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Tabulation of Revised Page

Sheet	Revisions							Sheet	Revisions						
	00	01	02	03	04	05			00	01	02	03	04	05	
1	X	X	X	X				31							
2	X	X	X	X				32							
3	X	X	X					33							
4	X	X		X				34							
5	X	X		X				35							
6	X	X		X				36							
7	X	X		X				37							
8	X	X		X				38							
9	X							39							
10	X							40							
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ITEM	DESCRIPTION GENEARL	REQUIREMENT	BIDDER/VENDOR PROPOSAL
1	GENERAL		
1.1	Outdoor Design Max Temperature (Max./ Min.) Indoor Design Max. Temperature / Humidity	(+40 °C / -25 °C) (+40 °C / 23% ~ 70%)	
1.2	Altitude above sea level	2500 m.a.s.l	
1.3	Site Atmosphere	Dusty	
1.4	Location / Service	Indoor Installation	
1.5	Seismic Condition	0.3g	
1.6	Neutral System of Supply	Solidly Earthed	
1.7	Drive Type (Synchronous, Asynchronous)	Asynchronous	
2	VFD CUBICLE CHARACTERISTICS		
2.1	Manufacturer / Country of Origin	As per A.V.L	
2.2	Panel Model/Type No.	By Vendor	
2.3	Standards	IEC 61439/ IEC 60947/ IEC 60529/ and other Relevant IEC Standards	
2.4	Type of Cubicle - (Fixed / Withdrawable)	Fixed	
2.5	Enclosure	Metal Enclosed	
2.6	Type of Installation	Free Standing	
2.7	Rear / Front Access	Front Access	
2.8	Rated Supply Voltage at VDF Input Terminals	400V ±10%	
2.9	Rated Supply Frequency at VDF Input Terminals	50Hz ±5% (Stationary: ±2% / Instantaneous: ±5%)	
2.10	Number of Supply Phases	3Ph+N+PE	
2.11	Panel Rated Voltage / Insulation Voltage	690 V/1 KV	
2.12	Degree of Protection	IP42	
2.13	Panel Paint Color Shade	RAL 7035-Epoxy Powder	
2.14	Thickness Of Paint Coating	80-120 micron	
2.15	Cable Entry	Bottom	
2.16	Removable Cable gland plate	Required Non-magnetic Type	
2.17	Cubicle Steel Sheet Thickness	Min. 2mm	
2.18	Type of Cooling	Forced	
2.19	Type of Insulation	Air Insulated	
2.20	Rated 1 Min. Power Frequency Withstand Voltage (R.M.S)	1.89KV @ Site Condition	
2.21	Rated Lightning Impulse Withstand Voltage	6KV, 1.2/50µs @ Site Condition	
2.22	Rated Short Circuit Withstand Current (KA)/ Time Duration (Sec.)	ACC to Relevant S.L.D for 0.4KV LV/MCC Documents: Stockpile Area (12002-D-EL-SLD-303-STP-211) Grinding Area (12002-D-EL-SLD-303-GRD-303) Flotation Area (12002-D-EL-SLD-303-FLO-367) Dewatering Area (12002-D-EL-SLD-303-DWT-425) Mo Area (12002-D-EL-SLD-341-MOL-490) Lime & Reagent (12002-D-EL-SLD-303-RGT-530)	
2.23	Bus-bar Coating	Same as MCC switchgear (Tin plated)	

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ITEM	DESCRIPTION GENEARL	REQUIREMENT	BIDDER/VENDOR PROPOSAL
2.24	Busbar rating (A)	V.T.S (10% over than VFD rated current)	
2.25	Main Bus-bar Size (mm)	By Supplier (Acc.to MCC SWG.)	
2.26	Earth Busbar Cross Section	Same as MCC switchgear (Min. 120 mm ²)	
2.27	Busbar Material	Hard Drawn Copper	
2.28	Busbar Insulation	Insulated, Flame Retardant	
2.29	Shape of Main Busbars	Flat/Rectangular	
2.30	Internal Safety Interlocks	Required	
2.31	Fan Failure Alarm	Yes	
2.32	Weight of One Cubicle	By Vendor	
2.33	Overall Dimension (H X W X D)	By Vendor	
2.34	Lifting Lugs	Yes	
2.35	Heat Dissipation @ Full Load (per Cubicle)-kw	By Vendor	
2.36	Provision for Extension at Each End of SWGR.	No	
2.37	Cubicle Heating with thermostat, Lighting and Socket	Yes / 230VAC	
2.38	Label	All devices shall have appropriately labelled	
2.39	Min. Wire Size (mm ²)	(Flame Retardant-PVC Insulation) 4 mm ² for CT's Secondary 2.5 mm ² for PT's Secondary 1.5 mm ² for Control Circuits	
2.40	Spare Terminals	20%	
3	VFD's GENERAL CHARACTERISTICS		
3.1	Manufacturer / Country of Origin	As Per Project A.V.L (ABB, Siemens, Schneider, WEG, Aucom)	
3.2	Manufacturer Model/Type	By Vendor	
3.3	VFD Features	Heavy Duty type/ Microprocessor-based/IGBT Modular construction/ Long Life Equipped by backlit alphanumeric HMI/ Keys for (Run- Stop), (Local- Remote control), (Increase- Decrease of speed), Menu Navigation and Parameter Select/Fault recorder/ Adjustment storage/Fault Diagnostic/ Low Harmonic	
3.4	Standards	IEC 61800/ IEC 61000-4/ IEEE 519/ IEC 60146, IEC 62262/IEC 61378	
3.5	Converter Type	6 Pulse	
3.6	Degree of Protection	IP20/21	
3.7	Back-Lit Alphanumeric LCD Display	Yes	
3.8	Over load capacity (% of rated current)	150% for 10 Sec. for variable torque applications 110% for 1 minute for constant torque applications	
3.9	Type of Cooling	Air Cooled	
3.10	Rated Output Voltage	400V±5%	
3.11	Control Circuit Voltage	By converter 230VAC/24VDC (Internal Power Supply)	

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ITEM	DESCRIPTION GENEARL	REQUIREMENT	BIDDER/VENDOR PROPOSAL
3.12	Drive Nominal Power (Kw) @ Site condition	By vendor	
3.13	Drive Nominal Current (A)	By vendor	
3.14	Output Voltage Range (V)	0 - Mains Supply Voltage	
3.15	Output Frequency Range (Hz)	0 - 300HZ	
3.16	Drive Efficiency (%) In Full Speed & Load	High Efficiency (Eff.≥92%)	
3.17	Type of Control (Speed, Torque, Power)	Speed (Default) Note 6	
3.18	Motor Speed Control Type (V/F / Vector / DTC)	V/F (Default) Note 6	
3.19	Torque Range (% of Nominal Torque)	By Vendor	
3.20	Speed Range (R.P.M)	10-100%	
3.21	Speed Precision (%)	±1%	
3.22	Losses at Full Load	By Vendor	
3.23	Jog Reverse Capability for Conveyor, Crusher...applications	Required	
3.24	Ability to Automatically Restart After an Overcurrent, Overvoltage, Under voltage or Loss of Input Signal Protective Trip.	Restart Attempt (Required)	
3.25	Facility to block the automatic re-start	Yes	
3.26	Thermal Protection (PTC/PT100)	A) 18.5KW ≤ Motors (DOL/VFD) ≤132KW → 3×PTC B) 132KW < Motors (DOL/VFD) ≤250KW → 3×PT100 For stator windings and 1×PT100 for motor bearing	
3.27	Inverter Fault	Required	
3.28	Ventilation Fault	Required	
	DC line over voltage	Required	
3.29	Protective Features:	- Under/ Over voltage protection (27/59) - Phase loss/ Phase reversal protection (47) - Programmable over current protection (50/51) - Over frequency operation (81) - Over temperature (49T) - Over speed of motor - Specific motor protection	
3.30	Control features: - Start/ Stop keys - Speed Control (Raise/Lower) - Forward/ Reverse - Auto/ Manual mode - Emergency Stop	Via HMI Display / Keypad mounted on front of the drive panel/ Selector switch	
3.31	The following parameters & indications shall be provided as a part of the Operator Control Panel: Indications: - Motor running - Motor stopped - Motor over speed - AC Mains ON - Rectifier output ON - Systems ready to start - Motor zero speed	On LCD/HMI Display	

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ITEM	DESCRIPTION GENEARL	REQUIREMENT	BIDDER/VENDOR PROPOSAL
	- Remote breaker tripped Metering: - Input AC voltmeters - Input AC frequency meter - Input AC ammeter - Output Voltmeters - Output Ammeter - Output frequency - Motor terminal state - Drive thermal state - Motor speed - Motor energy meter - DC volts		
3.32	Annunciation: - Rectifier fuse failure - Main AC failure - Inverter fuse failure - Inverter overload - Inverter high temperature - Failure of panel cooling system - Motor failed to start	Potential free contacts: (Wired up to terminal block for Client's use for remote monitoring)	
3.33	Voltage Dips Tolerated for Reacceleration /Restarting	V.T.S	
3.34	Total Harmonic Distortion of the current at inverter output (THDi)	V.T.S	
3.35	The Total Harmonic Distortion of the voltage at inverter output (THDv)	V.T.S	
3.36	Input Harmonic Filter	ACC. to IEEE 519 (VTA) (Our Recommendation: For drives $\geq 200\text{kw}$)	
3.37	Sine Wave output Filter (Sinus Filter)	For cables length between 200 up to 500m	
3.38	du/dt output Filter	For cables length between 100 up to 200m (Whenever necessary, the overshoot clamp to be recommended by supplier)	
3.39	Built in EMC Filter (Common mode filter)	Required	
3.40	Max. Noise Level at rated load	$\leq 70\text{db}@1\text{m}$	
3.41	Internal Fast Fuse Protection	Semiconductor types	
3.42	Line Protection in input of VFD	HRC Fuse-Semiconductor types	
3.43	Serial Communications between VFD & DCS	PROFINET based on the Ethernet network	
3.44	Control I/O Modules (Independently Programmable)	Min. 6 Digital Inputs Min. 3 Digital Output Relays Min. 3 Analog Inputs Min. 2 Analog Outputs (For more detail, please Refer to Relevant LV Switchgear Schematic diagrams)	
3.45	Min. Signal Between VFD & DCS As per "Typical Schematic Diagram"	Refer to LV Panel and MCC Schematic Diagrams Document No. 12002-D-EL-DWG-303-GNL-053	

Note: Type of Power Cables Between Motors and VFDs is N2XCY.

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ITEM	DESCRIPTION GENEARL	REQUIREMENT	BIDDER/VENDOR PROPOSAL
4.	CONTROL CURVE		
4.1.	Starting Curve	Acceleration Ramp	
4.2	Stopping Curve	Deceleration Ramp	
4.3	Acceleration Duration Time (Sec.)	Adjustable (Min. 0.1 to 20 Sec.)	
4.4	Deceleration Duration Time (Sec.)	Adjustable (Min. 0.1 to 20 Sec.)	
4.5	Speed Reference	Adjustable From Outside (0~10V & 4~20mA)	

V.T.S= Vendor to specify

Important Notes:

- 1) All of declared ratings are proposed and shall be checked and certified by supplier.
- 2) All tools, software and special cables necessary for the configuration, operation and maintenance activities shall be included in the scope of supply.
- 3) This Data Sheet should be filled-in, signed-up, stamped, & submitted to purchaser with the Vendor offer.
- 4) All VFDs shall de-rate according to site conditions.
- 5) VENDOR to recommend spares for two-year trouble-free operation along with its unit prices.
- 6) Drive list document is attached in Appendix 1.



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APPENDIX 1:

Refer to the Data sheet LV VFD Attachment.