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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							
18		X					48							
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1. ROUGHER FLOTATION CELLS DATASHEET

No.	Description	Units	Value
General data			
1	Quantity	#	12 Operational & 0 Standby
2	Tag No. / Location (indoors/ outdoors)	-	RC 3/4-33-3101-01~12 /Indoor AG 3-33-2402-01~12/Indoor
3	Application Description	-	ROUGHER FLOTATION CELL
Process / Operating Conditions			
Material Processed			
4	Type of cell	-	WEMCO (self-air supply) (VTC)
5	Cell arrangement	-	1*F-1-1-1-1-1-1-1-1-1-1-T
6	aeration	%	85
7	Bank design residence time (Nominal- Design)	mins	(30.33-35)
8	Number of cells	#	12
9	Number of banks	#	1
10	Number of cells per each bank	#	12
11	Total bank volume	m ³	3804 (VTC)
12	Cell volume	m ³	317 (VTC)
13	Air flow per cell	Nm ³ /h	VTs
14	Total Air Required	Nm ³ /h	VTs
15	Air pressure	kPa	VTs
Feed			
16	Mineralogy	-	Copper ore
17	Particle size d80	µm	90
18	Slurry pH	-	11.5
19	Slurry Density	t/m ³	1.27

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No.	Description	Units	Value
20	Solid Density	t/m ³	2.8
21	Solid content	%(m/m)	33
22	Solid rate total per bank (design)	dmt/h	2708.1
23	Solid rate total per bank (nominal)	dmt/h	2347.02
24	Slurry rate total per bank (design)	m ³ /h	6465.43
25	Slurry rate total per bank (nominal)	m ³ /h	5603.68
Concentrate			
26	Recovery	%	92.27
27	Solid rate total per bank (design)	dmt/h	379.13
28	Solid rate total per bank (nominal)	dmt/h	328.58
29	Slurry rate total per bank (design)	m ³ /h	1272.81
30	Slurry rate total per bank (nominal)	m ³ /h	1103.1
31	Solid content	%(m/m)	25
32	Slurry Density	t/m ³	1.19
Tails			
33	Solid rate total per bank (design)	dmt/h	2328.96
34	Solid rate total per bank (nominal)	dmt/h	2018.44
35	Slurry rate total per bank (design)	m ³ /h	5520.63
36	Slurry rate total per bank (nominal)	m ³ /h	4828.28
37	Solid content	%(m/m)	32.95
38	Reagents		Add in 5 th cell
39	C4132	g/t	3
40	C2430	g/t	2
41	MIBC	g/t	2
42	F742	g/t	2
43	FUEL OIL	g/t	5

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No.	Description	Units	Value
44	SIPX	g/t	2
Mechanical Information			
Tank specs			
45	Type	-	Cylindrical (VTC)
46	Height/diameter (overall)	mm	VTs
47	Height (Wetted)	mm	VTs
48	Cell Dimension	mm	VTs
49	Internal Wear Lining type	-	Rubber
50	Shell Thickness	mm	6 (VTC)
51	Base Thickness	mm	VTs
52	Discharge Nozzles	#	VTs (See NOTE 19)
53	Discharge Nozzle Size	mm	VTs (See NOTE 19)
54	Drain Nozzle Size	mm	VTs (See NOTE 19)
55	External Tank Surface Protection type	-	VTs
56	Internal wear Lining Thickness	mm	VTs
57	Laundry Spray System-	-	Included or excluded (VTs)
58	Laundry Spray System type	-	VTs
59	Overflow (double or single)	-	VTs
60	Overflow arrangement	-	VTs
61	Frothing paddle	-	VTs
62	Min. Head Room Required for Installation	mm	VTs
63	Another requirement	-	the possibility of bypassing for 1 st and 2 nd overflow concentrate cells must be considered. (VTC)
Laundry Specs			
64	Laundry Type (outside/inside)	-	Inside (VTC)
65	Radial Launderers	-	Yes or no

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No.	Description	Units	Value
66	Radial Launderers per Tank	#	VTs
67	Radial Launder Lip Length	mm	VTs
68	Total Available Lip Length (approx.)	mm	VTs
69	Launder Dimension	mm	VTs
70	Diameter	mm	VTs
71	Slope to Discharge	degree	VTs
72	Wear Lining type	-	VTs
73	Wear Lining Thickness	mm	VTs
74	Junction Box Dimension (L/W/H)	mm	If needed (VTs)
75	Tail Box Dimension (L/W/H)	mm	VTs
76	Elevation Drop Between Cells	mm	VTs
Feedbox specs			
77	Shape	-	Square or cylindrical (VTs)
78	Height	mm	VTs
79	Diameter	mm	VTs
80	Wear Lining type	-	Rubber
81	Wear Lining Thickness	mm	6 (VTC)
82	Mass	kg	VTs
83	Pulp Height Above Cell Pulp	mm	VTs
84	Inlet Nozzle Type	-	Nozzle or Square Flange or etc. (VTs) (See NOTE 19)
85	Inlet Nozzle Dimensions	mm	VTs (See NOTE 19)
86	Outlet Nozzle Type	-	Nozzle or square (VTs) (See NOTE 19)
87	Outlet Nozzle Dimensions	-	VTs (See NOTE 19)
Cell discharge valves			
88	Number of Discharge Valves Per Cell	#	VTs

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No.	Description	Units	Value
89	Valve type	-	VTs
90	Valve size	-	VTs
91	Valve Seat Materials of Construction	-	VTs
92	Valve cone Material	-	VTs
93	Valve Materials of Construction	-	VTs
Bearings			
94	Type / brand	-	According to AVL
95	Diameter	mm	VTs
96	Life	hours	VTs
V-belt drive (IF REQUIRED)			
97	Supplier & Model	-	VTs
98	Reduction Ratio	-	VTs
99	Safety Factor on Motor	-	VTs
Agitator & Stator			
100	Rotor type	-	VTs
101	Installed Power (each cell)	kW	VTs
102	Total Power (for all cells)	kW	VTs
103	Rotor Size	mm	VTs
104	Stator size	mm	VTs
105	Speed	rpm	VTs
106	Peripheral speed	m/s	VTs
107	Rotating Direction	-	Bidirectional (VTC)
108	Agitator Material	-	VTs
109	Stator Material & Thickness	-	VTs
110	Shaft Diameter	mm	VTs
111	Shaft length	mm	VTs

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No.	Description	Units	Value
112	Shaft Material	-	VTs
Plate work			
113	Tank Wall Thickness	mm	VTs
114	Tank Bottom Thickness	mm	VTs
115	Junction Box Plate Thickness	mm	VTs
116	Plate Material	-	VTs
117	Liner Material	-	Rubber
Coating specification			
118	Wetted & Non-Wetted Parts	-	VTs
Weights			
119	Tank	kg	VTs
120	Mechanism	kg	VTs
121	Motor	kg	VTs
122	Heaviest Item During Installation	kg	VTs
123	Heaviest Item During Maintenance	kg	VTs
I&C information			
Instrumentation			
124	Level control system	-	Required
125	Level Control Valve Type	-	Internal Hinged Dart Valve (VTC)
126	Dart Valve Size	mm	VTs
127	Dart Valve Shape	-	VTs
128	Number of Dart Valve per cell	#	2 (VTC)
129	Actuator Manufacturer	-	According to AVL
130	Actuator Model	-	VTs
131	Actuator Type	-	Rotary or linear
132	Level Instrument Type	-	Ultrasonic or Radar (VTC)
133	Level Instrument Model	-	VTs

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No.	Description	Units	Value
134	Flow meter for air	-	Required or not required (VTS)
135	Air Control Valve type	-	VTS
136	Temperature for air (flow compensation)	-	Required or not required (VTS)
137	pressure for air (flow compensation)	-	Required or not required (VTS)
138	Air Control Valve Manufacturer	-	VTS
139	Air Control Valve Size	mm	VTS
140	Actuator Manufacturer	-	VTS
141	Actuator Model	-	VTS
142	Actuator Type	-	VTS
143	Density measurement system	-	not required (VTC)
144	Bubble size detector and control system (froth vision)	-	Required for 1 st and 2 nd cell
145	Conductivity measurement system	-	not required (VTC)
146	Temperature measurement system	-	not required (VTC)
147	pH measurement system	-	not required (VTC)

ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
1. General				
1.1	Equipment tag No		AG 3-33-2402-01~12 /Indoor	
1.2	Equipment Name		ROUGHER FLOTATION MECHANISM	
1.3	Application Description		FLOTATION MACHINE	
1.4	Quantity		12	
1.5	Equipment Supplier			
2. ELECTRICAL CHARACTERISTICS				
2.1	Cable Entry info.		Will be Informed to Vendor after contract	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
2.2	Industrial Type		Heavy Duty	
2.3	Earthing System		Solidly Earthed-TN -S	
2.4	Location / Service		Outdoor/Indoor Area	
2.5	Installation		Horizontal/Vertical	
2.6	Torque Characteristics		See Note 10	
2.7	Service Factor		1 (VTC)	
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	6.6V±5%, 3ph (see NOTE 35) (VTC)	
2.16	Frequency, Variations	HZ	50HZ±2% (VTC)	
2.17	Rated Current	A	By vendor	
2.18	Number of Poles		By vendor	
2.19	Power Rating (Name Plate Rating)	kW	See Note 1, NOTE 19	
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	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
	Locked Rotor		VTs	
2.23	Speed	rpm		
2.24	Starting Method		▪D.O.L □ VFD (See Note 3)	
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) / Durati on Time	VTs	
	Auxiliary Terminal Box	(kA) / Durati on 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	
	From Hot		VTs	
2.35	Permissible locked rotor time (s)			
	@ 100% voltage		VTs	
	@ 80% voltage		VTs	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
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			
	Hazardous Area		IP65, explosion proof as per area classification (See Note 9)	
	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		6×PT100 (2 PT100 for each phase) (See Note 5)	
3.3	PT100 for Motor Bearing		2×PT100 (See Note 5)	
3.4	Setpoint Data for Winding PTCs			
	Alarm	°C	VTs	
	Trip	°C	VTs	
3.5	Noise Level		Less than 85 dBA @ 1m	
4. MECHANICAL CHARACTERISTIC				
4.1	Motor Mounting		VTs	
4.2	Enclosure/Frames		Cast Iron	

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
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	m/sec	Acc. to IEC 60034-14	
4.10	Max. Shaft vibration Displacement	mills 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	
4.13	Power Terminal Box			

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ITEM	Description	UNIT	PURCHASER'S REQUIREMENTS	VENDOR'S RESPONSE
	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	m	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)	

2. RECOMMENDED BLOWER FOR FLOTATION CIRCUIT DATASHEET

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Blower Specification for CLEANER CELLS				Vendor data
1	No. Blower Required	--	2 (VTC)	
2	No of Working / Standby	--	1 working / 1 standby (VTC)	
3	Blower Air Flow	Am3/h	5760 (VTC)	
4	Blowers Air Pressure	kPa	55 (VTC)	
5	Power:	kW	VTS	
6	Blower Type:	--	VTS	
7	VFD	--	Yes or no (VTS)	
Blower Specification for RE-CLEANER & RE-RE-CLEANER CELLS				Vendor data
1	No. Blower Required	--	2 (VTC)	
2	No of Working / Standby	--	1 working / 1 standby (VTC)	
3	Blower Air Flow	Am3/h	2940 (VTC)	
4	Blowers Air Pressure	kPa	30 (VTC)	
5	Power:	kW	VTS	
6	Blower Type:	--	VTS	
7	VFD	--	Yes or no (VTS)	

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:

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

$$\text{Required Mechanical power} < 22\text{KW} \rightarrow \text{API factor} = 1.25$$

$$22\text{KW} \leq \text{Required Mechanical power} < 55\text{KW} \rightarrow \text{API factor} = 1.15$$

$$55\text{KW} \leq \text{Required Mechanical power} \rightarrow \text{API factor} = 1.1$$
- 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.
- LV motors (above 8 kW controlled by VFD or where specifically is requested) shall have six (two per phase) PT100 on stator windings and two PT100 sensor for bearing.

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6. 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.
7. Exterior surface finish shall be the manufacturer's standard corrosion-resistant paint system.
8. 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.
9. 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 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.

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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
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. WFL: Will be Finalized
35. Motor equal or greater 250 kW shall be supplied by MV switchgear (6.6kV).