phase Motors : 3 Heaters : 1					
45	REMARKS									
46	1) Pump tag codes : BP-14100A1; BP-14100A2; BP-24100A1; BP-24100A2; BP-34100A1; BP-34100A1									
47	2) 95 deg C only occurs in upset conditions (hot draining of the OT-HRSG) < 1 times a year. Under normal conditions the pump temp will be max 35 deg C									
48	3) Under normal conditions the pumps will operate for 10 minutes every 22 hours. During hot draining the pumps will run for approx 6 to 8 hrs.									
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59	Design of Centrifugal Pumps shall be in accordance with DEP 31.29.02.30 - Gen.									
60	as amended by applicable Shell Pre-engineered Equipment Catalogue (SPEP) Agreement									
61	Selection of pump type and the procurement process shall be in accordance with DEP 31.29.02.11-Gen									
62	Prepared by : J. Kroeze	Date :	Equipment :	OT-HRSG drain tank blow down pump	Rev. Details	1	2	3	4	5
63	Checked by : B. Pasma	Date:	Plant :	Shell Carmon Creek	Date	FLS				
64	Approved by : T. de Jong	Date:	Consignee :	NEM Energy B.V.	Signed	JG				
65	Sheet No. 1 cont'd on sheet Nos. 2									
66	Engineering by :	NEM Energy			Equipment No.	remark 1)				
67	Principal :	-			Requisition No.	36026-519-02				

1	CENTRIFUGAL PUMP NUMBER(S)		remark 1)		Issued for Firm Proposals (based on final process data)				Revision
2	Customer's ref : 36026-519-01								
3	Manufacturer's ref. : 282423137/WYN-JC-4049								
4	GENERAL INFORMATION		REQUISITION		FIRM PROPOSAL		For Purchase		
5	Shell Pre-engineered Equipment Catalogue (SPEC)		Apply SPEC agreements		Fully SPEC compliant		Fully SPEC compliant		
6	Specification dated								
7	DESIGN OPERATING CONDITIONS		REQUISITION		FIRM PROPOSAL		For Purchase		
8	Pump speed (single/double suction impeller)	RPM	-	/	-	1770		1765	
9	Min. continuous flow (stable / thermal)	m3/h	by vendor			63		69.7	
10	Rated Capacity	m3/h	170.0			170		170	
11	Differential head at rated capacity	m liq.	19.1			15		19.1	
12	Efficiency at rated capacity	%	72.9			72.7		71.2	
13	Power absorbed at rated capacity	kW	14			10.5		13.9	
14	Capacity at BEP (actual impeller size)	m3/h	by vendor			15		163.2	
15	Power absorbed at 120 % BEP	kW	by vendor			TBA		15	
16	Recommended driver power	kW	by vendor			TBA		18.6	
17	Viscous correction factors	CQ / CH / CE	0.00	/	0.00	/	0.00	1	/ 1 / 1
18	NPSH required from Minimum to Rated capacity	m liq.	3.3 Max.					3	
19	NPSH required from Rated to 120% capacity	m liq.	8.0 Max.					8	
20	PUMP DESIGN		REQUISITION		FIRM PROPOSAL		For Purchase		
21	Pump model / frame / size :		by vendor		12EML		12EJH		
22	Basic Type (Rotor)		?		Vertically Suspended		Vertically Suspended		
23	ISO 13709 configuration code		?		VS2		VS1		
24	Single / Double volute / Diffuser		?		Single volute		Single volute		
25	Single / Double suction (first stage)		?		Single suction		Single suction		
26	Number of stages		Minimum		1		1		
27	Max. / Actual / Min. impeller diameter		mm		by vendor		230 / 237 / 213		246.1 / 233.4 / 190.5
28	Pump to meet operating conditions		kPaa deg C		casing design by vendor		/		1786.4 / 90
29	Max. allowable jacket / C.W. piping pressure		kPaa		by vendor		N.A		N.A
30	Suction specific speed with max. impeller diameter at BEP (m3/h - m - rpm)				Less than 12800		9410		7950 (US Units)
31	MATERIALS OF CONSTRUCTION		REQUISITION		FIRM PROPOSAL		For Purchase		
32	Service Group / Material Group:		b / MG 2		MG 2		B / MG 2 (NACE)		
33	Casing		as per SPEP Manual		as per SPEP Manual		A106 B/A516 Steel (fabs)		
34	Inner casing or volutes		as per SPEP Manual		as per SPEP Manual		A216 WCB Steel (bowls)		
35	Casing studs		as per SPEP Manual		as per SPEP Manual		A193 B7M		
36	Min. wall thickness		mm		as per SPEP Manual		as per SPEP Manual		7
37	Cover		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		N/A
38	Casing gaskets		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		Viton (o-rings)
39	Wet bolting		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		A193 B7M
40	Bearing Bracket		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		A216 WCB Steel
41	Impeller		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		A395 Ductile Iron
42	Impeller wear ring hardness		HB		as per SPEP Manual		as per SPEP Manual		22 (max)
43	Casing wear ring hardness		HB		as per SPEP Manual		as per SPEP Manual		22 (max)
44	Wear ring coating		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		None
45	Diffuser		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		Integral to bowls
46	Shaft		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		A276 410 S.S.
47	Interstage shaft sleeve		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		None
48	Interstage bushing		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		Nickel Graphalloy
49	Balance drum		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		N/A
50	Balance drum		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		N/A
51	Throat bushing		as per SPEP Manual		as per SPEP Manual		as per SPEP Manual		Nickel Graphalloy
52	PRESSURE CONTAINING PARTS		REQUISITION		FIRM PROPOSAL		For Purchase		
53	Pump casing manufacturer								Flowserve
54	Pump covers manufacturer								N/A
55	MECHANICAL SEAL & AUXILARY SYSTEM shall be in accordance with requisition number :								
56	Estimated seal criteria to be quoted on seal datasheet,		ESTIMATED		FIRM PROPOSAL		For Purchase		
57	Shaft diameter under sleeve		mm		-		-		42.9
58	Shaft speed		RPM		-		-		1765
59	Seal cavity pressure		kPaa		-		-		285
60	NOTES ON APPROVALS CLASSIFICATION (indicated in line 7 above)								
61	1). Selections shall only be classified as "Fully SPEP compliant" if they are standard pre-engineered SPEP products, operating within the pre-approved application parameters. Pump vendor shall not complete lines 35-53, refer to SPEP agreement for these details.								
62	2). All other selections, not covered by 1) above shall be classified as "Engineered Solution".								
63	To facilitate Principal approval, Pump vendor shall indicate full details in lines 35-53 above.								
64						Sheet No. 2 continued on sheet No. 3			
65	Engineering by :	NEM Energy				Equipment No.	remark 1)		
66	Principal :	-				Requisition No.	36026-519-02		

1	CENTRIFUGAL PUMP NUMBER(S)		remark 1)		Issued for Firm Proposals (based on final process data)		Revision
2	Customer's ref : 36026-519-01						
3	Manufacturer's ref. : 282423137/WYN-JC-4049						
4	WEIGHTS		REQUISITION	FIRM PROPOSAL	For Purchase		
5	Pump	Kg	by vendor	by vendor	1300		
6	Driver	Kg	by vendor	by vendor	195		
7	Gearbox	Kg	by vendor	N.A	N/A		
8	BEARINGS and LUBRICATION		REQUISITION	FIRM PROPOSAL	For Purchase		
9	Type of Lubrication :		Flooded oil bath	Flooded oil bath - ring	Flooded oil bath - ring		
10	Radial Bearings Type :		DEP 31.29.02.30	Rolling element	Rolling element		
11	Thrust Bearings Type :		DEP 31.29.02.30	Rolling element	Rolling element		
12	Applicable lubrication DEP		DEP 31.29.00.30	-	TBA		
13	Constant Level Oiler : make / type / model		by vendor		TBA		
14	Lube oil heating :		not required	Not required	Not required		
15	COOLING		REQUISITION	FIRM PROPOSAL	For Purchase		
16	Medium		Air cooling preferred	Air cooling	Air cooling		
17	Temp.(deg.C) / max. inlet pressure (kPaa)		/	/	/		
18	Cooling water piping material / API plan		Not applicable	/	/		
19	Cooling water flow to bearing housing(s)		Not applicable				
20	PIPING		REQUISITION	FIRM PROPOSAL	For Purchase		
21	Suction :	Diameter (mm) / ANSI flange class	/ ?	/	N/A /		
22		position facing driven end	?	?	?		
23	Discharge :	Diameter (mm) / ANSI flange class	/	/	6 / 150		
24		position facing driven end	?	?	Right side		
25	ACCESSORIES		REQUISITION	FIRM PROPOSAL	For Purchase		
26	Base plate :		Not in scope	N.A	N.A		
27	Foundation bolts :		Required	By NEM energy	By NEM energy		
28	Coupling - make / type :		DEP 31.29.02.11	Not applicable	John Crane		
29	Coupling guard - non-sparking :		DEP 31.29.02.30	Not applicable	Aluminium		
30	Vibration equipment connections		Threaded connections		N/A		
31	INSPECTION and TESTS		REQUISITION	FIRM PROPOSAL	For Purchase		
32	Inspection class		DEP 31.29.02.30	Class II	Class II		
33	Hydrostatic test	as per SPEP agreement	Observed	Observed	Non witnessed		
34	Performance test	as per SPEP agreement	Observed	Observed	Non witnessed		
35	NPSH test	if required by DEP 31.29.02.30	Observed	Not required	Not required		
36	Complete unit test	if required by DEP 31.29.02.30	Not required	Not required	Not required		
37	Auxiliary equipment test	as per SPEP agreement	Not required	Not applicable	Not required		
38	Disassembly after test	SPEP default is 'not required'	Not required	Not required	Not required		
39							
40							
41							
42							
43							
44							
45							
46	Pump speed during performance test	RPM	Site speed	Site speed	Site speed (~1765 rpm)		
47	Water test Capacity : (required for VCC Pumps only)	m3/h		Not applicable	Not applicable		
48	Water test Head : (required for VCC Pumps only)	m liq.		Not applicable	Not applicable		
49	Water test Efficiency : (required for VCC Pumps only)	%		Not applicable	Not applicable		
50	Water test Power : (required for VCC Pumps only)	kW		Not applicable	Not applicable		
51	Test bed / contract driver installed		Contract driver	Contract driver	Shop driver		
52	Hydrostatic test pressure : casing / jackets / piping		DEP 31.29.02.30	DEP 31-29-02.30	428 PSIG		
53	Special tests		Not required	Not required	Not required		
54	VENDOR's DATA		REQUISITION	FIRM PROPOSAL	For Purchase		
55	Scope of supply		as per SPEP agreement	as per SPEP agreement	as per SPEP agreement		
56	General Arrangement drawing reference		by vendor	by vendor	by vendor		
57	Cross sectional drawing reference		by vendor	by vendor	by vendor		
58	Interconnecting Piping Layout/Schematics reference		by vendor	By NEM energy	By NEM energy		
59	Performance curve reference		by vendor	by vendor	by vendor		
60	Report on torsional analysis (if analysis is required as per ISO 13700)		Not required	Not required	Not required		
61							
62							
63							
64			Sheet No. 3 continued on sheet No. 4				
65	Engineering by :	NEM Energy	Equipment No.		remark 1)		
66	Principal :	-	Requisition No.		36026-519-02		