PetroChad (Mangara) Limited

A GLENCORE Company

Vendor Document Cover Sheet

Vendor Name:	Alderley
Purchase Order Title:	Mangara Produced Water Treatment Upgrade
Equipment / Tag Number:	DOB-MAN-Z-4010
Vendor Document No:	29647W-00-P-1522-01

Vendor Issue Record

Rev	Date	Issue Status	Originator	Verifier	Approver
03	05/09/2019	Client Comments	CD	AT	MA
02	15/07/2019	For Purchase	CD	AT	MA
01	14/06/2019	First Issue	CD	MAG	MA

Document Title

Pressure Vessel Datasheet

Glencore Document Details

Document Number	P3048	PO	416441	TCD	MAN	C08	0001
	PROJECT	PO NUMBER		COUNTRY	ASSET-BLOCK	DOCUMENT TYPE	SEQUENCE

Issue Status	Issued for review	**Revision**	03
		Revision Date	05/09/2019

Vendor Document Review

Purchaser's review of Vendor's documents does not relieve Vendor of the responsibility for correctness under the Purchase Order. Permission to proceed does not constitute acceptance of design, detail and calculations, test methods or materials developed or selected by the Vendor and does not relieve the Vendor from full compliance with the Purchase Order or any other obligations, nor detract from any of the Purchaser's rights.

Code	1	2	3	4
Name	Chris Hicks			
Signature				
Date	19/09/2019			

Code 1	Reviewed with No comments (approved)
Code 2	Reviewed with Comments (revise and re-submit, work may proceed subject to incorporation of changes indicated)
Code 3	Revise and re-submit (work may NOT proceed)
Code 4	Not Reviewed (for information only)

IMPORTANT

Should the Vendor consider that any comments made by the Purchaser change the Scope of Supply, the Vendor shall advise the price and delivery implications of such changes within five working days of receipt. The Vendor must not incorporate such changes without prior approval of the Purchaser of the revised price and/or delivery period. RETROSPECTIVE CLAIMS WILL NOT BE CONSIDERED.

The document consists of this front sheet plus 5 pages.

Pressure Vessel Datasheet

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Document No: 29647W-00-P-1522-01

Document Title: Gas Flotation Vessel Datasheet

Equipment Tag Number: V-4010

Project Title: Mangara Full Field Development
Produced Water Treatment Package

Client: KBR / PetroChad

By	Proc.	Mech.	App.	Revision	Date	Revised for
CD	SSR	MAG	MA	01	14/06/2019	FIRST ISSUE
CD	SSR	AT	MA	02	15/07/2019	FOR PURCHASE
CD	-	AT	MA	03	05/09/2019	CLIENT COMMENTS

Pressure Vessel Datasheet

Package no.	Doc No. 29647W-00-P-1522-01		Rev. 03
Tag no.	V-4010	Location/Module	Mangara (Chad)
Unit	Gas Flotation Vessel Datasheet	No. req'd	1 off
Service	Produced Water Treatment	Project no.	29647W
Size & type	2.0m ID x 10.5m TT Gas Flotation Vessel	P.O. no.	PO-011663 29647
Supplier	Alderley Systems Limited	P&ID no.	29647W-00-T-0100-01
Manufacturer	UZUC S.A	Line no.	N/A

1	**1. DESIGN DATA**			**2. PROCESS DATA**		
2	Contents		Produced Water + HC Gas	**Hydrocarbon Liquid**		
3	Max. spec. Gravity		1.006	Flow (Normal / Max.)	ppmv	500 / 1,000
4	Operating Volume	m^3	23.0 at NLL (Note 12)	Specific Gravity		0.810 to 0.819
5	Operating Pressure	barg	0.8	Density at T & P	kg/m^3	810 to 819
6	Design Pressure	barg	FV / 10	Viscosity	cP	22.1 to 52.4
7	Operating Temperature	ºC	60	Surface tension	dyn/cm	16.3 to 18.6
8	Design Temperature	ºC	0 / 100	**Gas / Vapour**		
9	Design Code		ASME VIII Div 1	Flow (Min. / Max.)	SCFD	2,454 / 15,264
10	Vessel Orientation		Horizontal	Molecular weight	kg/kmol	24.4
11	Certifying Authority		N/A	Density at T & P	kg/m^3	Note 1
12	Internal Diameter	mm	2,000	Viscosity	cP	Note 1
13	Length (Tan / Tan)	mm	10,500	**Water**		
14	Corrosion Allowance	mm	3	Flow (Min. / Max.)	BWPD	5,000 / 31,105
15	Height to Centreline	mm	1,980	Specific gravity		0.996 to 1.006
16	Shell Thickness	mm	Vendor to Advise	Density at T & P	kg/m^3	996 to 1,006
17	Head Thickness	mm	Vendor to Advise	Viscosity	cP	0.59 to 0.65
18	Insulation	mm	N/A	Surface tension	dyn/cm	71.2
19	**3. MATERIALS OF CONSTRUCTION**					
20	Shell		SA 516 Gr 70	Name Plate		316 SS
21	Heads		SA 516 Gr 70	External Bolts		ASTM A320 L7
22	Nozzle Neck Plates		SA 106 Gr. B	External Nuts		ASTM A194 7L
23	Nozzle Neck Pipes		SA 106 Gr. B	Internal Bolting		316 SS Equivalent
24	Forged Nozzles		SA 105N	Internal Nuts		316 SS Equivalent
25	Forged Flanges		SA 105N	Baffles and Weir Plates		SA 240 316L
26	Blind Flanges		SA 105N	Fixed Internals		Note 2
27	Reinforcement Pads		SA 516 Gr 70	Removable Internals		SA 240 316L
28	Saddles		SA 516 Gr 70	Lifting Lugs / Trunnions		SA 516 Gr 70
29	Skirt		N/A	External Gaskets		Note 3
30	Brackets / Support		SA 516 Gr 70	Internal Gaskets		HNBR
31	Ladder and Platforms		N/A	External Paint		Note 4
32	Insulation Supports		N/A	Internal Paint / Lining		Note 4
33	Davit Arms		Carbon Steel			
34	**4. FABRICATION INSPECTION & TESTING**					
35	Post Weld Heat Treatment		To Code and Spec	DPI	%	To Code and Spec
36	Radiography	%	To Code and Spec	Production Test	%	To Code and Spec
37	Ultrasonic	%	To Code and Spec	Hydrotest	barg	To Code and Spec
38	MPI	%	To Code and Spec	Internals Integrity Testing		Note 5
39						
40	**5. WEIGHTS**					
41	Weight (Dry)	kg	Vendor to Advise	Weight (Dry + Internals)	kg	Vendor to Advise
42	Weight (Operating)	kg	Vendor to Advise			
43	Weight (Flooded)	kg	Vendor to Advise			

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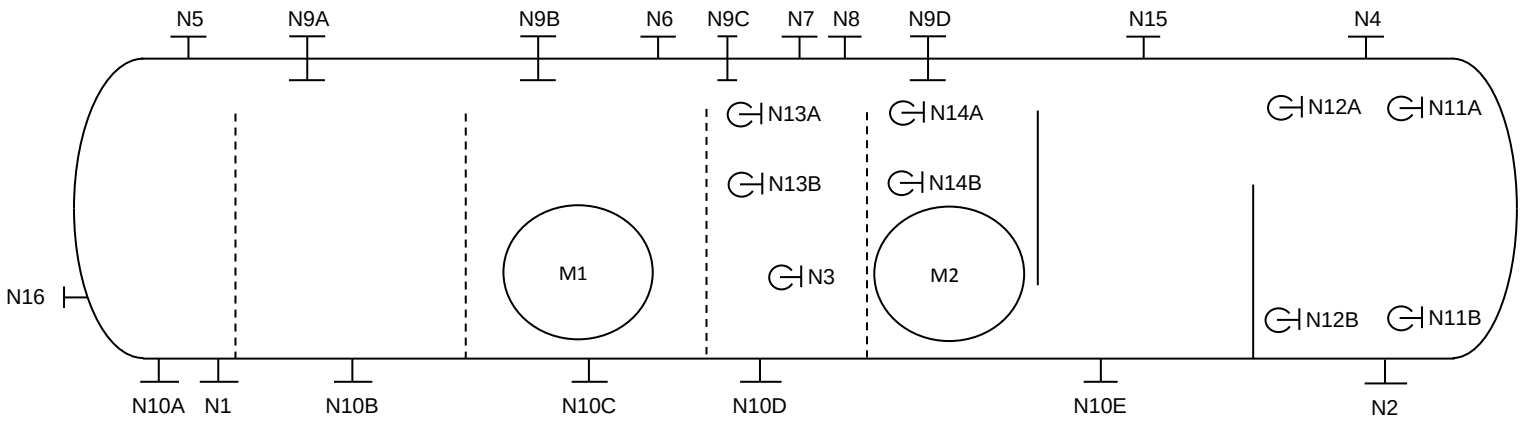
6. VESSEL SKETCH & NOZZLES:



MARK	NUMBER	NOM. BORE	ANSI CLASS	NOZZLE STANDOFF	SERVICE	REMARKS
N1	1	8"	150# WN RF	VTA	Produced Water Inlet	c/w Inlet Deflector (Note 6)
N2	1	8"	150# WN RF	VTA	Water Outlet	c/w Vortex Breaker (Note 6)
N3	1	2"	150# WN RF	VTA	Reject Outlet	c/w Internal Flange (Note 6)
N4	1	2"	150# WN RF	VTA	Gas Outlet	
N5	1	2"	150# WN RF	VTA	Fuel Gas Inlet	
N6	1	6"	150# WN RF	VTA	PSV	PSV-40106A / PSV-40106B (Supplied by Others)
N7	1	2"	300# WN RF	VTA	PZT (Trip)	PZT-40117
N8	1	2"	300# WN RF	VTA	PIT (Control)	PIT-40118
N9A-D	4	2"	150# WN RF	VTA	Recycle Water Inlet	c/w Internal Flange (Note 6)
N10A-E	5	2"	150# WN RF	VTA	Drains	
N11A-B	2	2"	300# WN RF	VTA	Water Side LG / LZT (Trip)	LG-40110 / LZT-40109
N12A-B	2	2"	300# WN RF	VTA	Water Side LIT (Control)	LIT-40108
N13A-B	2	2"	300# WN RF	VTA	Oil Side LG / LZT (Trip)	LG-40113 / LZT-40112
N14A-B	2	2"	300# WN RF	VTA	Oil Side LIT (Control)	LIT-40111
N15	1	2"	150# WN RF	VTA	Vent	
N16	1	2"	150# WN RF	VTA	Purge Connection	
M1	1	24"	150# WN RF	VTA	Manway	c/w Blind Flange, Davit Arm and Handles
M2	1	24"	150# WN RF	VTA	Manway	

NOTE: VESSEL SKETCH AND NOZZLE LOCATIONS ARE INDICATIVE ONLY, REFER TO 29647W-00-D-0254-01 VESSEL GENERAL ARRANGEMENT DRAWING FOR DETAILED REQUIREMENTS.

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92	**7. NOTES**
93	1. Fuel gas composition is as described in Table 8 of P3048-KBR-TCD-MAN-PR-SPC-0002 Produced Water Treatment
94	Functional Specification.
95	
96	2. Vendor to provide fixed internals that are internally welded to the vessel shell and are suitable for securing the required
97	removable internals. Removable internal details are provided in the drawings referenced in 29647W-00-T-0255-00 Internals
98	Layout Drawing. Fixed internals shall be UNS S31803 Duplex Stainless Steel material of construction. ~~Detail to be agreed~~
99	~~with vendor.~~
100	
101	3. External gaskets shall be 1/8" THK. Spiral Wound, 316L Inner and Outer Rings with Flexible Graphite Filler as described in
102	PCM-TCD-GEN-PI-SPC-0001 A01B Piping Class Specification.
103	
104	4. External paint shall be as per System 1 for non-insulated carbon steel equipment as described in PCM-TCD-GEN-MC-
105	SPC-0001 Protective Coating Specification.
106	Internal lining shall be as per System 2 for carbon steel equipment in hydrocarbon service as described in PCM-TCD-GEN-
107	MC-SPC-0001 Protective Coating Specification.
108	
109	5. Vendor to perform additional hydraulic tests to confirm integrity of the vessel removable internals as described in the
110	purchase specification document. Alderley to provide formal procedure for these tests.
111	
112	6. The required removable internals are as detailed below. Location of removable internals is described in the
113	29647W-00-T-0255-00 Internals Layout Drawing. Detail of each removable internal item is provided in the detail drawings
114	referenced in 29647W-00-T-0255-00 Internals Layout Drawing. Internally welded lifting point for assembling internals
115	shall be provided at the locations specified.
116	- 1 off Inlet Device associated with N1 inlet nozzle, lifting point required.
117	- 4 off Eductor Assemblies associated with each of the N9A-D nozzles, internal flange to be provided by vessel vendor,
118	eductors and distribution heads to be free issued by Alderley for installation by vendor.
119	- 4 off Horizontal Baffle Assemblies, lifting point required.
120	- 1 off Underflow Weir Assembly, lifting point required.
121	- 1 off Submerged Weir Assembly, lifting point required.
122	- 1 off 8 Inch Vortex Breaker associated with N2 outlet nozzle.
123	- 1 off 2 Inch Vortex Breaker mounted on the End Launder Assembly take off to N3 reject nozzle.
124	- 1 off Set of Side Launders Assemblies.
125	- 1 off Cross Launder Assembly.
126	- 1 off End launder Assembly.
127	- 1 off Water Outlet Compartment Launder Assembly.
128	
129	7. Vendor to provide internal gaskets where specified in the drawings referenced in 29647W-00-T-0255-00 Internals
130	Layout Drawing. Internal gaskets to be HNBR material of construction.
131	
132	8. Vessel requires cathodic protection. Vendor to provide internally welded clips to support sacrificial anodes.
133	Anodes to be free issued to the vessel vendor for installation. The location, number and design of anode clips to be
134	supplied to the vessel vendor following completion of anode study.
135	
136	
137	

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138	**7. NOTES (CONTINUED)**		
139	8. Vendor to provide externally welded piping supports as described in 29647W-00-D-0254-01 Vessel General Arrangement		
140	Drawing to allow external piping to be supported/braced from the vessel. ~~The number and location of these supports to~~		
141	~~be supplied to the vessel vendor.~~		
142			
143	9. Vendor to provide one (1) off set of externally welded ladder clips required for a single ladder to access the upper level		
144	instrument nozzles (N11A, N12A, N13A and N14A). Ladder to be supplied by others. Alderley to supply location and		
145	design of ladder clips.		
146			
147	10. Vendor to refer to P3048-KBR-TCD-MAN-EN-BOD-0001 Basis of Design for applicable general design data.		
148			
149	11. Deleted		
150			
151	12. Liquid Level Calculations (All liquid levels are based on vessel internal diameter and are measured from datum at		
152	lowest point):		
153	Water Side Levels		
154	Low Low Liquid Level (LLLL):	350	mm
155	Low Liquid Level (LLL):	620	mm
156	Normal Liquid Level (NLL):	1,240	mm
157	High Liquid Level (HLL):	1,440	mm
158	High High Liquid Level (HHLL):	1,650	mm
159			
160	Oil Side Levels		
161	Low Low Liquid Level (LLLL):	870	mm
162	Low Liquid Level (LLL):	960	mm
163	Normal Liquid Level (NLL):	1,060	mm
164	High Liquid Level (HLL):	1,150	mm
165	High High Liquid Level (HHLL):	1,240	mm
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