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	00	01	02	03	04	05		00	01	02	03	04	05	
1	x	x					31							
2	x	x					32							
3	x	x					33							
4	x	x					34							
5	x	x					35							
6	x	x					36							
7	x	x					37							
8	x	x					38							
9	x	x					39							
10	x	x					40							
11		x					41							
12		x					42							
13		x					43							
14		x					44							
15		x					45							
16		x					46							
17		x					47							
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1. Cu Concentrate Thickener

No.	Description	Units	Value
1	Quantity (Operational+ Standby)	#	1 (1 + 0)
2	Tag No.	-	3-34-3301-01
3	Location (indoors/ outdoors)	-	Outdoor
4	Application Description	-	Concentrate Thickener
5	Site Condition document	-	12002-D-PR-DOC-303-GNL-001
Process / Operating Conditions			
6	Solid Mineralogy	-	Copper Concentrate
7	Thickener unit area required	t/m ² h	0.1
8	Thickener diameter	m	30 (VTC)
9	Froth suppression spray flow rate	m ³ /h	20 (VTC)
10	Service	h/y	7680 (320 days/year)
Thickener Feed			
11	Ave. Feed solids flow rate (nominal)	tph	80.70
12	Ave. Feed solids flow rate (maximum)	tph	93.12
13	Ave. Feed slurry flow rate (nominal)	m ³ /h	324.32
14	Ave. Feed slurry flow rate (maximum)	m ³ /h	374.22
15	Slurry Density	t/m ³	1.17
16	Solid content	%(m/m)	19.85
17	Solid Density	t/m ³	4
18	Solid Particle size d80	µm	38
19	Slurry pH	-	10-12
20	Dilution system	-	E-Duc (VTC)
Thickener Overflow			
21	Overflow destination	-	Process water tank

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No.	Description	Units	Value
			(33-3231-14)
22	Overflow density	t/m3	1
23	Overflow flow rate (nominal)	m3/h	315.22
24	Overflow flow rate (maximum)	m3/h	356.95
25	Overflow solids concentration	ppm	TSS<300
Thickener Underflow			
26	Underflow destination	-	Filter press feed tank
27	Underflow solids density (nominal)	t/m3	4
28	Underflow solids density (maximum)	t/m3	4
29	Underflow solids flow rate (nominal)	tph	80.7
30	Underflow solids flow rate (maximum)	tph	93.12
31	Underflow slurry flowrate (nominal)	m3/h	63.63
32	Underflow slurry flowrate (maximum)	m3/h	73.42
33	Underflow solids	%	65
Flocculant Addition			
34	Flocculant addition needed	Yes/No	Yes
35	Flocculant dosage	g/t	10
36	Flocculent liquid rate	Lit/h	
37	Flocculent liquid Concentration	ppm	
Mechanical Information			
Thickener and Tank Specification			
38	Application	-	Copper conc. Dewatering
39	Thickener Type	-	High Rate, Raked, above-ground tank (VTC)
40	Tank Type	-	square or cylindrical mounted on structural supports (VTC)
41	Settle Area	m ²	706 (VTC)
42	Volume	m ³	VTs

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No.	Description	Units	Value
43	Diameter	m	30
44	Side Wall Height	m	VTs
45	Overall Height	m	VTs
46	Overflow Launder Dimension	-	VTs
47	Bottom Floor Plate Slope	Degree	VTs
48	Tank Freeboard	mm	VTs
49	Feed well Type	-	VTs
50	Feed well overall Dimension	-	VTs
51	Feed Well Plate Thickness	mm	VTs
52	Feed well Freeboard	mm	VTs
53	Empty Weight (Bottom & Shell):	kg	VTs
54	Operating Weight:	kg	VTs
55	Weight of Rake Mechanism & Lifting Device	kg	VTs
56	Froth removal system	-	Froth boom or De-Aeration tank & water spray (VTs)
57	Settling rate/Flux	-	VTs
RAKE Mechanism Data			
58	Number of Arms	pcs	4 (VTC)
59	Number of Rakes of Each Arms	pcs	2 Long + 2 Short (VTC)
60	Angle of Rakes	Degree	VTs
61	Operational Torque	N.M	VTs
62	Peak Torque	N.M	VTs
63	Design Torque	N.M	VTs
64	Rake Drive Power	Kw	VTs
65	Rake Rotation Speed	rpm	VTs
66	Rake arm Outside Dia.	m	VTs
67	Rake Arm Bottom Clearance	mm	VTs
68	No. of Blade	pcs	VTs

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No.	Description	Units	Value
69	Rotating Mechanism type	-	HYDRAULIC (VTC)
70	Mounting Plate (W×L×H)	mm	VTs
71	Rake Bearing	-	VTs
72	Shaft Seal	-	VTs
73	Rake Shaft (Dia. / Length)	mm	VTs
Lifting Mechanism Data			
74	Lifting Mechanism type:	-	HYDRAULIC (VTC)
75	Lifting Height:	mm	VTs
76	Lift Capacity:	-	VTs
77	Lift Speed:	mm/min	VTs
Material of Construction Data			
78	Shell	-	Carbon steel (VTC)
79	Bottom	-	Carbon steel (VTC)
80	Handrail		Yes
81	Walkway		Yes
82	Shaft	-	VTs
83	Rack mechanism	-	VTs
84	Lining	-	Rubber (VTC)
85	Shell Thickness	mm	8(VTC)
86	Bottom Thickness	mm	12(VTC)
87	Lining Thickness	mm	6mm (VTC)
88	Full span platform	-	Yes
RACK MECHANISM DRIVE SPECIFICATION			
89	Motor installed Power	kW	22 (VTC)
90	Motor absorbed Power	kW	VTs
91	Motor Operation	-	DOL/VFD (VTs)
92	Rotation	-	CCW/CW (VTs)
93	Gearbox Type (If applicable)	-	VTs
94	Gearbox Ratio (If applicable)	-	VTs
95	Gearbox output Speed (If applicable)	rpm	VTs
96	Motor & Gearbox Coupling (If applicable)	-	VTs
97	Cooling System	-	VTs

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No.	Description	Units	Value
LIFTING DRIVE SPECIFICATION			
98	Motor installed Power	kW	22 (VTC)
99	Motor absorbed Power	kW	VTs
100	Motor Operation	-	DOL/VFD (VTs)
101	Rotation	-	CCW/CW (VTs)
102	Gearbox Type (If applicable)	-	VTs
103	Gearbox Ratio (If applicable)	-	VTs
104	Gearbox output Speed (If applicable)	rpm	VTs
105	Motor & Gearbox Coupling (If applicable)	-	VTs
106	Cooling System	-	VTs
HYDRAULIC POWER PACK DATA FOR RACK MECHANISM			
107	Oil Pump type	--	VTs
108	Oil pump Capacity	Liter/hr	VTs
109	Oil pump Pressure	bar	VTs
110	Total Required / installed power	kW	VTs
111	Oil tank capacity / Dimension	--	VTs
112	Oil specification	--	VTs
113	External cooling	--	Required or not (VTs) Specification: (VTs)
114	Filter	--	Required or not (VTs) Specification: (VTs)
115	Relief Valve	--	Required or not (VTs) Specification: (VTs)
116	Level Transmitter	--	Required (VTC) Specification: (VTs)
117	Pressure Switch	--	Required (VTC) Specification: (VTs)
118	Temperature Switch	--	Required or not (VTs) Specification: (VTs)
119	Check Valve	--	Required or not (VTs) Specification: (VTs)
120	Air Breather	--	Required or not (VTs) Specification: (VTs)
121	Drip tray	--	Required or not (VTs) Specification: (VTs)
HYDRAULIC POWER PACK DATA FOR LIFTING MECHANISM			
122	Oil Pump type	--	VTs

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No.	Description	Units	Value
123	Oil pump Capacity	Liter/hr	VTs
124	Oil pump Pressure	bar	VTs
125	Total Required / installed power	kW	VTs
126	Oil tank capacity / Dimension	--	VTs
127	Oil specification	--	VTs
128	External cooling	--	Required or not (VTs) Specification: (VTs)
129	Filter	--	Required or not (VTs) Specification: (VTs)
130	Relief Valve	--	Required or not (VTs) Specification: (VTs)
131	Level Switch	--	Required or not (VTs) Specification: (VTs)
132	Pressure Switch	--	Required or not (VTs) Specification: (VTs)
133	Temperature Switch	--	Required or not (VTs) Specification: (VTs)
134	Check Valve	--	Required or not (VTs) Specification: (VTs)
135	Air Breather	--	Required or not (VTs) Specification: (VTs)
136	Drip tray	--	Required or not (VTs) Specification: (VTs)
GENERAL REQUIREMENT & ACCESSORIES			
137	Feed well		Yes
138	Overflow Launder	-	Yes
139	Feeding pipe	-	yes
140	Discharge	-	By Underflow Pumps
141	Local Control Panel & Display	-	Yes
142	Level Switch	-	Yes
143	Level Control	-	Yes
144	Torque meter overload detector	-	Yes
145	Lifting Position Indicator	-	Yes
146	Mud level indicator	-	Yes
147	Bed pressure indicator	-	Yes
148	Pressure Transmitter	-	Yes
149	Turbidity Instrument	-	Yes

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No.	Description	Units	Value
150	Others	-	VTs

ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
1. General				
1.1	Equipment tag No		3-34-3301-01	
1.2	Equipment Name		Cu Concentrate Thickener	
1.3	Application Description		Concentrate Dewatering	
1.4	Quantity		1	
1.5	Equipment Supplier			
2. ELECTRICAL CHARACTERISTICS				
2.1	Cable Entry info.		Will be Informed to Vendor after contract	
2.2	Industrial Type		Heavy Duty	
2.3	Earthing System		Solidly Earthed-TN -S	
2.4	Location / Service		Outdoor	
2.5	Installation		Horizontal/Vertical	
2.6	Torque Characteristics		See Note 10	
2.7	Service Factor		1.15	
2.8	Motor Type		Squirrel Cage Induction Motor	
2.9	Manufacturer		As per Approved Vendor List (In otherwise acc. to project agreements)	
2.10	Stator Winding		6 lead (suitable for wye-delta starting)	
2.11	Winding Material (Stator/Rotor)		Copper (See Note 8)	
2.12	Winding Type (Form/Random)		Form	
2.13	Duty Cycle		S1 (Continuous)	
2.14	Insulation Class / Temp. Rise		F/B (See Note 11)	
2.15	Voltage, Variations	V	400V±5%, 3ph (VTC)	
2.16	Frequency, Variations	HZ	50HZ±2% (VTC)	
2.17	Rated Current	A	By vendor	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
2.18	Number of Poles		By vendor	
2.19	Power Rating (Name Plate Rating)	kW	See Note 1, Note 2	
2.20	Absorbed Power	kW	VTs	
2.21	Power Factor	%		
	@2/4 Load		VTs	
	@3/4 Load		VTs	
	@Full Load		VTs	
	Locked Rotor		VTs	
2.22	Efficiency	%	Premium Efficiency	
	Efficiency Classification (IE Code)		Min. IE3	
	@2/4 Load		VTs	
	@3/4 Load		VTs	
	@Full Load		VTs	
	Locked Rotor		VTs	
2.23	Speed	rpm		
2.24	Starting Method		D.O.L (VTC)	
2.25	Starting Current (L.R.C)	A	VTs	
2.26	Acceleration Time	Sec	VTs	
2.27	Full Load Torque	N.m	VTs	
2.28	Starting Torque	% FLT	VTs	
2.29	Max.Torque	% FLT	VTs	
2.30	Pull-Up Torque / Break Down Torque	%	VTs	
2.31	Driven load moment of inertia GD2			
	Rotor	Kg.m ²	VTs	
	Load	Kg.m ²	VTs	
2.32	Withstand Fault Current		VTs	
	Main Terminal Box	(kA) / Duration Time	VTs	
	Auxiliary Terminal Box	(kA) / Duration Time	VTs	
2.33	No. of Starting per Hour		(See Note 15)	
	From Cold		3 (VTC)	
	From Hot		2 (VTC)	
2.34	Time interval between two Consecutive starts			
	From Cold		VTs	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
	From Hot		VTs	
2.35	Permissible locked rotor time (s)			
	@ 100% voltage		VTs	
	@ 80% voltage		VTs	
2.36	Torque-Speed Characteristics Curves (At 100% & 80% Rated Voltage)		VTs	
2.37	Current-Speed Characteristics Curves (At 100% & 80% Rated Voltage)		VTs	
2.38	Thermal Limit Curves (At 100% & 80% Rated Voltage)		VTs	
2.39	Power factor versus speed curves (At 100% & 80% Rated Voltage)		VTs	
2.40	Max Locked Rotor Current at Rated Volts (%FLA)		ACC. To IEC60034-6	
3. PROTECTION AND MEASUREMENT				
3.1	Motor Enclosure IP			
	Non-Hazardous Area		IP55 according to IEC 60034-5 (See Note 9)	
3.2	Terminal Boxes IP		IP55	
3.2	PT100 / PTCs (Thermistors) For Motor Windings		A) 45KW ≤ Motors ≤ 132KW → 3×PTC B) 132KW < Motors → 6×PT100 (See Note 5)	
3.3	PT100 for Motor Bearing		132KW < Motors → 2×PT100 (See Note 5)	
3.4	Setpoint Data for Winding PTCs			
	Alarm	°C	130 (VTC)	
	Trip	°C	150 (VTC)	
3.5	Noise Level		Less than 85 dBA @ 1m	
3.6	Safety requirements		see note 35	
3.7	Safety Sign		see note 36	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
3.8	Safety Installation and operation requirements			see note 37
4. MECHANICAL CHARACTERISTIC				
4.1	Motor Mounting		VTs	
4.2	Enclosure/Frames		Cast Iron	
4.3	Frame Reference		VTs	
4.4	Frame Earth Bus		Required	
4.5	Cooling Method		Cooling Method For Motor: TEFC (IC411) Cooling Method For VFD Motor: (min. IC416) (See Note 6)	
4.6	Rated Power for VFD Motor's External Fan	KW	VTs □400V □ 230V	
4.7	Fan material		Non-Sparking Design/ Corrosion Resistance/ Bi-directional/ Brass/Bronze/Aluminium	
4.8	Bearing Type and Material (For DE & NDE)		Anti-Friction type VTC	
4.9	Max. Bearing Housing vibration velocity	mm/s	Acc. to IEC 60034-14	
4.10	Max. Shaft vibration Displacement	mmills p- p	Acc. to IEC 60034-14	
4.11	Bearing Life		Not less than 50,000 hours VTC (See Note 16)	
4.12	Lubricating			
	Grease/Oil/ Other		Grease with premium grade (For outdoor services it shall be selected based on the Minimum ambient temp.)	
	Self / Forced		Self- Lubricated	
	Grease Relief Port (For regreasable Bearings)		Required	
	Bearing Lubrication Interval (Hour)		VTs	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
4.13	Power Terminal Box			
	Type		VTs	
	Cable Box Entry		ISO Metric Threaded	
	Location From DE (TOP/LHS/RHS)		(See Note 12)	
	Direction of Cable Entrance		(See Note 12)	
	Internal ground Stud		Yes	
4.14	Terminal Box for PTC/PT100 Sensors		Yes	
	Location From NDE (LHS/RHS)		VTs	
	Direction of Cable Entrance		Bottom	
4.15	Terminal Box for Space Heater		Required	
	Location From DE (LHS/RHS)		RHS	
	Direction of Cable Entrance		Bottom	
	Space Heater		230VAC	
4.16	Base Plate		VTs	
4.17	Outline Dimension	mm	VTs	
4.18	Motor Weight	kg	VTs	
4.19	Lifting Eye		(See Note 13)	
4.20	Name plate		Stainless Steel	
4.21	Painting Colour		(See Note 17)	
5. Control & instrumentation				

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
5.1	Control panel required	Y/N	YES	
5.2	Instrument required	Y/N	YES	

Notes:

- Rated Power shall be delivered at site condition or height & temperature de-rating factor shall be considered for sizing of motor.
- Rated Power shall be calculated as bellow:

$$P = (\text{Required Mechanical power}) * (\text{API factor})$$

Required Mechanical power <22KW → API factor = 1.25
22KW ≤ Required Mechanical power <55KW → API factor = 1.15
55KW ≤ Required Mechanical power → API factor = 1.1

MV Motors shall have a 1.0 service factor (SF) when operated at rated voltage and frequency.
- For the motor starting method please refer to the related mechanical datasheet and process viewpoint. (D.O.L or V.F.D)
- All motors controlled by VFD shall be equipped with insulated bearings at both drive and non- drive ends.
- For greater than 132 KW motor (controlled by /without VFD or where specifically is requested), shall have six (two per phase) PT100 on stator windings and two PT100 sensors for bearing. Six stator resistance temperature detectors (RTD5) shall be provided for each motor. The RTDs shall be embedded in the stator windings and terminated in a separate (IP55) terminal box. The RTDs shall be 100 ohms, three lead, and platinum.
- For motor driven by VFD and rated power above 160KW, IC416 shall be considered. For motor that feed by VFD, cooling fan shall be driven by separate motor.
- Exterior surface finish shall be the manufacturer's standard corrosion-resistant paint system.
- The rotor cage shall be made of brazed copper or copper alloy and shall be free from excessive inherent axial thrust, and shall be laminated.
- Motors to be used in hazardous areas shall be totally enclosed fan cooled (TEFC), IP65, explosion proof as per area classification. On explosion proof motors, means shall be provided for withdrawing end plates and cartridges housing (where fitted) in a manner which shall avoid damage to explosion proof flanges. Motors to be used in non-hazardous area, outdoor in non-process, shall be totally enclosed fan cooled (TEFC) with degree of protection IP55 according to IEC 60034-5. In non-hazardous area, indoor

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in non-process area, standard industrial type motors, with degree of protection IP55 according to IEC 60034-5 shall be used.

10. Motors shall have an equivalent NEMA design B torque characteristics for normal operating conditions. For high starting torque applications motors shall have an equivalent NEMA Design C characteristic. Motors for use with VFDs shall have IEC "N" (NEMA Design B) torque characteristics, unless specifically noted otherwise. Motor-driven equipment with a torque curve varying as the square of the speed shall, as a minimum, have a starting torque complying with design "N" as per IEC 60034-12. Motor-driven equipment with a constant torque shall, as a minimum, have a starting torque complying with design "H" as per IEC 60034-12.
11. in case of Using VFD Insulation class of windings shall be class H with temperature rise limited to the temperature of class B insulation, according to IEC standard.
12. Motors shall have terminal boxes suitable for accepting cables from any of the four directions at right angles in the plane of the terminal box. Main terminal box shall be positioned on the right- hand side when viewed from the driving end.
13. All motors shall have forged lifting eyes or lugs. Motors above 20kg weight shall be provided with lifting lugs or hooks or in special cases, lifting equipment set.
14. Installation, Operation & Maintenance Instruction, Dimensional Outline Drawing, Certified Test Report & Written Statement shall be prepared by Vendor.
15. Motors shall be designed for at least the number of direct on line starts per hour as specified in the IEC Standards. Motors with the capability of at least 5 starts per hour, direct on line, are preferred. Bidders shall include starts per hour information for all motors in the proposal, and include in motor protection.
16. Bearing life, in belt drive applications, with loading in accordance with the data provided, shall be rated for 50,000 hours and 100,000 hours for direct drive applications.
17. Finishing paint shall be RAL7032 or manufacturer's standard and in accordance with the painting schedule which shall be prepared by manufacturer and shall be sent to the buyer for approval.
18. Vendor shall provide and issue the important data required to design the related structure / foundation.
19. The vendor should use ASME B16.5 nozzle flange standard Tie in/Out points and ASME B16.47B for sizes larger than 26 inches.
20. The type, SCH, rating and standard of flanges must be specified.
21. The size of the nozzles must be mentioned in inch unit.
22. NDE: Non-Drive End
23. DOL: Direct On-Line
24. V: Vertical Mounted

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25. RHS: Right Hand Side
26. H: Horizontal Mounted
27. LRC: Locked Rotor Current
28. API: American Petroleum Institute
29. TEFC: Totally Enclosed Fan Cooled
30. FLT: Full Load Torque
31. VFD: Variable Frequency Drive
32. VTS: Vendor to Specify
33. VTC: Vendor to Confirm
34. Suitable de rating for the motors needs to be applied due to site elevation.
35. Regarding the safety requirements, refer to the MSDS document with document number 12002-D-SF-DSH-303-GNL-021 and follow it.
36. The Safety Sign & Escape Route Layout for Dewatering Building document number 12002-D-SF-LAY-303-DWT-140 shall be referred to and followed.
37. MAINTENANCE & INSTALLATION & OPERATION safety requirements should be specified by the vendor.
38. Supplier shall provide all of documents, such as: general arrangement (GA), etc.
39. Standard of nozzles must be according to ASME B16.5 & B16.47.
40. For Orientation & direction of nozzles, shall be approved with Piping department of client.
41. Design 3D model in PDMS (version 12.1).