

Process Datasheet

Vacuum Belt Filter

Document Number/Ref	2404-ALTK-0000-PR-DAT-0022
Revision	4
Altek Project Number	2404
Customer	Confidential Client
Contract/PO Number	
Altek Product	AluSalt™

Revision	Date	Document Status	Reason for Issue	Prepared	Checked	Approved
1	12-Dec-2024	Information Only	For Information	AF	MH	-
2	19-Feb-2025	Basic Design	For Information	DW	KB	KB
3	29-Jul-2025	Basic Design	For Information	DW	AM	KB
4	07-May-2026	Request for Quotation	For Quotation	AM	TA	-

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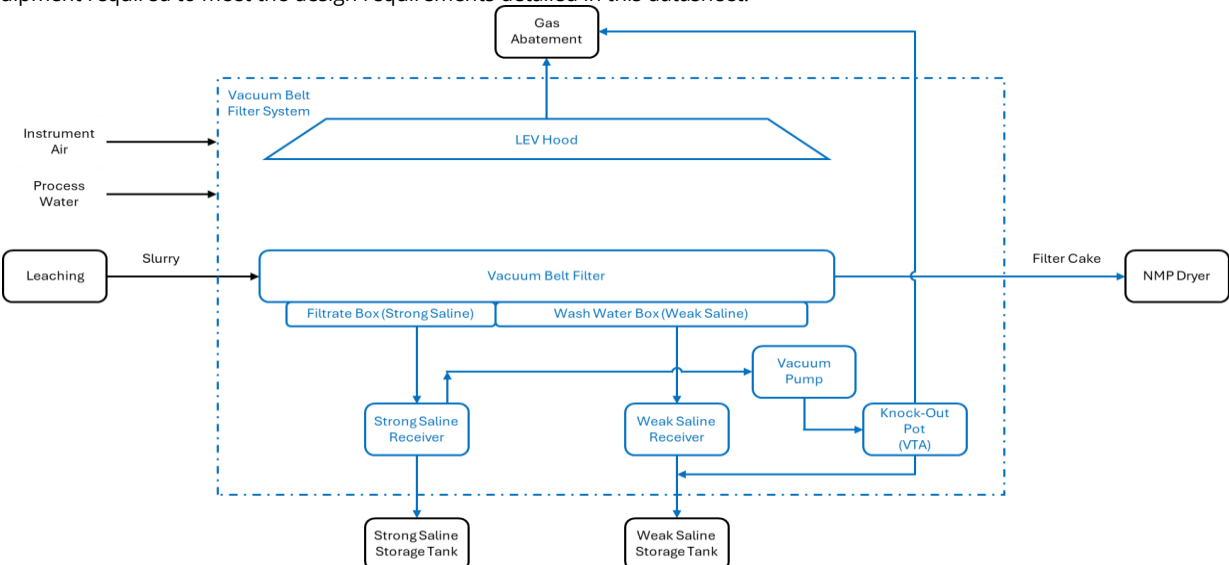
Company Registration No: 6264798



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1	PROCESS DATASHEET - VACUUM BELT FILTER	Rev
2	Introduction	
3	Altek are designing an AluSalt™ plant to treat 132,227 US tons (120,000 metric tonnes) of a salt slag - black dross blend per year.	
4	Salt slag and black dross consist of soluble salt and insoluble Non-Metallic Product (NMP). The powder blend is equally distributed	
5	across three identical NMP process lines. Initially the blend is processed in a dissolution tank to dissolve soluble material and react	
6	various Aluminium compounds, ultimately producing a slurry.	
7		
8	Slurry is pumped onto a Vacuum Belt Filter (VBF) where it will be dewatered and the resulting cake then washed to remove salts	
9	and chlorides. The slurry infeed will typically consist circa 20% wt. NMP, circa 20% wt. Salt and circa 60% wt. water; the slurry infeed	
10	will be dosed with flocculant to encourage solids settling on the VBF.	
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12	Dewatering in the first section of the VBF will produce 'strong saline' solution, part of which will be recycled back to the dissolution	
13	tanks and the excess will be treated in a Crystalliser Plant. Cake washing in the latter sections of the VBF will produce 'weak saline'	
14	solution. Weak saline is also recycled to several users within the plant, including the dissolution tanks.	
15		
16	The washed NMP Filter Cake leaving the VBF is required by the customer to have a Chloride content <0.5% wt , validated against	
17	silver nitrate ASTM C114-24 testing methodology. This is an essential performance requirement for the package system design. The	
18	wet NMP filter cake produced on the VBF is conveyed to a Dryer, where the material is dried to ≤0.2% wt. moisture (by others).	
19		
20	Altek has conducted extensive sample testing in order to optimise the wash ratio and cake thickness for the VBF; data from this	
21	testing is provided in this datasheet which shall feed into the package design. Further, a key design principle for the Alutsalt plant	
22	is zero water accumulation. This datasheet defines the maximum allowable water usage / saline solution output. The vendor is	
23	expected to develop a design which works within in these limits whilst achieving the specified performance criteria of a washed	
24	NMP Filter Cake to have a Chloride content <0.5% wt.	
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26	This document forms the basis of the Request for Proposal (RFP) for all aspects detailed in the scope of supply based on the data	
27	provided herein.	
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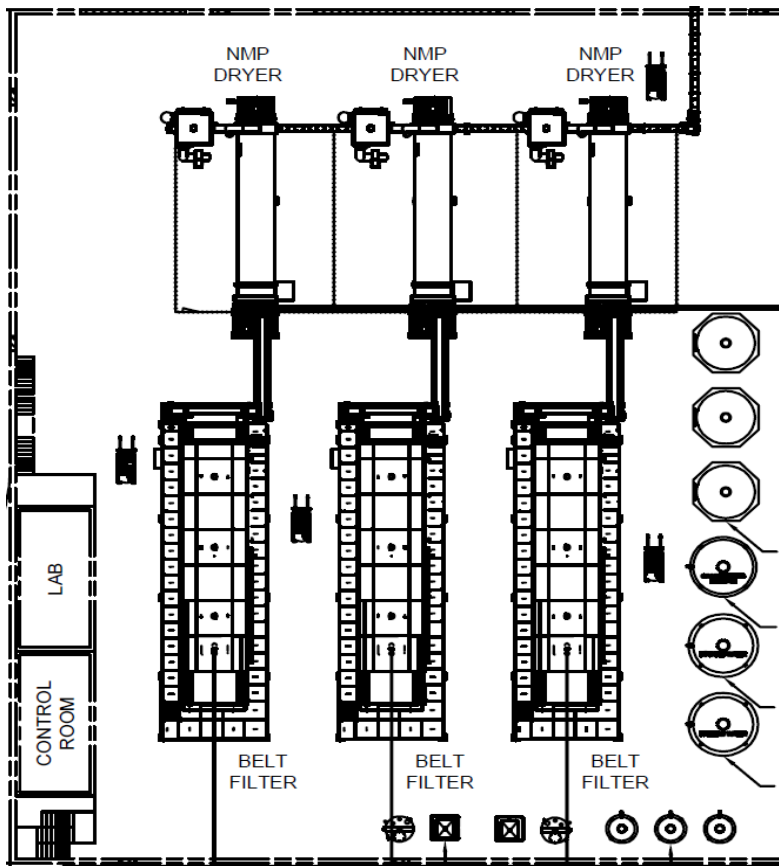
1	PROCESS DATASHEET - VACUUM BELT FILTER	Rev
2	Scope of Supply	
3	The vendor is to design, engineer, fabricate, test and deliver a complete package system for the Vacuum Belt Filters for the processing of Slurry. The system shall be designed as a fully integrated package including all associated mechanical, electrical, control and instrumentation required to ensure safe and efficient operation.	
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5	The scope of supply shall include the following as a minimum:	
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7	• 3off Vacuum Belt Filters • Dedicated ancillary equipment for each Vacuum Belt Filter - Vendor to define requirements and agree scope with Altek.	
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9	As a minimum, the ancillary equipment is expected to include:	
10		
11	- 3off. high pressure washing pumps, 1 off. per VBF. - 3off. LEV / Fume Hoods for the removal of gases / vapours generated by the filter cake, 1 off. per VBF. - 3off. Strong Saline Filtrate Receivers, 1 off. per VBF. - 3off. Weak Saline Filtrate Receivers, 1 off. per VBF. - 3off. Vacuum Pumps, 1 off. per VBF. - 3off. Vacuum Separators, 1 off. per Vacuum Pump.	
12		
13	• 3off dedicated PLCs and local control panel, 1 off per VBF. covering associated ancillaries. • Control and instrumentation for safe and efficient operation.	
14		
15	Vendor proposal inclusions:	
16		
17	• Mass & Energy Balance for the VBF, including all utility & process consumable requirements. • Design drawings (P&IDs / General Arrangements etc.) to provide clear definition of supply boundaries. • Functional Design Specification (FDS) for the entire system. • Daily rate for remote HazOp and LOPA attendance. • Lead time & delivery to site. • FAT / SAT. • Installation support. • Commissioning support with full reporting. • Training. • Documentation package as specified herein. • Performance guarantees for washed NMP Filter Cake to have a Chloride content <0.5% w/w. • Vendor to define and agree any testing required to ensure performance guarantees can be provided as part of the supply.	
18		
19	Options:	
20		
21	• 3off. Strong Saline Transfer Pumps, 1 off. per Receiver. • 3off. Weak Saline Transfer Pumps, 1 off. per Receiver. • 3off. Knock-Out Pots upstream of the vacuum pump, 1 off. per Vacuum Pump - vendor to confirm if required. • Access platforms within the package supply. If excluded, the vendor is expected to provide support to design associated with access within the battery limits. • Interconnecting pipework, ducting, expansion joints and supports within the battery limits.	
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23	Exclusions:	
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25	• Exhaust Fan. • Vent treatment system downstream of LEV / Fume Hood. • Offloading and positioning onsite. • Civils & structural steelwork.	
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1	PROCESS DATASHEET - VACUUM BELT FILTER								Rev	
2	Operating Data									
3	No. Required	3off. (Three) full package systems		Operation	283 days per year, 24 hours per day, 7 days per week					
4	Service	Dewatering, Filtration & Washing		Location	USA - Indoors					
5	Process Data for One Unit									
6	Infeed Material	-	Slurry							
7	Flowrates - Slurry & Filter Cake	-	Slurry Infeed			NMP Filter Cake Outfeed				
8		-	Minimum	Normal	Maximum	Minimum	Normal	Maximum		
9	Total	lbs/hr	Note 1	37650	Note 1	Note 1	10340	10790		
10	NMP Solids	lbs/hr	-	7843	-	-	7489	7489		
11	Salts	lbs/hr	-	7671	-	-	64	64		
12	Water	lbs/hr	-	22365	-	-	2668	3237		
13	Moisture	% wt.	-	59.4	-	-	25.8	30.0		
14	Particle Size Distribution	µm	Note 2							
15	Bulk Density	Wet/Dried	lbs/cuft	TBC / TBC						
16	Infeed Fluid Temperature Min/Norm/Max	°F	TBC / 104 / TBC Note 3							
17	Flocculant	-	VTA - SNF EM230 flocculant used in testing to date							
18	Filter Cake Chloride Content	% wt.	<0.5							
19	Saline Solution Composition	-	Strong Saline Solution			Weak Saline Solution				
20		-	Minimum	Normal	Maximum	Minimum	Normal	Maximum		
21	Salts	% wt.	-	25.8	-	-	5	-		
22	Water	% wt.	-	74.1	-	-	95	-		
23	Altek Sample Testing Summary									
24	Data provided was developed during Phase 1 of the project via Altek in-house testing as well as external lab testing. This information									
25	provides guidance on the system parameters considered in the design to achieve the specified performance criteria. The vendor									
26	shall corroborate system requirements by suitable means to allow for performance guarantees to be provided.									
27										
28	Filter Cake Depth	-	0.59 inches (15 mm) - Note 4							
29	Wash Ratio	-	2.42 Wash Water : 1 NMP in the Filter Cake, by weight - Note 4							
30	Maximum Water Usage	-	36.3 US gpm (8.245 m³/h) per VBF - Note 4							
31	Flocculant Used for Testing	-	SNF EM230 flocculant							
32	Chloride Testing Procedure	-	Silver Nitrate ASTM C114-24 testing methodology of NMP filter cake							
33	Block Flow Diagram									
34	This Block Flow Diagram is indicative of the Vacuum Belt Filter package system. The vendor shall define all unit operations and									
35	equipment required to meet the design requirements detailed in this datasheet.									
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1	PROCESS DATASHEET - VACUUM BELT FILTER					Rev
2	Vacuum Belt Filter - General Data					
3	Equipment Type & Tag Number	-	Vacuum Belt Filter D12-VF-101 / D12-VF-201 / D12-VF-301			
4	Design Code	-	VTA			
5	Design Temperature	Min/Max	°F	VTA / VTA		
6	Design Pressure	Min/Max	psig	VTA / VTA		
7	Material of Construction	Metallic - Wetted	-	316L Stainless Steel - VTA		
8		Belt	-	VTA		
9		Filter Cloth	-	VTA		
10		LEV Hood	-	316L Stainless Steel - VTA		
11	Dimensions	-	Overall	Belt	Filter Cloth	
12		Height	ft	VTA	VTA	VTA
13		Length	ft	VTA	VTA	VTA
14		Width	ft	VTA	VTA	VTA
15	Weight	Empty/Full	US tons	VTA / VTA		
16	Belt Speed		ft/min	VTA		
17	Filtration Area		sqft	VTA		
18	Filter Loading		lbs/sqft	VTA		
19	Filter Porosity		-	VTA		
20	Filtration Rate		lbs/sqft.min	VTA		
21	Wash Type		-	Direct / Counter Current - VTA based on max. allowable water consumption		
22	Number of Cloth Washing Spray Bars		-	VTA - Note 5		
23	Pressure at Spray Bar Connection		psig	VTA		
24	Total Water Consumption		US gpm	VTA - Note 6		
25	Vacuum Box Pressure		psig	-8.89 - VTA		
26	LEV Hood Dimensions	H / L / W	ft	VTA		
27	Exhaust Flowrate		ACFM	VTA		
28	Supports		-	VTA - floor standing. Vendor to provide suitable frame.		
29	Drives	Number/Type	-	VTA / VTA		
30	Installed Motor Power		hp	VTA		
31	Earthing Lug		-	Required - VTA quantity & location		
32	Noise Emission Limit		dBA	≤85 @ 3.3ft - Note 7		
33	Over/Under Pressure Protection		-	VTA - Note 8		
34	Access Requirements		-	VTA - Note 9		
35	Filtrate Receiver - General Data for One Unit					
36	Fluid		-	Strong Saline	Weak Saline	
37	Equipment Type		-	Primary Filtrate Receiver	Washing Filtrate Receiver	
38	Equipment Tag Number		-	D12-VE-101 / 201 / 301	D12-VE-102 / 202 / 302	
39	Capacity		US gallons	VTA	VTA	
40	Design Code		-	API 620 - VTA	API 620 - VTA	
41	Design Temperature	Min/Max	°F	32 / 250	32 / 250	
42	Design Pressure	Min/Max	psig	VTA / VTA	VTA / VTA	
43	Material(s) of Construction		-	VTA	VTA	
44	Corrosion Allowance		inches	Nil	Nil	
45	Dimensions	Tan-Tan	ft	VTA	VTA	
46		Int. Diameter	ft	VTA	VTA	
47	Weight	Empty/Full	US tons	VTA / VTA	VTA / VTA	
48	Supports		-	VTA	VTA	
49	Earthing Lug		-	Required - VTA quantity	Required - VTA quantity	
50	Breathing Rate	In/Out	US gpm	VTA / VTA	VTA / VTA	

1 PROCESS DATASHEET - VACUUM BELT FILTER					Rev
2 High Pressure Pump - General Data for One Unit					
3	Equipment Type	-	High Pressure Wash Pump - VTA Type		
4	Equipment Tag Number	-	D12-PU-101 / 201 / 301		
5	Make & Model	-	VTA		
6	Design Code	-	VTA		
7	Design Temperature	Min/Max	°F	32 / 250	
8	Design Pressure	Min/Max	psig	VTA / VTA	
9	Flowrate	Min/Max	US gpm	VTA / VTA	
10	Discharge Pressure	Min/Norm/Max	psig	VTA / VTA / VTA	
11	Material(s) of Construction	-	VTA		
12	Connections	Inlet/Outlet	-	VTA / VTA	
13	Seal Type	-	VTA		
14	Seal Material	-	VTA		
15	Driver Type	-	Variable Speed Drive		
16	Installed Motor Power	hp	VTA		
17	Earthing Lug	-	Required		
18	Noise Emission Limit	dBA	≤85 @ 3.3ft		
19 Vacuum Pump - General Data for One Unit					
20	Equipment Type	-	Liquid Ring Vacuum Pump - VTA		
21	Equipment Tag Number	-	D13-VP-101 / 201 / 301		
22	Make & Model	-	VTA		
23	Design Code	-	VTA		
24	Design Temperature	Min/Max	°F	32 / 250	
25	Design Pressure	Min/Max	psig	VTA / VTA	
26	Flowrate	Min/Max	ACFM	VTA / VTA	
27	Vacuum Generation	Min/Norm/Max	psig	VTA / VTA / VTA	
28	Material(s) of Construction	-	VTA		
29	Connections	Inlet/Outlet	-	VTA / VTA	
30	Seal Type	-	VTA		
31	Seal Material	-	VTA		
32	Driver Type	-	Variable Speed Drive		
33	Installed Motor Power	hp	VTA		
34	Ring Water Chiller	-	VTA to confirm requirement		
35	Earthing Lug	-	Required		
36	Noise Emission Limit	dBA	≤85 @ 3.3ft		
37 Site & Utility Data					
38	Compressed / Instrument Air	-	Clean & Dry Air @ 90 psig (TBC)		
39	Process Water	-	Potable Water - Supply Pressure, Min: 29 psig / Max: TBC Note 10		
40	Cooling Water	-	Supply Temperature: TBC / Supply Pressure: TBC		
41	Electricity	-	480V / 3 Phase / 60 Hz		
42	Equipment Location Conditions	-	Indoors / Ambient Temperature: 41°F to 113°F		
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1	PROCESS DATASHEET - VACUUM BELT FILTER								Rev	
2	Hazardous Area Classification									
3	Gas & Vapours	NFPA 497 - Class & Division Classification				NFPA 70 (NEC) / IEC 60079 - Zone Classification				
4		Class	Division	Group	Temp Class	Zone	Gas Group	Temp Class		
5	Internal	Class I	Division 1	Group B	T4	Zone 0	IIC	T4		
6	External	Class I	Division 2	Group B	T4	Zone 2	IIC	T4		
7	Dusts	NFPA 499 - Class & Division Classification				NFPA 70 (NEC) / IEC 60079 - Zone Classification				
8		Class	Division	Group	Temp Limit	Zone	Gas Group	Temp Limit		
9	Internal	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
10	External	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
11	EC&I Data									
12	PLC Communication	Vendor to include dedicated PLCs for the control and automation of each VBF system. The PLCs will								
13	Requirements	communicate with the plant SCADA system. VTA if signals will be provided via relay / volt free contact,								
14		or other communications protocol. The following signals must be available as system inputs/outputs								
15		as a minimum:								
16		• Start/Stop Signal Input								
17		• Healthy Signal Output								
18		• Running Signal Output								
19		• VBF General Fault Signal Output								
20		• Pump General Fault Signal Output								
21		• Vacuum Pump General Fault Signal Output								
22		• Any additional signals to be included as options								
23	Control & Instrumentation	All vendor standard instrumentation is to be included. The following instrumentation is expected to								
24	Requirements	be included as a minimum:								
25		• Online Chloride monitoring of the NMP filter cake. This is a client requirement for the filter cake								
26		discharged from the belt. VTA approach and measurement technique.								
27		• Cake depth monitoring.								
28		• Belt movement / speed monitoring.								
29		• Detection of belt failure (e.g. misalignment, tension etc.).								
30		• Detection of filter cloth failure (e.g. misalignment, tear etc.).								
31		• Blockage detection.								
32										
33		Vendor to additionally provide details of the following as a minimum:								
34		• Controlled Variables.								
35		• Alarms, Trips and Interlocks.								
36		• Associated safe shutdown philosophy.								
37	Control System	Allen Bradley (Rockwell Automation)								
38	Interface	Ethernet / IP / Hardwired 'handshake' signals / VTA								
39	Total Power Requirement	VTA								
40	Other	• Vendor to define any Safety Instrumented Systems (SIS) if required.								
41		• VBF package to interface with infeed equipment to ensure upstream system(s) safely shut down								
42		in the event of a failure.								
43		• VBF package to interface with outfeed equipment to ensure downstream system(s) safely shut								
44		down in the event of a failure.								
45		• Vendor to include wiring for all items within the package system, either provided pre-wired								
46		or with a footage allowance of cable for final connection / terminations on site.								
47		• Vendor to include local and remote E-Stop capability.								
48		• All equipment, valves and systems to fail safe.								
49										
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1	PROCESS DATASHEET - VACUUM BELT FILTER	Rev
2	Design Requirements & Technical Codes	
3	Refer to '2404-ALTAL Engineering Technical Specification' for a detailed list of Design Requirements, Technical Codes and Technical	
4	Standards applicable to all equipment supplied for this facility. The following codes are expected to apply in addition to those listed	
5	in the specification document:	
6		
7	• IEC 61131 - Programmable Controllers	
8	• ISA / IEC 61511 - Functional safety - Safety instrumented systems for the process industry sector	
9	• OSHA 29 CFR 1910 Occupational Safety and Health Standards for General Industry	
10		
11	The vendor is to provide a list of any additional codes applicable to design, manufacture, construction, supply and installation of	
12	the equipment covered under the Scope of Supply.	
13	Documentation & Certification	
14	Refer to '2404-ALTAL Engineering Technical Specification' for a list of Mechanical & Electrical Requirements, Certifications and	
15	Documentation applicable to all equipment supplied for this facility. The following documentation and certification are expected	
16	to be supplied in addition to those listed in the specification document:	
17		
18	• Functional Design Specification (FDS) and / or Control Philosophy	
19	• Cause & Effects	
20	• Hazardous Area Classification Certification - NEC Class & Division System and / or NEC Zone System as applicable	
21	• FAT / SAT test reports	
22	• Critical Spares List	
23		
24	The vendor is to provide a list of any additional documentation and certificates applicable to design, manufacture, construction,	
25	supply and installation of the equipment covered under the Scope of Supply.	
26	Layout Overview	
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1	PROCESS DATASHEET - VACUUM BELT FILTER	Rev
2	Notes	
3	1) Vendor to confirm minimum feedrate with respect to minimum turndown of the Vacuum Belt Filter.	
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5	2) Particle size distribution ranges have been determined from the following sample analysis:	
6	• Sample E58: d10: 4.6 d25: 15.4 d50: 61.4 d90: 333.5	
7	• Sample WB3-5: d10: 14.6 d25: - d50: 113.6 d90: 375.4	
8		
9	3) Vendor to confirm temperature parameters for all streams to allow for optimised performance of the VBF.	
10	Any heat exchangers required to achieve stated parameters will be supplied by Altek.	
11		
12	4) Altek sample testing during phase 1 has identified an optimum wash ratio (water : insoluble NMP) and cake	
13	depth to reduce the Chloride content of the NMP filter to <0.5% wt. The maximum allowable water stated is	
14	to prevent accumulation of saline solution within the plant.	
15		
16	5) Altek experience from past projects has identified a preference for adjustable spray bars / nozzles to allow for	
17	wash zones to be modified.	
18		
19	6) Vendor to confirm total water requirements for the VBF system. Maximum allowable water must be within	
20	stated limits. Vendor to confirm all individual wash flowrate and pressure requirements.	
21		
22	7) Vendor to provide guaranteed sound power and / or pressure levels for the equipment. Vendor to include	
23	details of engineering controls (e.g. enclosures, lagging, damping, mufflers, etc.) included within the equipment	
24	design.	
25		
26	8) Vendor to include details of all over and under pressure protection included within the scope of supply,	
27	including design codes for sizing basis.	
28		
29	9) Vendor to include details of any access platforms included within the scope of supply.	
30		
31	10) Process water composition will be available on request.	
32		
33	11) Slurry deposited on the VBF has to potential to continue reacting forming Hydrogen, Phosphine, Methane,	
34	Hydrogen Sulphide and Ammonia. Classification information has been stated with respect to the worst case	
35	group and temperature class for the materials listed. Vendor shall provide the following information:	
36	• Internal and external Hazardous Area Classification for the packaged equipment according to	
37	NFPA 497 - Class & Division Classification or IEC 60079 - Zone Classification.	
38	• Confirmation of the extent of any external hazardous areas.	
39	• Details of Hazardous Area Certification for equipment, instrumentation and valves, where applicable.	
40	• Identification of all potential release points of hazardous / toxic gases to the local environment.	
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