

Different coating Options

Option No. 1: Polymer Modified Bitumen (System No 229A/236)

Option No. 2: Three Layer Polyethylene (System No 228/235)

Option No. 3: Rigid Polyurethane (System No 229B/237)

Description			
	Option 1	Option 2	Option 3
PART A: BILL 1: PRELIMINARY & GENERAL			
BILL 2: CIVIL WORKS			
PART B: ABSTRACTION WORKS			
PART B1: VLIËËPOORT DIVERSION WEIR			
PART B1.1: Preliminary and General (Secondary)			
PART B1.2: TEMPORARY WORKS (Temporary works designed by the contractor)			
PART B1.3: Earthworks: Foundation			
PART B1.4: Weir structures			
PART B1.5: Landscaping and Rehabilitation			
PART B1.6: Ancillary works			
PART B2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART B2.1.1: Preliminary and General (Secondary)			
PART B2.1.2: Permanent access road and pipeline platform			
PART B2.1.3: Earthworks			
PART B2.1.4: Pump station structures and channels			
PART B2.1.5: Ancillary works			
PART B2.1.6: Landscaping and Rehabilitation			
PART C: LOW LIFT RISING MAIN			
PART C1: Preliminary and General (Secondary)			
PART C2: Pipe Supply, Delivery and Installation			
PART C3: Pipeline Earthworks			
PART C.4: Valve installations and chambers			
PART C5: Crossings			
PART C6: Landscaping and Rehabilitation			
PART C7: Fencing			
PART C8: Fibre Earthworks			
PART D: BALANCING RESERVOIR & SEDIMENTATION WORKS			
PART D1: SEDIMENTATION WORKS			
PART D1.1: Preliminary and General (Secondary)			
PART D1.2: Earthworks			
PART D1.3: Structure			
PART D1.4: Pipework			
PART D1.5: Desilting chute			
PART D1.6: Ancillary works			

Description			
	Option 1	Option 2	Option 3
PART D2: BALANCING RESERVOIR			
PART D2.1: Preliminary and General (Secondary)			
PART D2.2: Earthworks			
PART D2.3: Concrete Structures			
PART D2.4: Lining			
PART D2.5: Pipework			
PART D2.6: Landscaping and Rehabilitation			
PART D2.7: Borrow pits and Spoil Areas			
PART D2.8: Ancillary Works			
PART E: HIGH-LIFT PUMPING STATION			
PART E1.1: Preliminary and General (Secondary)			
PART E1.2: Earthworks			
PART E1.3: Pump station structures			
PART E1.4: Access road and parking			
PART E1.5: Ancillary works			
PART E1.6: Landscaping and Rehabilitation			
PART E1.7: Pipe Supply, Delivery and Installation			
PART E1.8: Pipeline Earthworks			
PART E1.9: Valve installations, chambers and manifolds			
PART E1.10: Fibre Earthworks			
PART F: HIGH LIFT RISING MAIN			
PART F1: Preliminary and General (Secondary)			
PART F2: Permanent Access Track			
PART F3: Pipe supply, delivery, installation and testing			
PART F4: Pipeline Earthworks			
PART F5: Valve installations and chambers			
PART F6: Crossings			
PART F7: Landscaping and Rehabilitation			
PART F8: Fencing			
PART F9: Borrow pits and Spoil Areas			
PART F10: Ancillary works			
PART F11: Fibre Earthworks			
PART G: BREAK PRESSURE RESERVOIR			
PART G1: Preliminary and General (Secondary)			
PART G2: Earthworks			
PART G3: Structures			
PART G4: Lining			
PART G5: Landscaping and Rehabilitation			
PART G6: Ancillary Works			

Description			
	Option 1	Option 2	Option 3
PART H: GRAVITY MAINS			
PART H1: BPR TO OFF TAKE C			
PART H1.1: Preliminary and General (Secondary)			
PART H1.2: Permanent Access Track			
PART H1.3: Pipe supply, delivery, installation and testing			
PART H1.4: Pipeline Earthworks			
PART H1.5: Valve installations and chambers			
PART H1.6: Crossings			
PART H1.7: Landscaping and Rehabilitation			
PART H1.8: Fencing			
PART H1.9: Borrow pits and Spoil Areas			
PART H1.10: Ancilliary Works			
PART H1.11: Fibre Earthworks			
PART H2: OFF TAKE C TO OFF TAKE B			
PART H2.1: Preliminary and General (Secondary)			
PART H2.2: Permanent Access Track			
PART H2.3: Pipe supply, delivery, installation and testing			
PART H2.4: Pipeline Earthworks			
PART H2.5: Valve installations and chambers			
PART H2.6: Crossings			
PART H2.7: Landscaping and Rehabilitation			
PART H2.8: Fencing			
PART H2.9: Borrow pits and Spoil Areas			
PART H2.10: Ancilliary Works			
PART H2.11: Fibre Earthworks			
PART H3: OFF TAKE B TO OFF TAKE A			
PART H3.1: Preliminary and General (Secondary)			
PART H3.2: Permanent Access Track			
PART H3.3: Pipe supply, delivery, installation and testing			
PART H3.4: Pipeline Earthworks			
PART H3.5: Valve installations and chambers			
PART H3.6: Crossings			
PART H3.7: Landscaping and Rehabilitation			
PART H3.8: Fencing			
PART H3.9: Borrow pits and Spoil Areas			
PART H3.10: Ancilliary Works			
PART H3.11: Fibre Earthworks			
BILL 3: MECHANICAL			
A3: PRELIMINARY AND GENERAL (SECONDARY)			
PART B2.2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART D1: SEDIMENTATION WORKS TOTAL			
PART E: HIGH-LIFT PUMPING STATION			

Description			
	Option 1	Option 2	Option 3
BILL 4: ELECTRICAL			
PART A4: PRELIMINARY AND GENERAL (SECONDARY)			
PART B2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART D: BALANCING RESERVOIR & SEDIMENTATION WORKS			
PART E: HIGHLIFT PUMPING STATION			
PART F12: HIGH LIFT RISING MAIN			
PART G7: BREAK PRESSURE RESERVOIR			
PART H: GRAVITY MAINS			
PART H1.12: GRAVITY MAINS BPR TO OFF TAKE C			
PART H2.12: GRAVITY MAINS OFF TAKE C TO OFF TAKE B			
PART H3.12: GRAVITY MAINS OFF TAKE B TO OFF TAKE A			
BILL 5: CONTROL AND INSTRUMENTATION, COMMUNICATION AND SECURITY			
PART A5: PRELIMINARY AND GENERAL (SECONDARY)			
PART B2.2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART C: LOW LIFT RISING MAIN			
PART D1: SEDIMENTATION WORKS			
PART D2: BALANCING RESERVOIR			
PART E: HIGH-LIFT PUMPING STATION			
PART F: HIGH LIFT RISING MAIN			
PART G: BREAK PRESSURE RESERVOIR			
PART H1: BPR TO OFF TAKE C			
PART H2: OFF TAKE C TO OFF TAKE B			
PART H3: OFF TAKE B TO OFF TAKE A			
BILL 6: CATHODIC PROTECTION AND AC MITIGATION			
PART A6: PRELIMINARY AND GENERAL (SECONDARY)			
PART B2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART C: LOW LIFT RISING MAIN			
PART D2: BALANCING RESERVOIR			
PART E: HIGH-LIFT PUMPING STATION			
PART F: HIGH LIFT RISING MAIN			
PART G: BREAK PRESSURE RESERVOIR			
PART H: GRAVITY MAINS			
PART H1: BPR TO OFF TAKE C			
PART H2: OFF TAKE C TO OFF TAKE B			
PART H3: OFF TAKE B TO OFF TAKE A			
BILL 7: TESTS ON COMPLETION COMMISSIONING, TRIAL OPERATION AND DEFECTS NOTIFICATION PERIOD			
PART B1: VLIEËPOORT DIVERSION WEIR			
PART B2: DIVERSION WORKS AND LOW-LIFT PUMPING STATION			
PART C: LOW LIFT RISING MAIN			

Description			
	Option 1	Option 2	Option 3
PART D1: SEDIMENTATION WORKS			
PART D2: BALANCING RESERVOIR			
PART E: HIGH-LIFT PUMPING STATION			
PART F: HIGH LIFT RISING MAIN			
PART G: BREAK PRESSURE RESERVOIR			
PART H1: BPR TO OFF TAKE C			
PART H2: OFF TAKE C TO OFF TAKE B			
PART H3: OFF TAKE B TO OFF TAKE A			
PLANT SPARES REQUIRED BY THE EMPLOYER			

BILL 8: PROVISIONAL SUMS & DAYWORKS

Sub-Total			
Provisional sum: Allowance for Contract Price Adjustment (14.00% of Sub-Total)			
Sub-Total all Portions			
Provisional sum: Allowance for Contingencies (15% of Sub-Total all Portions)			
Sub-Total incl. Contingencies			
Minimum Contract Skills Development Goal (CSDG) sum = CE (0.25% x Sub-Total incl. Contingencies)			
Total Construction Cost			
Value Added Tax at 15%			
Total Amount of Tender Carried Forward to Form of Offer and Acceptance			

Variance with Option No. 1: Polymer Modified Bitumen (System No 229A/236) In %

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
8				BILL 8: PROVISIONAL SUMS & DAYWORKS				
8.1				GENERAL REQUIREMENT FOR THE ENGINEER / EMPLOYER				
8.1.1		1.009		Cellular phone costs	PS	1	1 975 000	1 975 000
8.1.2		1.009		Long Terms Accommodation	PS	1	2 146 000	2 146 000
8.1.3		1.009		Ad-Hod Accommodation	PS	1	2 012 000	2 012 000
8.1.4		1.009		Transport	PS	1	4 024 000	4 024 000
8.1.5		1.009		Office Consumables and stationary	PS	1	268 000	268 000
8.1.6		1.009		Ablution Consumables	PS	1	403 000	403 000
8.1.7		1.009		IT Equipment	PS	1	4 648 000	4 648 000
8.1.8		1.009		Office Equipment and Furniture	PS	1	3 100 000	3 100 000
8.1.9		1.009		Personal Protective Equipment (PPE)	PS	1	805 000	805 000
8.1.10		1.009		Subsistence expenses	PS	1	537 000	537 000
8.1.11		1.009		Supplementary catering for monthly site meetings	PS	1	1 610 000	1 610 000
8.1.12		1.009		Factory Acceptance Testing (FAT)	PS	1	45 505 000	45 505 000
8.1.13		1.009		Laboratory and Field Testing Equipment	PS	1	3 314 000	3 314 000
8.1.14		1.009		Contractor's charges and profit on above	%		70 347 000	
8.2				OH&S, ENVIRONMENTAL AND SOCIAL ALLOWANCES				
8.2.1		1.009		Project Launch / Ground Breaking	PS	1		482 900
8.2.2		1.009		Contractor's charges and profit	%		482 900	
8.2.3		1.009		Relocation of endangered, protected and sensitive species	PS	1		7 954 200
8.2.4		1.009		Contractor's charges and profit	%		7 954 200	
8.2.5		1.009		Rescue and transplanting of protected trees	PS	1		13 677 400
8.2.6		1.009		Contractor's charges and profit	%		13 677 400	
8.2.7		1.009		Collection of propagules for reinstatement purposes	PS	1		3 085 100
8.2.8		1.009		Contractor's charges and profit	%		3 085 100	
8.2.9		1.009		Comprehensive monitoring plan be drafted that is aimed at determining the overall functionality of the fishway as well as the fish communities (and other aquatic biota) within the river reach	PS	1		402 400
8.2.10		1.009		Contractor's charges and profit	%		402 400	
8.2.11		1.009		Replacement of lost individuals where translocation operations fall short	PS	1		15 557 300
8.2.12		1.009		Contractor's charges and profit	%		15 557 300	
8.2.13		1.009		All other fencing not measured elsewhere in the bill of quantities	PS	1		45 496 200
8.2.14		1.009		Contractor's charges and profit	%		45 496 200	
8.2.15		1.009		Additional noise & vibration preventative requirements for protected and sensitive fauna	PS	1		7 323 800
8.2.16		1.009		Contractor's charges and profit	%		7 323 800	
8.2.17		1.009		Relocation of Graves / Management of heritage & paleontological features	PS	1		6 203 700
8.2.18		1.009		Contractor's charges and profit	%		6 203 700	
8.2.19		1.009		Terrestrial Ecologist, Aquatic Ecologist, Botanist, Heritage Specialist and Social Specialist for Walkdown	PS	1		5 633 700
8.2.20		1.009		Contractor's charges and profit	%		5 633 700	
							Carried Forward	

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
							Brought Forward	
8.2.21		1.009		General environmental and social preventative requirements that may require construction related equipment to execute.	PS	1		8 048 100
8.2.22		1.009		Contractor's charges and profit	%		8 048 100	
8.2.23		1.009		Temporary/New watering holes for game	PS	1		2 012 000
8.2.24		1.009		Contractor's charges and profit	%		2 012 000	
8.2.25		1.009		Provision of vegetative material	PS	1		26 538 600
8.2.26		1.009		Contractor's charges and profit	%		26 538 600	
8.2.27		1.009		Planting of vegetative material	PS	1		8 846 200
8.2.28		1.009		Contractor's charges and profit	%		8 846 200	
8.2.29		1.009		Additional rehabilitation measures	PS	1		7 779 800
8.2.30		1.009		Contractor's charges and profit	%		7 779 800	
8.2.31		1.009		Pit for AIA radiographic material storage	PS	1		2 280 300
8.2.32		1.009		Contractor's charges and profit	%		2 280 300	
8.2.33		1.009		Additional PPE provision for varying COVID lockdown level requirements (applicable to lock down level 4 and higher)	PS	1		12 300 200
8.2.34		1.009		Contractor's charges and profit	%		12 300 200	
8.2.35		1.009		Occupational Health and Safety training and equipment for landowners using site access roads	PS	1		1 207 200
8.2.36		1.009		Contractor's charges and profit	%		1 207 200	
8.2.37		1.009		Emergency evacuation other than contractor's workforce and staff	PS	1		670 700
8.2.38		1.009		Contractor's charges and profit	%		670 700	
8.2.39		1.009		Mobile clinic	PS	1		2 704 200
8.2.40		1.009		Contractor's charges and profit	%		2 704 200	
8.2.41		1.009		Social management and socio-economic development related resources (excl. RAP)	PS	1		10 730 800
8.2.42		1.009		Contractor's charges and profit	%		10 730 800	
8.2.43		1.009		Royalties and other charges	PS	1		2 682 700
8.2.44		1.009		Contractor's charges and profit	%		2 682 700	
8.2.45		1.009		Licence plate recognition cameras	PS	1		1 207 200
8.2.46		1.009		Contractor's charges and profit	%		1 207 200	
8.2.47		1.009		RAP (Relocation of homesteads, game and livestock camps, crops and the related matters, including the specialist costs).	PS	1		150 000 000
8.2.48		1.009		Contractor's charges and profit	%		150 000 000	
							Carried Forward	

Item no.	Part	Payment Reference	Breakdown	Description	Unit	Quantity	Rate	Amount
							Brought Forward	
8.3				RELOCATION OF SERVICES				
8.3.1		1.009		Moving of unknown services	PS	1		858 500
8.3.2		1.009		Contractor's charges and profit	%		858 500	
8.3.3		1.009		Moving existing telephone reticulation	PS	1		1 877 900
8.3.4		1.009		Contractor's charges and profit	%		1 877 900	
8.3.5		1.009		Moving existing Eskom electrical reticulation	PS	1		5 365 400
8.3.6		1.009		Contractor's charges and profit	%		5 365 400	
8.4				QUALITY CONTROL AND TESTING				
8.4.1		1.009		Acceptance control testing by external laboratory or other accredited facilities	PS	1		8 048 100
8.4.2		1.009		Contractor's charges and profit	%		8 048 100	
8.4.3		1.009		Specialist Third Party Inspection	PS	1		26 826 900
8.4.4		1.009		Contractor's charges and profit	%		26 826 900	
8.4.5		1.009		Hand tools, instruments and other testing equipment and consumables	PS	1		1 690 100
8.4.6		1.009		Contractor's mark-up	%		1 690 100	
8.4.7		1.009		Electronic Site Management System and Smartphone Application	PS	1		6 706 700
8.4.8		1.009		Contractor's mark-up	%		6 706 700	
8.4.9		1.009		Electronic Preferential Procurement Management and Reporting System	PS	1		1 690 100
8.4.10		1.009		Contractor's mark-up	%		1 690 100	
8.4.11		1.009		Independent high-frequency pressure and flow logging during the Commissioning and Trial Operation phases	PS	1		2 146 200
8.4.12		1.009		Contractor's mark-up	%		2 146 200	
8.4.13		1.009		Geotechnical tests	PS	1		1 341 300
8.4.14		1.009		Contractor's mark-up	%		1 341 300	
8.4.15		1.009		Drilling and borehole yield test	PS	1		2 682 700
8.4.16		1.009		Contractor's mark-up	%		2 682 700	
8.5				CIVIL				
8.5.1		1.009		Water supply for Hydrotesting	PS	1		670 700
8.5.2		1.009		Contractor's charges and profit	%		670 700	
8.5.3		1.009		Chamber manhole cover (locking mechanism)	PS	1		4 024 000
8.5.4		1.009		Contractor's charges and profit	%		4 024 000	
8.5.5		1.009		Facebrick material	PS	1		3 755 800
8.5.6		1.009		Contractor's charges and profit	%		3 755 800	
8.5.7		1.009		Furniture, blinds, storage, feature wall, safe and appliances	PS	1		985 900
8.5.8		1.009		Contractor's charges and profit	%		985 900	
							Carried Forward	

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
							Brought Forward	
8.5.9		1.009		Storage shelving, cupboards and countertops	PS	1		449 400
8.5.10		1.009		Contractor's charges and profit	%		449 400	
8.5.11		25.012(a)		Provision of approved herbicide and ant poison	PS	1		181 100
8.5.12		25.012(b)		Contractor's charges and profit	%		181 100	
8.5.13		1.009		Mass haul provision	PS	1		134 134 700
8.5.14		1.009		Contractor's charges and profit	%		134 134 700	
8.5.15		1.009		Assessing, upgrading and maintaining of underperforming Access Roads	PS	1		150 000 000
8.5.16		1.009		Contractor's charges and profit	%		150 000 000	
8.5.17		1.009		Ancillary infrastructure	PS	1		450 000 000
8.5.18		1.009		Contractor's charges and profit	%		450 000 000	
8.5.19		1.009		The provision of Water for Construction	PS	1		1 300 000
8.5.20		1.009		Contractor's charges and profit	%		1 300 000	
8.5.21		1.009		Cost of the contractor to construct river bank protection in accordance with the drawings, specifications and bill of quantities as provided and instructed by the Engineer.	PS	1		39 500 000
8.5.22		1.009		Contractor's charges and profit	%		39 500 000	
8.6				MECHANICAL & ELECTRICAL				
8.6.1		31.002 & 31.003		5 metric tonne mono-rail complete with electrical wire rope hoist and crawl	PS	1		812 100
8.6.2		1.009		Contractor's charges and profit	%		812 100	
8.6.3		1.009		Repeater A (LLPS to HLPS)	PS	1		447 700
8.6.4		1.009		Contractor's charges and profit	%		447 700	
8.6.5				Design, supply, delivery, installation and commissioning of hydro-cyclone sediment removal system including: Three hydro-cyclone clusters with all related valves and internal pipework, earth works, pipework feeding hydro-cyclone clusters, transferring overflows to balancing dams and transferring underflows to sludge channels, concrete foundations, access platforms and stairs, control and instrumentation, safety equipment and signage	PS	1		83 500 000
8.6.6		1.009		Contractor's charges and profit	%		83 500 000	
				Distribution Transformers Power Supply Points				
8.6.7		1.009		Break Pressure Reservoir (BPR)	PS	1	403 100	403 100
8.6.8		1.009		Break Pressure Tank (BPT)	PS	1	403 100	403 100
8.6.9		1.009		Off-Take A	PS	1	403 100	403 100
8.6.10		1.009		Off-Take B	PS	1	403 100	403 100
8.6.11		1.009		Off-Take C (Future)	PS	1	403 100	403 100
8.6.12		1.009		Repeater A (BPR to Off-Takes) (1 x Magnetic Flow Meter)	PS	1	403 100	403 100
8.6.13		1.009		Repeater A (HLPS to BPT)	PS	1	403 100	403 100
8.6.14		1.009		Repeater B (BPR to Off-Takes) (Flow Meter Installation)	PS	1	403 100	403 100
8.6.15		1.009		Repeater C (BPR to Off-Takes) (Flow Meter Installation)	PS	1	403 100	403 100
8.6.16		1.009		Contractor's charges and profit on above	%		3 627 900	
							Carried Forward	

Item no.	Part	Payment Reference	Breakdown	Description	Unit	Quantity	Rate	Amount
							Brought Forward	
8.7				CONTROL AND INSTRUMENTATION SYSTEMS, COMMUNICATION AND SECURITY				
8.7.1		1.009		Full Integration between the RMS, MCWAP-1 and MCWAP-2 Primary and Secondary Communication System	PS	1		600 000
8.7.2		1.009		Contractor's charges and profit	%		600 000	
8.7.3		1.009		Full Integration between the RMS, MCWAP-1 and MCWAP-2 Control Systems	PS	1		1 600 000
8.7.4		1.009		Contractor's charges and profit	%		1 600 000	
8.7.5		1.009		SCADA system programme updating	PS	1		200 000
8.7.6		1.009		Contractor's charges and profit	%		200 000	
8.8				AC & CP QUALITY CONTROL AND TESTING				
8.8.1		34.003		Short Deep Soil Resistivity Survey	PS	1		2 028 700
8.8.2		1.009		Contractor's charges and profit	%		2 028 700	
8.8.3		34.004		SRB Testing	PS	1		685 200
8.8.4		1.009		Contractor's charges and profit	%		685 200	
8.8.5		34.005		DC & AC Potential monitoring (during construction & commissioning period)	PS	1		17 627 200
8.8.6		1.009		Contractor's charges and profit	%		17 627 200	
8.8.7		34.005		DC & AC Potential monitoring (3 months - Trial operation)	PS	1		839 700
8.8.8		1.009		Contractor's charges and profit	%		839 700	
8.8.9		34.010		Coating Conductance Test	PS	1		456 800
8.8.10		1.009		Contractor's charges and profit	%		456 800	
8.8.11		34.011		CIPS/DCVG Survey (at completion of construction)	PS	1		3 923 100
8.8.12		1.009		Contractor's charges and profit	%		3 923 100	
8.8.13		34.011		CIPS/DCVG Survey (End of DNP)	PS	1		3 923 100
8.8.14		1.009		Contractor's charges and profit	%		3 923 100	
8.9				MISCELLANEOUS				
8.9.1		1.009		DAB allowance (Employer's contribution)	PS	1		21 193 300
8.9.2		1.009		Contractor's charges and profit	%		21 193 300	
8.10				ADDITIONAL SPARES CONSIDERED NECESSARY BY THE EMPLOYER				
8.10.1		1.009		Civil Works	PS	1		268 300
8.10.2		1.009		Contractor's charges and profit	%		268 300	
8.10.3		1.009		Mechanical Works	PS	1		4 581 900
8.10.4		1.009		Contractor's charges and profit	%		4 581 900	
8.10.5		1.009		Electrical Works	PS	1		2 149 700
8.10.6		1.009		Contractor's charges and profit	%		2 149 700	
							Carried Forward	

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
							Brought Forward	
8.10.7		1.009		Control Systems, Wireless Communication and Security Control	PS	1		873 300
8.10.8		1.009		Contractor's charges and profit	%		873 300	
8.11				DAYWORK CHARGES - LABOUR				
				Varied work instructed by the Engineer to be executed on daywork basis				
8.11.1		1.009		General Unskilled Labour	hr	20 000		
8.11.2		1.009		General Semi-Skilled Labour	hr	16 000		
8.11.3		1.009		General Skilled Labour	hr	12 000		
8.11.4		1.009		Artisan	hr	1 600		
8.11.5		1.009		Boilermaker (Pipe Fabricator)	hr	2 400		
8.11.6		1.009		Boilermaker Assistant	hr	2 400		
8.11.7		1.009		Qualified Welder	hr	2 400		
8.11.8		1.009		Welder Assistant	hr	2 400		
8.11.9		1.009		Fitter	hr	1 600		
8.11.10		1.009		Fitter Assistant	hr	1 600		
8.11.11		1.009		Grinder	hr	1 600		
8.11.12		1.009		Qualified Electrician	hr	1 200		
8.11.13		1.009		Electrician Assistant	hr	1 200		
8.11.14		1.009		Shutter hand	hr	1 600		
8.11.15		1.009		Steel Fixer	hr	1 600		
8.11.16		1.009		Rigger	hr	1 200		
8.11.17		1.009		Quality Inspector	hr	4 000		
8.11.18		1.009		Quality Inspector Technician	hr	4 000		
8.11.19		1.009		Mechanic	hr	800		
8.11.20		1.009		General Operator	hr	8 000		
8.11.21		1.009		LDV Driver	hr	8 000		
8.11.22		1.009		Bus Driver	hr	4 000		
8.12				DAYWORK CHARGES - EQUIPMENT				
				Varied work instructed by the Engineer to be executed under daywork basis. Rate to include operator, fuel, maintenance, insurances and all other costs. Dry rate must be completed else value = "nil" ("Dry rate" = "Wet rate" less Fuel)				
8.12.1		1.009		Backhoe Loaders (TLB's) 4x2 Size > 5 ton / small (Dry rate = _____)	hr	320		
8.12.2		1.009		4x4 Size > 7 ton / medium (Dry rate = _____)	hr	360		
8.12.3		1.009		4x4 Size > 9 ton / large (Dry rate = _____)	hr	400		
8.12.4		1.009		Bulldozers Size D6 > 125 kW (Dry rate = _____)	hr	120		
8.12.5		1.009		Size D8 > 200 kW (Dry rate = _____)	hr	160		
8.12.6		1.009		Size D10 > 400 kW (Dry rate = _____)	hr	240		
8.12.7		1.009		Other Size _____, _____ kW (Dry rate = _____)	hr	80		
8.12.8		1.009		Flatbed Truck with crane Capacity 4 ton / small (Dry rate = _____)	hr	280		
8.12.9		1.009		Capacity 6 ton / medium (Dry rate = _____)	hr	320		
8.12.10		1.009		Capacity 10 ton / large (Dry rate = _____)	hr	360		
8.12.11		1.009		Off highway dump trucks Capacity 8m ³ / small (Dry rate = _____)	hr	280		
8.12.12		1.009		Capacity 10 m ³ / medium (Dry rate = _____)	hr	320		
8.12.13		1.009		Capacity 15 m ³ / large (Dry rate = _____)	hr	360		
8.12.14		1.009		Tipper Trucks Capacity > 8m ³ / small (Dry rate = _____)	hr	120		
8.12.15		1.009		Capacity > 10 m ³ / medium (Dry rate = _____)	hr	160		
8.12.16		1.009		Capacity > 15 m ³ / large (Dry rate = _____)	hr	200		
8.12.17		1.009		Wheel Loaders Bobcat	hr	160		
							Carried Forward	

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
							Brought Forward	
8.12.18		1.009		Capacity > 1.5 m³ bucket / small (Dry rate = _____)	hr	240		
8.12.19		1.009		Capacity > 3 m³ bucket / medium (Dry rate = _____)	hr	280		
8.12.20		1.009		Capacity > 5 m³ bucket / large (Dry rate = _____)	hr	320		
				Water Tankers				
8.12.21		1.009		Capacity > 2 kl / small towable (Dry rate = _____)	hr	320		
8.12.22		1.009		Capacity > 10 kl / medium (Dry rate = _____)	hr	360		
8.12.23		1.009		Capacity > 18 kl / large (Dry rate = _____)	hr	400		
				Light Delivery Vehicle (LDV)				
8.12.24		1.009		LDV > 2 ton (Dry rate = _____)	hr	800		
				Crawler Excavator				
8.12.25		1.009		Model > 15 ton / 88 kw / small (Dry rate = _____)	hr	560		
8.12.26		1.009		Model > 20 ton / 120 kw / medium (Dry rate = _____)	hr	600		
8.12.27		1.009		Model > 30 ton / 200 kW / large (Dry rate = _____)	hr	640		
				Motor Graders				
8.12.28		1.009		Model > 130 kW / medium (Dry rate = _____)	hr	240		
8.12.28								
				Self propelled vibrating rollers (smooth drum)				
8.12.29		1.009		Mass > 5 ton / medium (Dry rate = _____)	hr	80		
8.12.30		1.009		Mass > 10 ton / medium (Dry rate = _____)	hr	120		
				Self propelled vibrating rollers (padfoot)				
8.12.32		1.009		Mass > 8 ton / medium (Dry rate = _____)	hr	80		
8.12.33		1.009		Mass > 12 ton / medium (Dry rate = _____)	hr	120		
				Pneumatic tyred rollers (specify mass)				
8.12.34		1.009		Mass > 9 ton / medium (Dry rate = _____)	hr	80		
8.12.35		1.009		Mass > 15 ton / large (Dry rate = _____)	hr	120		
				Walk behind vibrating rollers				
8.12.36		1.009		Model > 700 kg / BW 65 / small (Dry rate = _____)	hr	160		
8.12.37		1.009		Model > 1000 kg /BW 75/medium (Dry rate = _____)	hr	200		
				Plate compactors				
8.12.38		1.009		Model > 100 kg (Dry rate = _____)	hr	160		
				Wacker's				
8.12.39		1.009		Model > 60kg (Dry rate = _____)	hr	160		
				Concrete mixers				
8.12.40		1.009		Volume > 320 litre / small (Dry rate=_____)	hr	440		
8.12.41		1.009		Volume > 1200 litre / medium towable (Dry rate = _____)	hr	440		
8.12.42		1.009		Volume > 7000 litre / large (Dry rate = _____)	hr	440		
				Concrete mixer truck				
8.12.43		1.009		Capacity > 5m³ (Dry rate = _____)	hr	280		
				Portable diesel compressors				
8.12.44		1.009		Capacity > 50 cfm / small (Dry rate=_____)	hr	240		
8.12.45		1.009		Capacity > 250 cfm / medium Dry rate=_____)	hr	280		
8.12.46		1.009		Capacity > 490 cfm / large Dry rate=_____)	hr	320		
				Water pump				
8.12.47		1.009		Capacity > 30 l/s / small (Dry rate=_____)	hr	240		
8.12.48		1.009		Capacity > 100 l/s / medium (Dry rate=_____)	hr	280		
8.12.49		1.009		Capacity > 300 l/s / large (Dry rate=_____)	hr	320		
				Welding unit				
8.12.50		1.009		Size > 200 Amp / small (Dry rate=_____)	hr	160		
8.12.51		1.009		Size > 300 Amp / medium (Dry rate=_____)	hr	200		
8.12.52		1.009		Size > 800 Amp / large (Dry rate=_____)	hr	240		
							Carried Forward	

Item no.	Part	Payment	Breakdown	Description	Unit	Quantity	Rate	Amount
		Reference						
							Brought Forward	
8.12.53		1.009		Mobile generator set (specify KVA) Size > 2 kVA / small (Dry rate=_____)	hr	160		
8.12.54		1.009		Size > 4 kVA / medium (Dry rate=_____)	hr	200		
8.12.55		1.009		Size > 8 kVA / large (Dry rate=_____)	hr	240		
				Lifting Equipment				
8.12.56		1.009		Side Booms Pipe Layer	hr	240		
8.12.57		1.009		Crane > 20 ton / small (Dry rate=_____)	hr	280		
8.12.58		1.009		Crane > 30 ton / medium (Dry rate=_____)	hr	320		
8.12.59		1.009		Crane > 50 ton / large (Dry rate=_____)	hr	400		
				General Equipment				
8.12.60		1.009		Blasting Pot	hr	80		
8.12.61		1.009		Airless Spray Machine	hr	80		
				Transport Heavy Equipment to and from Site. Distance shall be measured only way only (tender rate shall however include for transport in both directions). Note: Distance travelled on Site will not be paid.				
8.12.62		1.009		Low-bed (suitable for the largest piece of equipment)	km	4 000		
				Flatbed Truck with crane				
8.12.63		1.009		Capacity 4 ton / small	km	1 000		
8.12.64		1.009		Capacity 6 ton / medium	km	1 000		
8.12.65		1.009		Capacity 10 ton / large	km	1 000		
				Tipper Trucks				
8.12.66		1.009		Capacity > 8m³ / small	km	1 000		
8.12.67		1.009		Capacity > 10 m³ / medium	km	1 000		
8.12.68		1.009		Capacity > 15 m³ / large	km	1 000		
				Water Tankers				
8.12.69		1.009		Capacity > 2 kl / small towable	km	4 000		
8.12.70		1.009		Capacity > 10 kl / medium	km	4 000		
8.12.71		1.009		Capacity > 18 kl / large	km	4 000		
8.12.72		1.009		Provisional Amount for establishment charge by rental company as instructed by the Engineer.	PS	1		804 800
8.12.73		1.009		Contractor's charges and profit	%		804 800	
				DAYWORK CHARGES - MATERIALS				
8.12.74		1.009		Materials required in the execution of dayworks	PS	1		10 730 800
8.12.75		1.009		Contractor's charges and profit	%		10 730 800	
				BILL 8: PROVISIONAL SUMS & DAYWORKS TESTS (Carried forward to Summary of Bills)				

PART C1: AGREEMENT AND CONTRACT DATA

PART C1.1: FORMS OF OFFER (LETTER OF TENDER)

LETTER OF TENDER

TENDER NO: 054/2024/PMID/MCWAP2/RFB

TO: The Chief Executive
TCTA
First Floor
Block 9 Byls Bridge Office Park
Cnr Olivenhoutsbosch & Jean Avenue
Doringkloof
CENTURION, 0046
South Africa

Sir

We have examined the tender for TENDER NO 054/2024/PMID/MCWAP2/RFB and the attached Appendix and Addenda No's..... for the execution of the above-named Works. We offer to execute and complete the Works and remedy any defects therein in conformity with this Tender, which includes all of these documents:

1. **For Pipe Coating Option 1:** - for the sum of:-

R..... (excl. VAT) (in figures)

(.....
.....) (in words)

R..... (incl. VAT) (in figures)

(.....
.....) (in words)

(From the relevant Tender Sum on the Summary Page in the Bill of Quantities), or such other sum as may be determined in accordance with the Conditions of Contract.

Should the Employer elect to award the Contract based on Option 2 or Option 3 below, the offer to execute and complete the Works and remedy any defects therein in conformity with this Tender, which includes all relevant documents.

AND

2. **For Pipe Coating Option 2:** - for the sum of:-

R..... (excl. VAT) (in figures)

(.....
.....) (in words)

R..... (incl. VAT) (in figures)

(.....
.....)

.....) (in words)

(From the relevant Tender Sum on the Summary Page in the Bill of Quantities), or such other sum as may be determined in accordance with the Conditions of Contract.

AND

3. For Pipe Coating Option 3: - for the sum of:-

R..... (excl. VAT) (in figures)

(.....
.....) (in words)

R..... (incl. VAT) (in figures)

(.....
.....) (in words)

(From the relevant Tender Sum on the Summary Page in the Bill of Quantities), or such other sum as may be determined in accordance with the Conditions of Contract.

We understand and acknowledge that the Employer will decide during the evaluation of Tenders which of the pipe coating options is to be preferred.

We agree to abide by this Tender for the period of 84 days from the date of the submission of Tender and it shall remain binding upon us and may be accepted at any time before the expiration of that period. We acknowledge that the Appendix forms part of this Letter of Tender.

If this offer is accepted, we will provide the specified Performance Security, commence the Works as soon as is reasonably practicable after the Commencement Date, and complete the Works in accordance with the above-named documents within the Time for Completion.

In the event of this Tender being withdrawn by us or in the event of our failing to take up the Contract or to provide an approved Performance Security as required in terms of Sub-Clause 4.2 of the Conditions of Contract, we agree that the Tender Security included with this Tender shall be redeemed in full in the favour of the Employer.

Unless and until a formal Agreement is prepared and executed this Tender together with the Employer's written acceptance thereof, shall constitute a binding contract between us and the Employer, and each of the constituent members of our joint venture shall be jointly and severally bound to the Employer for the performance of the Contract and designate.....to act as leader with authority to bind us all. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

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We agree that the Laws of the Republic of South Africa shall govern the Contract and we choose *domicilium citandi et executandi* in South Africa at (full address):

.....
.....
.....

We understand that the Employer is not bound to accept the lowest or any tender received, and that any expense incurred by us in tendering will not be defrayed.

Dated this day of 20

Name

in the capacity of

Duly authorised to sign tenders for and on behalf of

Signature :

Address :

:

:

Telephone Number :

Facsimile Number :

Witness 1 :

Witness 2 :

Address :

Address :

:

:

:

:

Occupation:

Occupation:

NB. Mandatory to complete Option 1, Option 2 and Option 3 above.

APPENDIX TO TENDER

	Sub-Clause	
Employer's name and address	1.1.2.2 & 1.3	Chief Executive Officer TCTA First Floor Block 9 Byls Bridge Office Park Cnr Olivenhoutsbosch & Jean Avenue Doringkloof CENTURION, 0046 South Africa
Contractor's name and address	1.1.2.3 & 1.3
Engineer's name and address	1.1.2.4 & 1.3	GBN Joint Venture Consultants 3rd Floor Building 4 19 Ninth Street, Houghton Estate Rosebank 2196
Time for Completion of the Works	1.1.3.3	Whole of the Works – 1278 days (42 months) inclusive of: <ul style="list-style-type: none"> • Commissioning Period – 91 days • Trial Operation Period – 91 days
Defects Notification Period	1.1.3.7	365 days
Sections of the Works	1.1.5.6	The Works will comprise various Parts and/or Sections as indicated on the Project Structure Diagram and further outlined in Volume 1 Section 1.6
Electronic transmission systems	1.3	Email as per Sub-Clause 1.3
Governing Law	1.4	Republic of South Africa
Ruling language	1.4	English
Language for communications	1.4	English
Time for right of access to the Site	2.1	On the Commencement Date
Time for notification of error, fault or other defect in Employer's Requirements or Specification	4.1	28 calendar days

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	Sub-Clause	
Amount of Performance Security	4.2	10% of the Accepted Contract Amount in SA Rand (inclusive of VAT)
Amount of Supplementary Performance Security	4.2	2% of the Accepted Contract Amount in SA Rand (inclusive of VAT)
Normal working hours	6.5	Monday to Friday between 6h00 and 18h00 and Saturday between 6h00 and 18h00 but strictly in compliance with applicable legislation and authorisation
Special non-working days	6.5	The South African construction industry customary year end break plus South African Statutory Public Holidays and Sundays and in compliance with applicable legislation
Planning Software to be utilised	8.3	Candy – Construction Project Control software by CCS or as mutually agreed
Number of working days delay to be allowed for in programme	8.4	24 working days per annum or pro rata for any lesser period
Delay Damages	8.7 & 14.15(b)	Delay damages will be levied on delays in the following milestones: <ul style="list-style-type: none"> • Ready for Commissioning (RFC) • Ready for Trial Operations (RFTO) • Ready for Operations (RFO)
Total maximum amount of delay damages	8.7	10% of the Accepted Contract Amount in SA Rand (inclusive of VAT)
Contract Price Adjustment; Table(s) of adjustment data are contained in Schedule C	13.8	For payments each month
Civil Engineering and Building Works	13.8(a)	a = 0.22; b = 0.15; c = 0.51; d = 0.12
Steel Pipes, Pipe Specials and Fittings	13.8(b)	a = 0.2; b = 0.8
Mechanical and Electrical Works	13.8(c)	a = 0.3; b = 0.7
Total advance payment	14.2	10% of the Accepted Contract Amount
Currencies and proportions	14.2	100% in South African Rand
Start repayment of advance payment	14.2	6 months after payment of the advance
Repayment of advance payment	14.2	12 equal monthly amounts
Percentage Retention	14.3	10%
Limit of retention money	14.3	10% of the Accepted Contract Amount

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	Sub-Clause	
Plant and Materials intended for the Works	14.5	This Sub-Clause shall not apply
Minimum amount of Interim Payment Certificates	14.6	0.5% of the Accepted Contract Amount
Currency of Payment	14.15	South African Rand
Date by which DAB shall be appointed	20.2	56 days after the Commencement Date
The DAB shall be	20.2	A DAB of three members nominated from members of the Association of Arbitrators (Southern Africa)
Appointment (if not agreed) to be made by	20.3	Chairman of the Association of Arbitrators (Southern Africa)

Signature :

On behalf of :

Date :

**PART C1.2: CONTRACT DATA
(PART 2: DATA PROVIDED BY THE CONTRACTOR)**

**PART C1.2: CONTRACT DATA
(PART 2: DATA PROVIDED BY THE CONTRACTOR)**

Data Provided by the Contractor:

The Contractor is :
Address :
Telephone :
Facsimile :
E-mail :

The authorised and designated representative of the Contractor is:

Name :

The address for receipt of communications is:

.....
Telephone :
Facsimile :
E-mail :
Address :

PART T2 – RETURNABLE DOCUMENTS

PART T2.1: LIST OF RETURNABLE DOCUMENTS

T2.1.1 - RETURNABLE DOCUMENTS

THE TENDERER IS REQUIRED TO SUBMIT THE FOLLOWING DOCUMENTS WITH THE TENDER:

1. Tender Security (in the form of Annexure T2.1-1)
2. Parent Company Guarantee (in the form of Annexure T2.1-2)
3. Certified copy of Certificate of Incorporation (if Tenderer is a Company)
4. Certified copy of Founding Statement (if Tenderer is a Close Corporation)
5. Certified copy of Partnership Agreement (if Tenderer is a Partnership)
6. Authority for Signatory to Tender (in the form of Annexure T2.1-3)
7. Indemnity form in connection with Site Inspection (in the form of Annexure T2.1-4)
8. Certificate of Attendance at Tender Clarification Meeting and Site Inspection (in the form of Annexure T2.1-5)
9. Confirmation of current registration with CIDB for all Joint Venture Members (as appropriate)
10. Letter of Intent from suppliers and/or subcontractors to enter into negotiations with the operator of the Works for the implementation of maintenance contracts for the mechanical and electrical works, as may be required by the operator (in the form of Annexure T2.1-6)
11. Record of Addenda to Tender Documents (in the form of Annexure T2.1-7)
12. Tax Compliance Status Pin (in the form of Annexure T2.1-8)
13. SANAS verified B-BBEE certificate or Consolidated SANAS verified B-BBEE certificate for a Joint Venture (in the form of Annexure T2.1-9)
14. Evidence that the Tenderer is registered and in good standing with a compensation insurer who is approved by the Department of Employment and Labour in terms of section 80 of the Compensation for Occupational Injury and Disease Act (COID) (Act 130 of 1993). The Tenderer is required to disclose all inspection, investigations and their outcomes conducted by the Department of Employment and Labour into the conduct of a Tenderer at a time during the 36 months preceding the date of this tender (Letter of Good Standing with the Compensation Commissioner).
15. Certificate of Compliance with OHS Act 1993 and Construction Regulations 2003 (Certificate of Good Standing).
16. National Treasury Central Supplier Database Report.

The Tenderer is also required to submit forms in Volume 2, T2.2.1 Returnable Schedules.

**ANNEXURE T2.1-1
FORM OF TENDER SECURITY**

To be provided to:

The Chief Executive
TCTA
First Floor
Block 9 Byls Bridge Office Park
Cnr Olivenhoutsbosch & Jean Avenue
Doringkloof
CENTURION, 0046
South Africa

Whereas

(hereinafter called "the Tenderer")

has been invited by the TCTA to submit a tender for the execution of **TENDER NO 054/2024/PMID/MCWAP2/RFB - ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS** and works associated therewith (hereinafter called "the Works") and to submit the same for the consideration of TCTA.

And whereas the Tenderer proposes to submit to TCTA a tender (hereinafter called "the Tender") in accordance with such invitation;

We, the undersigned

.....

(Name 1)

and

(Name 2)

acting herein in our respective capacities as

.....

(Position 1)

and

(Position 2)

of

(Institution)

(hereinafter called "the Bank")

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and being duly authorised to sign and incur obligations in the name of the Bank under and in terms of a Resolution of the Board of Directors of the Bank, a notarised certified copy of which is annexed hereto, hereby irrevocably and unconditionally guarantee and undertake on behalf of the Bank that:

1. The Bank will:
 - 1.1 Pay to TCTA within 28 days of receipt of TCTA's first written demand and without proof of any breach of the Tender conditions by the Tenderer an amount not exceeding the sum of 1% of the tender price;
 - 1.2 Make such payment to TCTA at an address designated by TCTA for this purpose.
2. TCTA shall be entitled to demand payment against the guarantee for circumstances that may include, but may not necessarily be limited to, the following:
 - (a) If a Tenderer withdraws his Tender during the period of Tender validity; or
 - (b) If due to any misconduct by the Tenderer, the Tender is rejected; or
 - (c) If a successful Tenderer fails to furnish the required Performance Security within the specified time limit.
3. If the Tender is:
 - 3.1 Accepted by TCTA within 84 days from the date fixed for the receipt of the Tender or within such extended duration as may be agreed in writing between the Tenderer, the Bank and TCTA, and the Tenderer has provided Performance Security in accordance with its undertaking in Sub-Clause 4.2 of the Conditions of Contract respectively; or
 - 3.2 Not accepted by TCTA within 84 days from the date fixed for the receipt of the Tender or within such extended duration as may be agreed in writing between the Tenderer, the Bank and TCTA; or
 - 3.3 If before the expiration of that period of 84 days or such extended duration, a tender from another person for the execution of the works is accepted by TCTA, then this Guarantee shall expire.
4. The demand for payment together with this guarantee shall constitute conclusive proof of the Bank's indebtedness hereunder for the purposes of any proceedings including but not limited to provisional sentence proceedings instituted against the Bank in any Court of Law having jurisdiction.
5. Neither the failure of TCTA to enforce strict or substantial compliance by the Tenderer with his obligations nor any act, conduct, or omission by TCTA will discharge the Bank from any liability under this guarantee.
6. The guarantee shall:
 - 6.1 Exist independently of any contract (or any amendment, variation or novation thereof) between the Tenderer and TCTA.
 - 6.2 Be returned to the Tenderer on expiry.

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- 6.3 Not be ceded or assigned by TCTA, or otherwise dealt with in any manner whatsoever which has or may have the effect of transferring or encumbering or alienating TCTA's rights hereunder.
- 6.4 Be deemed to have been made in South Africa and to be governed and construed by and in accordance with the laws of South Africa to the jurisdiction of whose Court the Bank irrevocably submits itself. The submission to such jurisdiction shall not (and shall not be construed to) limit the right of TCTA to take proceedings against the Bank in any other court of competent jurisdiction nor shall the taking of proceedings in any one or more jurisdictions against the Bank preclude the taking of proceedings against the Bank in any other jurisdiction whether concurrently or not.
- 7. The Bank having no presence within the jurisdiction of the South Africa Court hereby agrees that service on its correspondent bank (insert name of bank at an address in South Africa) shall constitute effective service on the Bank.

SIGNED ON THIS DAY OF 20

AT

(Place)

..... and

(Signature 1)

(Signature 2)

AS WITNESSES:

1. 2.

Attachment: Resolution of Board of Directors (Certified Copy)

**ANNEXURE T2.1-2
FORM OF PARENT COMPANY GUARANTEE**

To be provided to:

The Chief Executive
TCTA
First Floor
Block 9 Byls Bridge Office Park
Cnr Olivenhoutsbosch & Jean Avenue
Doringkloof
CENTURION, 0046
South Africa

TENDER NO 054/2024/PMID/MCWAP2/RFB - ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

We have been informed that

(hereinafter called the “Contractor”) is submitting an offer for such Contract in response to your invitation, and that the conditions of your invitation require his offer to be supported by a parent company guarantee.

In consideration of you, the Employer, awarding the Contract to the Contractor, we (*name of parent company*) irrevocably and unconditionally guarantee to you, as a primary obligation, the due performance of all the Contractor’s obligations and liabilities under the Contract, including the Contractor’s compliance with all its terms and conditions according to their true intent and meaning.

If the Contractor fails to so perform his obligations and liabilities and comply with the Contract, we will indemnify the Employer against and from all damages, losses and expenses (including legal fees and expenses) which arise from any such failure for which the Contractor is liable to the Employer under the Contract.

This guarantee shall come into full force and effect when the Contract comes into full force and effect. If the Contract does not come into full force and effect within a year of the date of this guarantee, or if you demonstrate that you do not intend to enter into the Contract with the Contractor, this guarantee shall be void and ineffective. This guarantee shall continue in full force and effect until all the Contractor’s obligations and liabilities under the Contract have been discharged, when this guarantee shall expire and shall be returned to us, and our liability hereunder shall be discharged absolutely.

This guarantee shall apply and be supplemental to the Contract as amended or varied by the Employer and the Contractor from time to time. We hereby authorise them to agree any such amendment or variation, the due performance of which and compliance with which by the Contractor are likewise guaranteed hereunder. Our obligations and liabilities under this guarantee shall not be discharged by any allowance of time or other indulgence whatsoever by the Employer to the Contactor, or by any variation or suspension of the works to be executed under the Contract,

or by any amendments to the Contract or to the constitution of the Contractor or the Employer, or by any other matters, whether with or without our knowledge or consent.

This guarantee shall be governed by the law of the same country (or other jurisdiction) as that which governs the Contract and any dispute under this guarantee shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with such Rules. We confirm that the benefit of this guarantee may be assigned subject only to the provisions for assignment of the Contract.

Date:

Signature:

ANNEXURE T2.1-3 FORM OF AUTHORITY FOR SIGNATORY

Signatories for Companies, Partnerships or Close Corporations must establish their authority thereto by attaching a copy of the relevant resolution to that effect of their Board of Directors, Members or Partners duly signed and dated. An example is shown below for a Company. A similar authority must be included for the individual who is authorised by the Tenderer (Company or Joint Venture) to sign the Tender documents on behalf of the Tenderer.

By resolution of the Board of Directors at a meeting on 20

At

Mr / Ms

whose signature appears below, has been duly authorised to sign all documents in connection with this Tender for **TENDER NO 054/2024/PMID/MCWAP2/RFB - ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**, and any contract which may arise there from, on behalf of (*company, block capitals*)

.....

SIGNATURE OF RESPONSIBLE PERSON OF COMPANY:

IN HIS CAPACITY AS:

DATE:

SIGNATURE OF SIGNATORY AUTHORISED TO SIGN ON BEHALF OF COMPANY:

.....

WITNESSES:

.....

(NOTE: This is a typical example of an authority for signature. Signatures of both Responsible Person and authorised Signatory are required on the certificate provided by the Tenderer).

**ANNEXURE T2.1-4
INDEMNITY FORM – SITE INSPECTION**

TO WHOM IT MAY CONCERN

In connection with a Site visit for the purposes of the **TENDER NO 054/2024/PMID/MCWAP2/RFB - ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS** the under named:

Name of Attendee	ID Number	Address
.....
.....
.....
.....
.....
.....

Acting in our individual capacities and as representatives of:

.....

(Name of Tenderer)

(hereinafter called “the Tenderer”) hereby indemnify TCTA and its personnel, contractors and agents from and against all liability in respect of our entering into and being conveyed by any vehicle, airborne or otherwise and entering upon any premises or lands and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs, and expenses however caused, which, but for the TCTA’s permission for the Tenderer to exercise the right to enter and be conveyed by any vehicle or otherwise or enter such premises or lands, would not have arisen and whether or not caused by the negligence of TCTA.

Signed on this day of 20

at

(Place)

Name of Attendee

Signature

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**ANNEXURE T2.1-5
PRE-TENDER CLARIFICATION MEETING AND SITE INSPECTION
CERTIFICATE**

This is to certify that I / We

.....
.....
.....

being the duly authorised representative(s) of (Tenderer)

.....
.....

of (address)

.....
.....

Telephone No.

Facsimile No.

Cell phone No.

E-mail

Attended the Pre-Tender Clarification Meeting and visited and inspected the Site of the Works on
(date).....

in the company of the Engineer:

.....

and the Employer:

.....

Signed on behalf of the Tenderer

Signed on behalf of the Engineer

or the Employer

DATE

SIGNATURE

**ANNEXURE T2.1-6
FORM OF LETTER OF INTENT FROM SUPPLIERS AND/OR
SUBCONTRACTORS TO ENTER INTO NEGOTIATIONS WITH THE
OPERATOR**

To be provided to:

The Contractor

**TENDER NO 054/2024/PMID/MCWAP2/RFB - ABSTRACTION WORKS, PUMPING STATIONS,
RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

We have been informed that the Department of Water Affairs, being the permanent operator for the above Contract works, may require that mechanical and electrical suppliers and/or subcontractors, who were appointed by the Contractor, enter into negotiations with the operator for the implementation of maintenance contracts for the mechanical and electrical works pertaining to the said contract.

In consideration of this requirement, we:

.....
(name of supplier or subcontractor)

hereby undertake that we will enter into such negotiations on receipt of your instruction to do so.

We further undertake that any manufacturers' and/or suppliers' warranties and/or guarantees, which were vested in the Contractor, and which may remain valid after the Expiry Date are to be ceded immediately following the Expiry Date to the operator by the Contractor and the relevant warrantor or guarantor. The terms and conditions of such cessions shall form a part of the maintenance contracts negotiated and agreed between the parties concerned, as may the terms and conditions pertaining to any extended warranties and/or guarantees that may be requested by the operator and which are available on commercially reasonable terms and conditions.

SIGNATURE:.....

(of person authorised to sign on behalf of the supplier / subcontractor)

In his capacity as:

DATE:.....

SIGNATURE: DATE:

(of person authorised to sign on behalf of the Tenderer)

ANNEXURE T2.1-6 (CONT'D)

Tenderers are advised that the Letter(s) of Intent from the suppliers and/or subcontractors submitted with the Tender must, in total, provide undertakings to enter into negotiations with the operator in order that acceptable maintenance contracts are concluded dealing with, but not necessarily limited to, the following:

All components of the pump system

All components of the ancillary systems to the pump system

All components of the power supply and switchgear system

All components of the control and instrumentation system

All components of the SCADA system

All valves within the pump station

Transformers

ANNEXURE T2.1-7 RECORD OF ADDENDA TO TENDER DOCUMENTS

I / We confirm that the following communications amending the Tender documents that I / we received from the Employer or his representative before the closing date for submission of this tender offer have been taken into account in this tender offer.

ADDENDUM NO.	DATE	TITLE OR DETAILS

Copies of and receipt slips for the above Addenda are to be submitted with the tender offer.

SIGNATURE: DATE:

(of person authorised to sign on behalf of the Tenderer

**ANNEXURE T2.1-8
TAX COMPLIANCE STATUS PIN**

ANNEXURE T2.1-9

**SANAS VERIFIED B-BBEE CERTIFICATE OR
CONSOLIDATED SANAS VERIFIED B-BBEE CERTIFICATE FOR A
JOINT VENTURE**

(TO BE ATTACHED BY THE TENDERER)

VOLUME 2

T2.2.1: RETURNABLE SCHEDULES

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

TENDER NO 054/2024/PMID/MCWAP2/RFB**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS****Notes to Applicants**

The forms are to be completed, as may be appropriate, by the categories designated as follows:

- Category 1: A single contractor or each member of a proposed joint venture.
 Category 2: Proposed specialist suppliers such as pipe suppliers, valve suppliers and pipe specials manufacturers, electrical equipment suppliers, motor suppliers, etc.
 Category 3: Proposed subcontractors.

Please answer all questions, respond to all pages and number each page.
 Supplementary pages may be copied and inserted (in the correct place) if required.
 Please retain a copy of your complete submission.
 Project financial data for South African firms must be stated in ZAR.

Request for Bid Forms

PAGE	DOCUMENT PURPOSE	DESCRIPTION	STATUS	To be completed by category		
				1	2	3
B	Compliance	Lead Contractor and Participating Organisations	Mandatory	x	x	x
H1	Compliance	Joint Venture Formation (If applicable)	Mandatory	x		
H2	Compliance	Comfort Letter: Ultimate Parent Company Guarantee	Mandatory	x		
H3	Compliance	Letter of Intent to Form a Joint Venture (If applicable)	Mandatory	x		
Annexure T2.1-1	Compliance	Tender Security	Mandatory	x		
Part C1.1	Evaluation	Forms of Offer (Letter of Tender)	Mandatory	x		
Part C1.2	Evaluation	Contract Data	Mandatory	x		
Part C2.2	Evaluation	Priced Bill of Quantities and Summary of Bills	Mandatory	x		

PAGE	DOCUMENT PURPOSE	DESCRIPTION	STATUS
C1 – C2	Evaluation	Resources: Key Personnel CV Template	Non-mandatory
D1 – D7	Evaluation	Resources: Project Key Personnel	Non-mandatory

Request for Bid Form



E	Evaluation	Experience: Welded steel Pipeline Construction Projects commissioned over the past 20 years	Non-mandatory
F1	Evaluation	Experience: Jet Grouting Projects	Non-mandatory
F2	Evaluation	Experience: Civil Construction Projects	Non-mandatory

PAGE	DOCUMENT PURPOSE	DESCRIPTION	STATUS
F3	Evaluation	Experience: Pump Installation	Non-mandatory
F4	Evaluation	Experience: Variable Speed Drives	Non-mandatory
F5	Evaluation	Experience: Telemetry Contracts	Non-mandatory
L	Evaluation	Experience: Reference Letters	Non-mandatory
Annexure T2.1-9	Evaluation	SANAS verified B-BBEE Certificate or the Consolidate SANAS verified B-BBEE Certificate	Non-mandatory
V1 – V7	Evaluation	Construction Management Plans	Non-mandatory
W1	Evaluation	Audited Annual Financial Statements for the past 5 years signed off by a qualified financial auditor	Non-mandatory
W2	Evaluation	Projected revenue for the next two years	Non-mandatory
W3	Evaluation	Statement from Tenderer’s Bank(s) of credit facilities currently in place; and Letter from a registered RSA financial institution acceptable to TCTA confirming they would provide a 10% of the accepted contract amount as Performance Security – Demand Guarantee to the Tenderer	Non-mandatory

PAGE	DOCUMENT PURPOSE	DESCRIPTION	STATUS
G2	Contractual	Suppliers / Manufacturers Details	Non-mandatory
G3	Contractual	Subcontractors Details	Non-mandatory
G4	Contractual	General Information: Participating Organisations	Non-mandatory
I	Contractual	Permission to Seek Information	Non-mandatory
J1 – J2	Contractual	Proposed Project Management and Delivery Structure & Organogram with comprehensive Roles and Responsibility Matrix	Non-mandatory
P6	Contractual	Letter of Intent to Submit Performance Security	Non-mandatory
Q1–Q3 Q4–Q6 Q7–Q9 Q10– Q14	Contractual	Standard Bidding Forms SBD 1 SBD 4 SBD 5 SBD 6.1	Non-mandatory

Request for Bid Form



R1 – R9	Contractual	Localisation Returnable based on applicable DTI Published Designation SBD 6.2 and Annexure C	Non-mandatory
S1 – S5	Contractual	Socio-Economic and Enterprise Development	Non-mandatory
T	Contractual	Estimated Monthly Cash Flows During Construction	Non-mandatory
U1	Contractual	Engineers Indicative Construction Delivery Timelines	Non-mandatory
U2	Contractual	The Tenderer Construction Programme	Non-mandatory

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Lead Contractor and Participating Organisations

Name of Construction Company or Lead Partner in Joint Venture:

Address:

Name of Authorised Designated Person:

List of Participation:

JOINT VENTURE MEMBERS				
Name of Member ^(Note 1)	Percentage participation	CIDB rating(s)	Years	
			In RSA	Internationally
			South African Co	Yes No
			South African Co	Yes No
			South African Co	Yes No
			South African Co	Yes No

Note 1: The area of expertise of the Companies to be briefly outlined in a separate letter under this section



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Resources: CV Template

PROPOSED POSITION ON TEAM:

Name:
 Profession:
 Date of Birth:
 Parent Firm:
 Position in Firm: *Indicate if Director, Senior Contract or Contract Manager, Site Agent, Engineer etc.*
 Years with Firm:
 Nationality:

Tertiary Education (and year obtained; degree, diploma, certificate, trade tests, apprenticeships, etc.):

Professional Accreditation (and year obtained):

Years of Relevant Experience: xxx

Languages: *Please indicate first language. If the first language is not English, please indicate proficiency in English. In other languages, including South African indigenous languages, please show speaking, reading and writing ability.*

	Speaking	Reading	Writing
English			

Countries of Work Experience

KEY QUALIFICATIONS

Under this heading, give an outline of the staff member's qualifications, trade and training, and relevance to the work to be performed by him / her on the team.

RELEVANT EXPERIENCE

*Describe degree of responsibility held by proposed key personnel on a **relevant previous assignments/projects**, as per the table here below.*

Project Details					Proposed Key Resource's Involvement Details		
<i>Project Title</i>	<i>Project Start Date</i>	<i>Project End Date</i>	<i>Project Value</i>	<i>Project Description</i>	<i>Project Location (Country and Reference Town)</i>	<i>Position Held</i>	<i>Duration of your involvement</i>

Request for Bid Form



SUMMARY OF OTHER EXPERIENCE

Under this heading, list project, positions held by staff member since qualifying / graduation, giving dates, names of employing organization, location, project description, value of construction projects, project duration, duration on the project.

Project Details					Proposed Key Resource's Involvement Details		
<i>Project Title</i>	<i>Project Start Date</i>	<i>Project End Date</i>	<i>Project Value</i>	<i>Project Description</i>	<i>Project Location (Country and Reference Town)</i>	<i>Position Held</i>	<i>Duration of your involvement</i>

REFERENCES

Declaration:

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications and that, at the time of signature, I am available and will serve in the position indicated for me in the Bid document No. 054/2024/PMID/MCWAP2/RFB Mokolo and Crocodile River Water Augmentation Project Phase 2 (MCWAP-2A)

Signature of Staff Member

Date

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Resources: Project Key Personnel

Applicants shall indicate the key personnel they anticipate would be involved in the contract should it be awarded to them. Curriculum Vitae shall be submitted, in the format prescribed on Pages C1 to C2, for each of the key personnel referred to. (Pages D1 to D7)

Pages C1 to C2 must include a commitment as to the availability of listed key personnel (or equivalents in experience) in the event of a contract award. The curriculum vitae (CVs) submitted for the key personnel must be accompanied by a declaration of availability for the entire duration of the construction period. In cases where alternative personnel are to be provided in future, the skills of such personnel should be equal to or better than that reflected on the original submitted CV.

Curriculum Vitae (CV), up to a maximum of three (3) pages must be submitted, for each of the proposed key personnel. In an annexure, the CV must specifically include the certified copies of qualifications (during the last three months), experience and contact details of at least three (3) contactable referees. Where the qualifications are not in English, certified English translations must be submitted.

Applicants must identify in the detail indicated in the Table below the key personnel, whom it is proposed to assign to the project, **with due consideration of the nature and scale of the works entailed**. Details are to be provided accompanying the information entered in the Table below confirming that the applicant has the required minimum number of personnel with the required specialised skills and/or qualifications in its employ to adequately manage and implement the contract. Alternatively, provide full details as to how the required skilled personnel will be sourced for full-time assignment to the contract. The applicant should clearly demonstrate the ability and experience of the applicant to properly manage and control the contract throughout all stages of the construction period, with specific reference to the tasks and responsibilities that will be responsible for.

Position on Team (Designation and discipline)	Name	Years of Experience in Relevant Discipline [Note 1]	Period with Company	Highest value of Contract handled

[Note 1: for example: civil engineering, environmental/health and safety/industrial relations/interface management, programming, multidisciplinary construction supervision etc.]

TENDER NO 054/2024/PMID/MCWAP2/RFB
ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

The following resources are considered, as a minimum, to be Key Personnel

Please note, where reference is made to a qualification / professional registration, it is done within the South African context. Where a qualification / professional registration is not from a South African Institution, the Bidder is responsible to have it officially evaluated / accredited and compared to the South African equivalent. Furthermore, all qualifications and registration documents in a language other than English, must also be officially translated into the English language.

Key Resource	Experience / Qualifications
Construction Manager / Contractor's Representative	<p>The Construction Manager is in charge of making sure that day-to-day needs of the project are carried out for the section of the works assigned to him, i.e. pipeline construction, weir construction, pump stations, etc. He is responsible for scheduling and organising resources, monitoring the budget and providing inputs to payment certificates, initiating RFI's, provide inputs to claims / VO's, ensure compliance with specification requirements, etc. This incumbent predominantly carries out their role from an office, administrative and document-orientated position.</p> <p>Experience: As a Construction Manager and having experience in construction of \geq 800 mm ND steel pipeline bulk water infrastructure mega-projects with a minimum length of 20 km and/or construction of a mass reinforced concrete bulk water infrastructure abstraction / dam works with one construction project management FIDIC contract experience. If the tenderer separates the role of the Construction Manager and Contractor's Representative, the tenderer shall provide CVs for both roles:</p> <ul style="list-style-type: none"> • Minimum of 15 years <p>Qualifications: A degree/diploma or equivalent to NQF level 6 in Construction Management or a degree/diploma in Engineering. All foreign certificates must be accompanied with SAQA equivalent result.</p> <p>Professional Registration: Additional points will be allocated for professional registration with at least ECSA or SACPCMP or equivalent.</p>

Key Resource	Experience / Qualifications
<p>Site Agent 1 - Pipeline</p>	<p>The Site Agent is responsible for implementing and managing the work on site, for the section of the works assigned to him. His primary duties are, but not limited to the following:</p> <ul style="list-style-type: none"> • Ensuring compliance with OHS, Environmental and social requirements. • Tracking daily activities against the project schedule. • Determining means, methods and constructability. • Ensuring design details are built properly. • The Monitoring quality requirements. • Overseeing field workers, usage of plant and equipment and onsite subcontractors, etc. <p>Experience: As a Site Agent with experience in the construction of \geq 800 mm ND welded buried steel pipeline bulk water infrastructure projects with a minimum length of 20 km:</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: Qualified in relevant trade, or a qualification (degree, diploma or equivalent to NQF level 6) in construction management or engineering. All foreign certificates must be accompanied with SAQA equivalent result.</p> <p>Professional Registration: Additional points will be allocated for professional registration with at least ECSA or SACPCMP or equivalent.</p>
<p>Site Agent 2 – River Abstraction / Dam Works</p>	<p>The Site Agent is responsible for implementing and managing the work on site, for the section of the works assigned to him. His primary duties are, but not limited to the following:</p> <ul style="list-style-type: none"> • Ensuring compliance with OHS, Environmental and social requirements. • Tracking daily activities against the project schedule. • Determining means, methods and constructability. • Ensuring design details are built properly. • The Monitoring quality requirements. • Overseeing field workers, usage of plant and equipment and onsite subcontractors, etc. <p>Experience: As a Site Agent with experience in construction of mass- and reinforced concrete river abstraction / dam works with the use of Jet Grouting technology / method for soil / ground stabilisation:</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: Qualified in a relevant trade, or a qualification (degree, diploma or equivalent to NQF level 6) in construction management or engineering. All foreign certificates must be accompanied with SAQA accredited equivalent result.</p> <p>Professional Registration: Additional points will be allocated for professional registration with at least ECSA or SACPCMP or equivalent.</p>

Key Resource	Experience / Qualifications
<p>Site Agent 3 – Pump Stations</p>	<p>The Site Agent is responsible for implementing and managing the work on site, for the section of the works assigned to him. His primary duties are, but not limited to the following:</p> <ul style="list-style-type: none"> • Ensuring compliance with OHS, Environmental and social requirements. • Tracking daily activities against the project schedule. • Determining means, methods and constructability. • Ensuring design details are built properly. • The Monitoring quality requirements. • Overseeing field workers, usage of plant and equipment and onsite subcontractors, etc. <p>Experience: As a Site Agent and having experience in the construction / installation of mechanical equipment covering rotating equipment, pumps and pump stations mechanical equipment including related piping works and HVAC installation and commissioning of pipeline bulk water infrastructures projects. This may include the management of electrical equipment installation covering motors and variable speed drivers installations for pump stations and electrical reticulation installation and commissioning:</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: Qualified in a relevant trade, or a qualification (degree, diploma or equivalent to NQF level 6) in construction management or engineering. Additional points will be allocated for professional registration. All foreign certificates must be accompanied with SAQA accredited equivalent result.</p> <p>Professional Registration: Additional points will be allocated for professional registration with at least ECSA or SACPCMP or equivalent.</p>
<p>Site Agent 4 - Structures</p>	<p>The Site Agent is responsible for implementing and managing the work on site, for the section of the works assigned to him. His primary duties are, but not limited to the following:</p> <ul style="list-style-type: none"> • Ensuring compliance with OHS, Environmental and social requirements. • Tracking daily activities against the project schedule. • Determining means, methods and constructability. • Ensuring design details are built properly. • The Monitoring quality requirements. • Overseeing field workers, usage of plant and equipment and onsite subcontractors, etc. <p>Experience: As a Site Agent and having experience in the construction of reinforced concrete structures related to bulk water systems i.e. pump stations, reservoirs and valve chambers:</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: Qualified in a relevant trade, or a qualification (degree, diploma or equivalent to NQF level 6) in construction management or engineering. All foreign certificates must be accompanied with SAQA accredited equivalent result.</p> <p>Professional Registration: Additional points will be allocated for professional registration with at least ECSA or SACPCMP or equivalent.</p>

Key Resource	Experience / Qualifications
<p>Integration Manager</p>	<p>The primary duties, responsibilities and requirements to be met by the Integration Manager is set out under Volume 3, Part C3.1, Specification Section 1 General, Subsection 1.10.5 (Integration Management).</p> <p>Experience: As Integration Manager on multidisciplinary bulk water projects of similar scope.</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: A relevant degree, diploma or equivalent to NQF level 6 in Construction Management, Project Management or Engineering. All foreign certificates must be accompanied with SAQA equivalent result.</p>

Key Resource	Experience / Qualifications
<p>Environmental Officer</p>	<p>The duties of the Environmental Officer will primarily comprise of the following:</p> <ul style="list-style-type: none"> • Aiding the Contractor to comply with all the project environmental requirements, objectives and targets; • Facilitating environmental activities and environmental awareness training of all personnel on site; and • Implementing an internal environmental compliance management system. <p>Further details are, amongst others, provided in Volume 3, Part C3.1, Specification Section 4 Environmental Management.</p> <p>Experience: As Environmental Officer on projects of similar scope. Environmental management experience shall cover the requirements for controlling the impact of construction activities on the environment, specifically relating to the biophysical environment. Such experience shall include the management of Critical Biodiversity areas in relation to contractors' construction activities and operations to carry out the Works, but also with the control of how the operations are carried out. Such experience shall further demonstrate the experience in all relevant legal requirements and international best practices as it relates to the environmental requirements on an ongoing basis throughout the construction period.</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: A natural sciences degree/diploma or equivalent to NQF level 6 equivalent in Environmental Management, and registered with SACNASP. All foreign certificates must be accompanied with SAQA equivalent result.</p>
<p>Health and Safety Manager</p>	<p>Must be a competent person responsible for the management of Health and Safety and the coordination, administration and management of Health and Safety related resources on the construction site, as outlined, amongst others, in Volume 3, Part C3.1, Specification Section 2 Occupational Health and Safety.</p> <p>Experience: As a Construction Health and Safety Manager on a Construction Site. The Contractor shall take full responsibility for the prevention of unhealthy and unsafe working conditions and practices and for the promotion of a healthy Site and safe working practices on the Site in so far as such conditions and practices affect his employees and any other persons while present on Site.</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: Registered and in good standing with the SACPCMP in the designation as a CHSM, or equivalent to NQF level 6 as provided for in the Bid document in Volume 3, Part C3.1, Specification Section 2 Occupational Health and Safety. All foreign certificates must be accompanied with SAQA accredited equivalent result.</p>

Key Resource	Experience / Qualifications
<p>Social Officer</p>	<p>The duties of the Socio-Economic Development Officer shall be responsible, amongst other tasks, for all socio-economic development compliance requirements and report, monthly, annually and at the end of the Contract as specified in:</p> <ul style="list-style-type: none"> • Volume 3, Part C3.1, Specification Section 3 Social Management and Socio-Economic Development Requirements. <p>Experience: As Social Officer on projects in South Africa. Social management on the project is concerned not only with the final results of the Contractor's operations to carry out the Works, but most importantly with the manner in which the project's operations are carried out in line with the legislation and international best practices, paying attention to potential impacts on landowners, occupiers, farmers, neighbours, local communities and ensuring that the project obtains a social license to operate. It is thus a requirement that the Contractor shall comply with the social requirements on an on-going and integrated basis. The social requirements are specified primarily in Section 3 – Social Management & Socio-economic requirements.</p> <ul style="list-style-type: none"> • Minimum of 10 years <p>Qualifications: A degree in Social Sciences, Public Relations, Development Studies, Communication, archaeology, anthropology, related Qualification in Social Studies domain, a degree in Environmental Management or equivalent to NQF level 6. All foreign certificates must be accompanied with SAQA accredited equivalent result.</p>

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ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Provide Detail of Welded Steel Pipeline Construction Reference Projects Completed and Commissioned over the Past Twenty Years – at least one to a maximum of five (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Telephone and Fax No's)	Year of Construction		Pipeline Diameter (ND)	Pipeline Total Length (km)	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

Notes:

1. Stipulate the Pipeline diameter of ≥ 800 mm ND.
2. Stipulate the total pipeline length of ≥ 800 mm ND (this should be \geq to 20km).
3. State position e.g. sole responsibility, main contractor, a member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form.....(enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

Request for Bid Form



**TENDER NO 054/2024/PMID/MCWAP2/RFB
 ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

Experience: Provide details of two Jet Grouting Projects that involved variable saturated soil conditions (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Telephone and Fax No's)	Year of Construction		Jet Grouting Geological Condition Description (Note1)	Total Jet Grouting Depth	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

1. Stipulate the geological and the purpose of the Jet Grouting done (this should be similar to the requirements of this project).
2. Stipulate the total depth of the Jet Grouting done (this should be of a depth $\geq 10m$).
3. State position e.g. sole responsibility, main contractor, a member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form (enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

NB: If the Tenderer does not provide the required information for evaluation, the Tenderer will be scored zero for those elements. Any information not provided during the bid process will be required during contracting.

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Provide details for two Civil Construction Projects for Abstraction Works with > 2000 m³ reinforced concrete (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Address, Telephone and Fax No's)	Year of Construction		What was the predominant work content	Value of Contract (Note 1 and 2) US\$ x 1000 or ZAR x 1000	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

Notes:

1. "Contract" relates to the work for which the applicant was responsible. Value of Contract to be given in US\$ or ZAR.
2. Here applicable, use exchange rates prevailing at start of construction and state exchange rate used.
3. State position e.g. sole responsibility, member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form(enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

NB: If the Tenderer does not provide the required information for evaluation, the Tenderer will be scored zero for those elements. Any information not provided during the bid process will be required during contracting.

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Provide details of three Pump Supply and Installations with pumps > 1 m³/s capacity and head > 100 m Projects (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Address, Telephone and Fax No's)	Year of Construction		What was the predominant work content	Value of Contract (Note 1 and 2) US\$ x 1000 or ZAR x 1000	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

Notes:

1. "Contract" relates to the work for which the applicant was responsible. Value of Contract to be given in US\$ or ZAR.
2. Here applicable, use exchange rates prevailing at start of construction and state exchange rate used.
3. State position e.g. sole responsibility, member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form(enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

NB: If the Tenderer does not provide the required information for evaluation, the Tenderer will be scored zero for those elements. Any information not provided during the bid process will be required during contracting.

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Provide details of three Variable Speed Drives > 2 MVA projects (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Address, Telephone and Fax No's)	Year of Construction		What was the predominant work and rating of the VSD's	Value of Contract (Note 1 and 2) US\$ x 1000 or ZAR x 1000	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

Notes:

1. "Contract" relates to the work for which the applicant was responsible. Value of Contract to be given in US\$ or ZAR.
2. Here applicable, use exchange rates prevailing at start of construction and state exchange rate used.
3. State position e.g. sole responsibility, member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form(enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

NB: If the Tenderer does not provide the required information for evaluation, the Tenderer will be scored zero for those elements. Any information not provided during the bid process will be required during contracting.

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Provide details of two Telemetry Projects covering a distance \geq 50 km each with multiple RTU's and SCADA (for evaluation)

Project Name and Location	Name of entity undertaking the works	Employing Authority and Supervising Engineer (Plus Address, Telephone and Fax No's)	Year of Construction		What was the predominant work and distance (km) installed	Value of Contract (Note 1 and 2) US\$ x 1000 or ZAR x 1000	Applicants		Remarks with reference Project Sheet Note (Note 4 and Note 5)
			Start	Finish			Role (Note 3)	% Financial participation	

Notes:

1. "Contract" relates to the work for which the applicant was responsible. Value of Contract to be given in US\$ or ZAR.
2. Here applicable, use exchange rates prevailing at start of construction and state exchange rate used.
3. State position e.g. sole responsibility, member of joint venture (Level of participation), or major sub-contractor.
4. Number of sheets appended by the applicant comprising this form(enter "Nil" if none).
5. Provide Project Sheet detailing project performance covering Project Schedule (Schedule Variance in Month with reference to initial Baseline), Health and Safety Score Card at Completion and Environmental Performance Score Card and Completion.

NB: If the Tenderer does not provide the required information for evaluation, the Tenderer will be scored zero for those elements. Any information not provided during the bid process will be required during contracting.

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

NOT USED

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

NOT USED

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Suppliers / Manufacturers Details

PROPOSED SPECIALIST SUPPLIERS; PIPE SUPPLIERS, VALVE SUPPLIERS, PIPE SPECIALS MANUFACTURERS, ELECTRICAL EQUIPMENT SUPPLIERS, PUMP SUPPLIERS, MOTOR SUPPLIERS.			
Supplier / Manufacturer Name <small>(Note 1)</small>	Years		
	In RSA	Internationally	
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No

Note 1: The Suppliers / Manufacturers area of expertise and scope to be executed in terms of this Tender to be briefly outlined in a separate letter under this section

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Subcontractors Details

PROPOSED SUBCONTRACTORS			
Name <small>(Note 1)</small>	Years		
	In RSA	Internationally	
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No
	South African Co	Yes	No

Note 1: The Subcontractors area of expertise and scope to be executed in terms of this Tender to be briefly outlined in a separate letter under this section

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

General Information: Participating Organisations

Applicant is to provide information below for each participating company as per list of participation in Pages B and G2 to G4.

4 Name of Company:

Postal address:

Telephone number:

Telefax number:

Contact email address:

Registered office address:

5 Description of company (for example, General Civil Engineering Contractor):

6 Specify whether the participating entity is a RSA Company or an International Company:

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Joint Venture Formation

If the company intends to enter a joint venture for the project, please provide the following information, otherwise state *"not applicable"*:

JOINT VENTURE

In the case of a joint venture, one of the members should be nominated as the joint venture principal, responsible for the preparation and implementation of the contract. This party should be in charge during the tender processes and execution of the contract should the joint venture be the successful applicant. The partner in charge shall be authorised to assume liabilities and to receive instructions for and on behalf of the joint venture.

There is no limit to the number of members that may form a joint venture for the purpose of submitting this Bid and for the implementation of the contract that may result therefrom. It is however, a condition that all partners accept joint and several liability for their participation in any contract concluded pursuant to the Bid process.

The joint venture forms may be supported by additional information with further details of the proposed joint venture such as the joint venture purpose and objective, the proposed management structure, the contribution of each member to the joint venture operations, the commitment of the members to joint and several liability for due performance, recourse/sanctions within the joint venture in the event of default or withdrawal of any member, and arrangements for providing the required indemnities.

- Each joint venture member is required to provide the Employer with a Comfort Letter: Ultimate Parent Company Guarantee as indicated in Page H2.
- The applicant is required to provide a letter of intent to form a joint venture (Page H3).
- Each joint venture member and specialist supplier (Category 2 in 'Notes to Applicants' on Page A1) is required to authorise the Employer to seek supplementary information from any source (but particularly the banks) if he so desires, as indicated in Page I.



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Comfort Letter:

Ultimate Parent Company Guarantee

TO TRANS-CALEDON TUNNEL AUTHORITY (TCTA)

We.....

(Name of ultimate or indirect parent company)

confirm that the above-named company is the ultimate parent company of the applicant named below and confirm our undertaking to provide with the Tender an ULTIMATE PARENT COMPANY GUARANTEE to guarantee the performance of the applicant to the Trans-Caledon Tunnel Authority (TCTA) under any contract jointly and severally as appropriate should the application to prequalify as a prospective tenderer for the above named Tender, submitted by (name of applicant)

be successful,

Signed Date

At

(Place)

Name and Position

being a duly authorised officer of the above-named ultimate parent company.



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Letter of Intent to Form a Joint Venture

TO TRANS-CALEDON TUNNEL AUTHORITY (TCTA)
Joint Venture

Company A..... Company D.....
of..... of
(address) (address)
Company B..... Company E.....
of..... of
(address) (address)
Company C..... Company F.....
of..... of
(address) (address)

The parties to the Joint Venture confirm our undertaking to enter into a joint venture agreement, for the purposes of the Contract, under which all members will be jointly and severally liable for the execution of the Contract (if awarded the Contract) should the application to prequalify as a prospective tenderer for the Contract be successful.

Signed for and on behalf of the Parties on this day of 20.....

At..... (place)

FOR COMPANY A SIGNATURE..... CAPACITY.....
FOR COMPANY B SIGNATURE..... CAPACITY.....
FOR COMPANY C SIGNATURE..... CAPACITY.....
FOR COMPANY D SIGNATURE..... CAPACITY.....
FOR COMPANY E SIGNATURE..... CAPACITY.....
FOR COMPANY F SIGNATURE..... CAPACITY.....



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Permission to Seek Information

TO WHOM IT MAY CONCERN

We.....
(Name of Company)

hereby authorise you to provide to the Trans-Caledon Tunnel Authority (TCTA) any information it may require in connection with our application to bid as a prospective tenderer for TENDER NO 054/2024/PMID/MCWAP2/RFB, Construction of Abstraction Works, Pumping Stations, Reservoirs, Pipeline, Related Multidiscipline Works and Ancillary Works

Signed Date.....

at.....(Place)

Name and Position

being a duly authorized officer of the above-named company.

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

**Proposed Project Management Structure & Organogram
(Construction Management and Delivery Team)**

The Contractors Construction Management and Delivery Team

The contractors Construction Management and Delivery Team that will be responsible for the overall management and coordination of the contract. The position / roles and company affiliation of the various individuals should be clearly indicated, as well as the following:

- If a Joint Venture, include the organisational and functional relationships between all members of the joint venture, including the way the members will participate in the contract and contribute to the work as well as any specialist suppliers and/or subcontractors. The mere fact of an association, JV or consortium will not be considered an adequate response.
- Highlighting their specific companies' roles. It is of particular importance to show that at least one Joint Venture partner or sub-contractor has the necessary skills and proven record of accomplishment to execute each of the components or tasks under the contract.

The Contractors site-based staff responsible for dealing with construction activities

A proposed project execution organogram is to be provided by the applicant clearly identifying and illustrating the following:

- The key personnel, their position, name and company affiliation.
- All elements of the work need to be clearly addressed, and as a minimum the following:
 - Abstraction works.
 - Jetting and grouting.
 - Pipeline construction works, including cathodic protection, pipeline structures, etc.
 - Mechanical works.
 - Electrical and related works; electrical, SCADA, instrumentation, communication, security, etc.
 - Civil works.
 - Material supply.
 - Plant and equipment management and maintenance.
 - Environmental aspects.
 - Health and safety.
 - Social aspects.
 - Industrial relations and human resources.
 - Project controls; commercial aspects, project finances, programming and planning, document control, quality control, project integration, etc.
 - Project commissioning.

The Contractors Team that will be allocated during the Defects Liability Period

The proposed organogram is to be provided by the applicant clearly identifying and illustrating the following:

- The key personnel, their position, name and company affiliation.

- All elements of the work that will require specific actions/ personnel to be allocated, such as for instance, but not limited to the following:
 - All aspects associated with the works where operational and maintenance activities may require actions or inputs.
 - Environmental aspects.
 - Health and safety aspects.
 - Social aspects.
 - Industrial relations and human resources, etc.

A functional diagram indicating the allocations and use of Suppliers and Subcontractors related to portions of the Works

The proposed diagram must clearly identify and illustrate the following, for both the Construction duration as well as during the Defects Liability Period:

- The role and responsibilities of all participating subcontractors, suppliers, and manufacturers.
- Applicants must detail where they intend making use of specialist suppliers and/or subcontractors for portions of the Works and indicate with whom it is likely the works will be placed. A comprehensive roles and responsibility matrix (RACI) covering all disciplines with clear indication of single points of accountability and various levels including sub-contractors, specialist and suppliers with reference to the Project Management and Delivery Structure Organogram.

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

NOT USED

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

Experience: Reference Letters

TCTA reserves the right and may request from the applicant to provide client reference letters on completed projects and running project(s) related to projects listed in Page E, Pages F1 to F6 and Pages V1 to V6.

Each such letter from the Client must contain the following information in no more than 2 pages:

- Project Name.
- Project Client details, Reference Person and contact no.
- Project Scope Statement.
- Final Contract Value (As at Final Tender Payment Certificate).
- Actual project construction duration



TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

NOT USED

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

NOT USED



TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

NOT USED

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Performance Security

Applicants must provide a letter from a reputable South African Bank confirming that they would be able to provide a Performance Security of up to ZAR100 million. Failure by an applicant to submit this letter will result in the relevant submission not being considered in the Bid evaluation process.

at _____ on this the _____ day of _____

Request for Bid Form



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

SBD 1

**PART A
INVITATION TO BID**

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (NAME OF DEPARTMENT/ PUBLIC ENTITY)					
BID NUMBER:		CLOSING DATE:		CLOSING TIME:	
DESCRIPTION					
BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT (STREET ADDRESS)					
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO			TECHNICAL ENQUIRIES MAY BE DIRECTED TO:		
CONTACT PERSON			CONTACT PERSON		
TELEPHONE NUMBER			TELEPHONE NUMBER		
FACSIMILE NUMBER			FACSIMILE NUMBER		
E-MAIL ADDRESS			E-MAIL ADDRESS		
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		OR	CENTRAL SUPPLIER DATABASE No:	MAAA

Request for Bid Form



<p>ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES OFFERED?</p>	<p><input type="checkbox"/>Yes <input type="checkbox"/>No</p> <p>[[IF YES ENCLOSE PROOF]]</p>	<p>ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES OFFERED?</p>	<p><input type="checkbox"/>Yes <input type="checkbox"/>No</p> <p>[[IF YES, ANSWER THE QUESTIONNAIRE BELOW]]</p>
---	--	--	--

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? YES NO

DOES THE ENTITY HAVE A BRANCH IN THE RSA? YES NO

DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? YES NO

DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? YES NO

IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? YES NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.



**PART B
TERMS AND CONDITIONS FOR BIDDING**

1. BID SUBMISSION:	
1.1.	BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
1.2.	ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.
1.3.	THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
1.4.	THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).
2. TAX COMPLIANCE REQUIREMENTS	
2.1	BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2	BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3	APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.
2.4	BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.5	IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED; EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.6	WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
2.7	NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:
(Proof of authority must be submitted e.g. company resolution)

DATE:

SBD 4

BIDDER’S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder’s declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest¹ in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

¹ the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.



.....

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:

.....
.....

3 DECLARATION

I, the undersigned, (name)..... in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

- 3.1 I have read and I understand the contents of this disclosure;
- 3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
- 3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium² will not be construed as collusive bidding.
- 3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
- 3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
- 3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.
- 3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act

² Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

Request for Bid Form



No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature Date

.....
Position Name of bidder

SBD 5

This document must be signed and submitted together with your bid

THE NATIONAL INDUSTRIAL PARTICIPATION PROGRAMME

INTRODUCTION

The National Industrial Participation (NIP) Programme, which is applicable to all government procurement contracts that have an imported content, became effective on the 1 September 1996. The NIP policy and guidelines were fully endorsed by Cabinet on 30 April 1997. In terms of the Cabinet decision, all state and parastatal purchases / lease contracts (for goods, works and services) entered into after this date, are subject to the NIP requirements. NIP is obligatory and therefore must be complied with. The Industrial Participation Secretariat (IPS) of the Department of Trade and Industry (DTI) is charged with the responsibility of administering the programme.

1 PILLARS OF THE PROGRAMME

- 1.1 The NIP obligation is benchmarked on the imported content of the contract. Any contract having an imported content equal to or exceeding US\$ 10 million or other currency equivalent to US\$ 10 million will have a NIP obligation. This threshold of US\$ 10 million can be reached as follows:
- (a) Any single contract with imported content exceeding US\$10 million; or
 - (b) Multiple contracts for the same goods, works or services each with imported content exceeding US\$3 million awarded to one seller over a 2 year period which in total exceeds US\$10 million; or
 - (c) A contract with a renewable option clause, where should the option be exercised the total value of the imported content will exceed US\$10 million; or
 - (d) Multiple suppliers of the same goods, works or services under the same contract, where the value of the imported content of each allocation is equal to or exceeds US\$ 3 million worth of goods, works or services to the same government institution, which in total over a two (2) year period exceeds US\$10 million.
- 1.2 The NIP obligation applicable to suppliers in respect of sub-paragraphs 1.1 (a) to 1.1 (c) above will amount to 30 % of the imported content whilst suppliers in respect of paragraph 1.1 (d) shall incur 30% of the total NIP obligation on a pro-rata basis.
- 1.3 To satisfy the NIP obligation, the DTI would negotiate and conclude agreements such as investments, joint venture or consortiums, sub-contracting, licensee production, export promotion, sourcing arrangements and research and development (R&D) with partners or suppliers.
- 1.4 A period of seven years has been identified as the time frame within which to discharge the obligation.

2 REQUIREMENTS OF THE DEPARTMENT OF TRADE AND INDUSTRY

- 2.1 In order to ensure effective implementation of the programme, successful bidders (contractors) are required to, immediately after the award of a contract that is in excess of R10 million (ten million Rands), submit details of such a contract to the DTI for reporting purposes.
- 2.2 The purpose for reporting details of contracts in excess of the amount of R10 million (ten million Rands) is to cater for multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as provided for in paragraphs 1.1. (b) to 1.1. (d) above.

3 BID SUBMISSION AND CONTRACT REPORTING REQUIREMENTS OF BIDDERS AND SUCCESSFUL BIDDERS (CONTRACTORS)

- 3.1 Bidders are required to sign and submit this Standard Bidding Document (SBD 5) together with the bid on the closing date and time.
- 3.2 In order to accommodate multiple contracts for the same goods, works or services; renewable contracts and multiple suppliers for the same goods, works or services under the same contract as indicated in sub-paragraphs 1.1 (b) to 1.1 (d) above and to enable the DTI in determining the NIP obligation, successful bidders (contractors) are required, immediately after being officially notified about any successful bid with a value in excess of R10 million (ten million Rands), to contact and furnish the DTI with the following information:
- Bid / contract number.
 - Description of the goods, works or services.
 - Date on which the contract was accepted.
 - Name, address and contact details of the government institution.
 - Value of the contract.
 - Imported content of the contract, if possible.
- 3.3 The information required in paragraph 3.2 above must be sent to the Department of Trade and Industry, Private Bag X 84, Pretoria, 0001 for the attention of Mr Elias Malapane within five (5) working days after award of the contract. Mr Malapane may be contacted on telephone (012) 394 1401, facsimile (012) 394 2401 or e-mail at Elias@thedti.gov.za for further details about the programme.



4 PROCESS TO SATISFY THE NIP OBLIGATION

- 4.1 Once the successful bidder (contractor) has made contact with and furnished the DTI with the information required, the following steps will be followed:
 - a. The contractor and the DTI will determine the NIP obligation;
 - b. The contractor and the DTI will sign the NIP obligation agreement;
 - c. The contractor will submit a performance guarantee to the DTI;
 - d. The contractor will submit a business concept for consideration and approval by the DTI;
 - e. Upon approval of the business concept by the DTI, the contractor will submit detailed business plans outlining the business concepts;
 - f. The contractor will implement the business plans; and
 - g. The contractor will submit bi-annual progress reports on approved plans to the DTI.
- 4.2 The NIP obligation agreement is between the DTI and the successful bidder (contractor) and, therefore, does not involve the purchasing institution.

Bid number Closing date:

Name of bidder

Postal address

.....

Signature Name (in print)

Date

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Applicant:

SBD 6.1

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 To be completed by the organ of state

(delete whichever is not applicable for this tender).

- a) The applicable preference point system for this tender is the **90/10** preference point system.
- b) The applicable preference point system for this tender is the **80/20** preference point system.
- c) Either the **90/10 or 80/20 preference point system** will be applicable in this tender. The lowest/highest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender (even in the case of a tender for income-generating contracts) shall be awarded for:

- (a) Price; and
- (b) Specific Goals.

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

- 1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.
- 1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

- (a) **“tender”** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- (b) **“price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- (c) **“rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- (d) **“tender for income-generating contracts”** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- (e) **“the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

$$\begin{array}{ccc}
 \mathbf{80/20} & \mathbf{or} & \mathbf{90/10} \\
 \\
 \mathbf{Ps} = \mathbf{80} \left(\mathbf{1} - \frac{\mathbf{Pt} - \mathbf{Pmin}}{\mathbf{Pmin}} \right) & \mathbf{or} & \mathbf{Ps} = \mathbf{90} \left(\mathbf{1} - \frac{\mathbf{Pt} - \mathbf{Pmin}}{\mathbf{Pmin}} \right)
 \end{array}$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

P_{min} = Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

$$P_s = 80 \left(1 + \frac{P_t - P_{max}}{P_{max}} \right) \text{ or } P_s = 90 \left(1 + \frac{P_t - P_{max}}{P_{max}} \right)$$

Where

- P_s = Points scored for price of tender under consideration
- P_t = Price of tender under consideration
- P_{max} = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:
- 4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—
 - (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or
 - (b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,
 then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

(Note to organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.)

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.)

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)	Number of points claimed (80/20 system) (To be completed by the tenderer)
1	10	N/A		N/A
2	9			
3	6			
4	5			
5	4			
6	3			
7	2			
8	1			
Non-compliant contributor	0			

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm.....

4.4. Company registration number:

4.5. TYPE OF COMPANY/ FIRM

- Partnership/Joint Venture / Consortium
- One-person business/sole propriety
- Close corporation
- Public Company
- Personal Liability Company
- (Pty) Limited
- Non-Profit Company
- State Owned Company

[TICK APPLICABLE BOX]

4.6. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

Request for Bid Form



- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
 - (a) disqualify the person from the tendering process;
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
 - (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
 - (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (e) forward the matter for criminal prosecution, if deemed necessary.

	SIGNATURE(S) OF TENDERER(S)
SURNAME AND NAME:
DATE:
ADDRESS:

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Localisation Returnables based on applicable DTI Published Designation

The relevant DTI returnables to be completed and inserted under this section.

SBD 6.2 DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Standard Bidding Document (SBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

1. General Conditions

- 1.1. Where necessary, for tenders referred to in paragraph 1.2 above, a two-stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.
- 1.2. A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.
- 1.3. The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

- x is the imported content in Rand
- y is the bid price in Rand excluding value added tax (VAT)

Request for Bid Form



Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) on the date of advertisement of the bid as indicated in paragraph 3.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on [http://www.thedti.gov.za/industrial development/ip.jsp](http://www.thedti.gov.za/industrial%20development/ip.jsp) at no cost.

1.4. A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

2. The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

<u>Description of services, works or goods</u>	<u>Stipulated minimum threshold</u>
_____	_____ %
_____	_____ %
_____	_____ %

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	
-----	--	----	--

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.resbank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF BID NO.

ISSUED BY: (Procurement Authority / Name of Institution):
.....

NB

- 1 The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
- 2 Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thedti.gov.za/industrial_development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. **Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below.** Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned,..... (full names),

do hereby declare, in my capacity as

of(name of bidder entity),
the following:

- (a) The facts contained herein are within my own personal knowledge.
- (b) I have satisfied myself that:
 - (i) the goods / services / works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
- (c) The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 3.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Request for Bid Form



Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.

The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 3.1 above and the information contained in Declaration D and E.

- (d) I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
- (e) I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies available to it.

SIGNATURE:

WITNESS No. 1 _____

DATE: _____

WITNESS No. 2 _____

DATE: _____

Request for Bid Form

SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

Note: VAT to be excluded from all calculations

(C1)	Tender No.							
(C2)	Tender description:							
(C3)	Designated product(s)							
(C4)	Tender Authority: Trans Caledon Tunnel Authority							
(C5)	Tendering Entity name:							
(C6)	Tender Exchange Rate:	Pula		EU		GBP		
(C7)	Specified local content %							

		Calculation of local content						Tender summary			
Tender item no's	List of items	Tender price each (excl VAT)	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Qty	Total tender value	Total exempted imported content	Total Imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
1	CEMENT										
2. STEEL PRODUCTS AND COMPONENTS FOR CONSTRUCTION & VALUE-ADDED STEEL PRODUCTS											
2.1 2.1.1 STEEL CONVERGENCE PIPES											
a)	Spiral Submerged Arc Welding with a size of 500-3500 mm and bare physical properties										
b)	Spiral Submerged Arc Welding with a size of 500-3500 mm and bare physical properties										
c)	Spiral Submerged Arc Welding with a size of 500-3500 mm and lined and coated physical properties										
d)	Spiral Submerged Arc Welding with a size of 500-3500 mm and galvanized, lined and coated physical properties										

Request for Bid Form



SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

Note: VAT to be excluded from all calculations

(C1)	Tender No.
(C2)	Tender description:
(C3)	Designated product(s)
(C4)	Tender Authority: Trans Caledon Tunnel Authority
(C5)	Tendering Entity name:
(C6)	Tender Exchange Rate:
(C7)	Specified local content %

Pula	EU	GBP
------	----	-----

Calculation of local content

Tender summary

Tender item no's	List of items	Tender price each (excl VAT)	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Qty	Total tender value	Total exempted imported content	Total Imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
2.2 STEEL PIPES FITTINGS AND SPECIALS											
a)	Bare										
b)	Galvanized										
c)	Galvanized and coated										
d)	Galvanized, Lined and Coated										
e)	Forged Fittings										

Request for Bid Form



SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

(C1) Tender No.		Note: VAT to be excluded from all calculations
(C2) Tender description:		
(C3) Designated product(s)		
(C4) Tender Authority: Trans Caledon Tunnel Authority		
(C5) Tendering Entity name:		
(C6) Tender Exchange Rate:	Pula <input type="text"/> EU <input type="text"/> GBP <input type="text"/>	
(C7) Specified local content %		

Calculation of local content

Tender summary

Tender item no's	List of items	Tender price each (excl VAT)	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Qty	Total tender value	Total exempted imported content	Total Imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
3. PUMPS, MEDIUM VOLTAGE (MV) MOTOR AND ASSOCIATED ACCESSORIES											
3.1	Pumps										
3.2 Medium Voltage Electric Motor											
Power rating of 185 KV- 20 000 KV and greater than 1 000 volts											
Components and Manufacturing processes											
	Casting or Frame Fabrication										
	Fabrication and winding of the Rotor Core										
	Accessories										
	Assembly and testing of the fully-built unit										

Request for Bid Form



SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

Note: VAT to be excluded from all calculations

(C1)	Tender No.	
(C2)	Tender description:	
(C3)	Designated product(s)	
(C4)	Tender Authority: Trans Caledon Tunnel Authority	
(C5)	Tendering Entity name:	
(C6)	Tender Exchange Rate:	Pula <input type="text"/> EU <input type="text"/> GBP <input type="text"/>
(C7)	Specified local content %	

		Calculation of local content						Tender summary				
Tender item no's	List of items	Tender price each (excl VAT)	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Qty	Total tender value	Total exempted imported content	Total Imported content	
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)	
5. ELECTRICAL AND TELECOM CABLES												
5.1 CABLES USED FOR POWER TRANSMISSION												
a)	Low Voltage											
b)	Low Voltage Reticulation											
c)	Medium and High Voltage											
d)	ACR											
5.2 CABLES USED FOR TELECOMMUNICATIONS												
a)	Optical Fibre Cables											
b)	Copper Telecom Cables											
6. VALVES AND ACTUATORS												
a)	Valves and Actuators											
								(C20) Total tender value	R 0			
Signature of tenderer from Annex B								(C21) Total Exempt imported content		R 0		
								(C22) Total Tender value net of exempt imported content		R 0		
								(C23) Total Imported content		R 0		
								(C24) Total local content		R 0		
Date:										(C25) Average local content % of tender		



TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

SOCIO-ECONOMIC AND ENTERPRISE DEVELOPMENT – Contractual

As part of contract condition the Applicant is required to submit with his Tender by way of this Tables, information and details relating to the targets as listed in the social and supplier Development Specification

Should the space available on any of the Tables be inadequate, the Bidder shall append such supplementary tables as he deems necessary to comply with the Tender requirements. Each supplementary sheet shall display “TENDER NO 054/2024/PMID/MCWAP2/RFB” and shall be properly cross-referenced and firmly appended to the relevant Schedule, or otherwise included, such that they will not inadvertently be detached from the Tender. A complete contents list of all supplementary sheets, including those that may be attached to the Schedule, shall be provided by the Tenderer. References given are for guidance only and not necessarily exclusive of other pertinent information in the Tender Documents. Each page of each Schedule, including any supplementary tables, shall be signed by the Tenderer.

The information provided in this Schedule, apart from providing information that will be used in the Contract, is material to the Tender evaluation and to the assessment of how well the Tenderer has complied with the requirements of the Tender.

Number of sheets, appended by the Tenderer, comprising this Table (if nil, enter Nil)

SIGNATURE:

DATE:

(of person authorised to sign on behalf of the Bidder)

(i) **ENTERPRISE DEVELOPMENT**

The Tenderer must complete the table below to reflect the details of the BOEs that are targeted to participate on this Contract. The Tenderer shall take into account, as a minimum, **Clause 50.5 of the Social and Enterprise Development Specification**.

Table 1: Enterprise Development (Refer to Clause 50.5.1 of the Social and Enterprise Development Specification for target)

Name of the Enterprise Development Beneficiary (EDB)	Exempt Micro Enterprise (EME) and/or Qualifying Small Enterprise (QSE) status	Description of work allocated	Value of scope of work allocated (R)
		Total	

Request for Bid Form



(ii) PREFERENTIAL PROCUREMENT

The Tenderer must complete the table below to reflect the details of the BOEs that are targeted to participate on this Contract. The Tenderer shall consider, as a minimum, **Clause 50.4.1 of the project Social and Enterprise Development Specification**.

Table 2: Preferential Procurement (Refer to Clause 50.4.1 of the Social and Enterprise Development Specification for target)

Name of the Preferential Procurement Beneficiary (EDB)	Description of work/services and goods targeted	Value of scope of work/services/goods targeted (R)
	Total	

Request for Bid Form



(iii) EMPLOYMENT

The Tenderer must complete the table below to reflect the total work force anticipated on this Contract, including all personnel employed by Sub-contractors. The Tenderer shall take into account, as a minimum, **Clause 50.3.2 of the Social and Enterprise Development Specification**.

Table 3: Employment: Participation of Black Professional People

Employment group	Origin				Ethnic Group		
	Local (Lephalale Local Municipality and Thabazimbi Local Municipality areas) (A)	Limpopo Province (B)	Elsewhere (C)	Sub-Total (Person-Hours)	Black people (D)	Other (E)	Sub-Total (Person-Hours)
1.Unskilled: Black Persons							
2.Unskilled: Black Woman							
3.Unskilled: Youth							
4.Unskilled: Persons with Disability							
5.Semi-skilled: Black Persons							
6.Semi-skilled: Black Woman							
7.Semi-skilled: Youth							
8.Semi-skilled: Persons with Disability							
9.Skilled Labour Black People							
TOTALS							

Request for Bid Form



(iv) Skills Development Training

The Tenderer must complete the table below to reflect the total work force anticipated on this Contract, including all personnel employed by Sub-contractors. The Tenderer shall take into account, as a minimum, **Clause 50.6.1 of the Social and Enterprise Development Specification**.

Table 4: Skills Development Training

Expenditure spent on relevant construction training (learnership and skills programmes)	As a percentage of the Contract Site Wage Bill offered
%

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Estimated Monthly Cash Flow During Construction

The Participant must provide the following related to the estimated project cash flow over the construction period:

- 1 A Table indicating monthly cash flows, as well as cumulative monthly cash flows.
- 2 A graph reflecting monthly cash flows, as well as cumulative monthly cash flows.

TENDER NO 054/2024/PMID/MCWAP2/RFB
ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

The Engineers Indicative Construction Delivery Timelines

The Engineers Indicative Construction Delivery Timelines, as well as the Construction Schedule assumptions is provided under this Page U1.

Timelines to Completion from Site Handover date:

Key Milestones	Duration after Site Handover to key Milestone
Total Construction Duration to Takeover Certificate	76
- Ready for Commissioning (RFC)	48
- Ready for Trial Operation (RFTO)	51
- Ready for Operation (RFO)	54
- Water Delivery	54
- Taking-Over Certificate	76
Key Tasks	Estimated Duration in Months
STRUCTURES CONSTRUCTION ACTIVITIES	43
- B-ABSTRACTION WORKS	43
- C-LOW-LIFT RISING MAIN (CH 0 to 5,833)	23
- D-BALANCING RESERVOIR AND SEDIMENTATION WORKS	41
- E-HIGH-LIFT PUMPING STATION	31
PIPELINE CONSTRUCTION ACTIVITIES	42
- F-HIGH-LIFT RISING MAIN (CH 0 to 29,171)	27
- G-BREAK PRESSURE RESERVOIR (BPR-90MI)	32
- H-GRAVITY MAIN (CH 0 to 95,000)	41
COMMISSIONING (Including Defects Notification Period)	27

The Tenderer hereby confirms acknowledgement of the delivery timelines above and that the submitted schedule under Form U2 is aligned.

Name: _____

Signature: _____

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED
MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

The Tenderer Construction Programme

The Tenderer must attach to this Page U2, its Tendered Construction Programme, in compliance with Part 3 Scope of Work, Specification C3.1, Section 1 General, Subsection 1.9 Programming Requirements.

The Tenderer Construction Programme must further demonstrate how the Tenderer will meet the delivery timelines provided in Page U1 and supported by the respective Tenderer Construction Management Plans and resourcing thereof.

It is also imperative that the Tenderer's Construction Programme is aligned with the Tenderer Construction cash flow.

TENDER NO 054/2024/PMID/MCWAP2/RFB

ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE, RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS

Construction Management Plans Required as part of Bid Submission

As part of contract condition the Applicant shall submit Construction Management Plans related to the following key construction activities listed below.

- a. CMP: Organisational Structure and Resource Plan.
- b. CMP V1: Pipeline Construction Management Plan.
- c. CMP V2: Temporary Works for Abstraction Works Construction Management Plan.
- d. CMP V3: Abstraction Works, Excavations and Preparation at the Diversion Weir, Diversion Works and Low Lift Pumping Station Construction Management Plan.
- e. CMP V4: Project Integration Management Plan.
- f. CMP V5: Occupational Health, Safety and Security Construction Management Plan.
- g. CMP V6: Environmental Construction Management Plan.
- h. CMP V7: Social Construction Management Plan.

The requested Management Plan responses:

- Shall be project specific in terms of the required Scope of Work.
- Must address the Project Objectives, Specification Requirements and Contractual Requirements as appropriate.
- Should be concise and to the point.

Nothing in the Construction Management Plans submitted with the tender submission shall be construed to supersede any section of the Specifications or other requirements of the Contract.

CMP: Organisational Structure and Resource Plan

Bidders must submit the organisational structure indicating the deployment of key and additional resources required to meet the tender requirements. Bidders must also submit the construction team structure indicating resource deployment covering the planned work fronts and work areas clearly indicating key disciplines resources deployment in consideration of the project requirements and specifications as listed here below:

- Overall Construction Management Team/Resources
- Construction Supervision and/or Site Agents for various work front/ fronts and work areas as per the Tenderer Construction Management Approach and respective management plan.
- Environmental Management Team
- Health and Safety Management Team
- Social Management Team
- Site Management
- Procurement Team
- Material Management

CMP V1: Pipeline Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V1.1	<p>Indicate the critical aspects that will be considered / managed associated with pipeline trench excavations, with specific reference to:</p> <ul style="list-style-type: none"> • How the different pipeline construction servitude widths will be managed including the handling of various excavated and borrowed construction material within the construction servitude (provide diagrams of the servitude cross sections). • Management of pipeline construction along the servitude, with specific reference to different soil conditions, as well as within dolomitic areas and related constraints such as Bat Cave, Marshall Eagle, Game Farming, but not limited to: • Construction processes to be followed. • Pipeline Construction plant/equipment to be used throughout duration of project. • Management and disposal of excavated trench material. • Traffic management. • Landowners and occupiers crossing the servitude. • The logistics, handling and storage of pipes covering delivery to storage areas within the construction servitude.
CMP V1.2	<p>Provide details related to how the laying of the pipes in the trench and the alignment of the pipe ends to facilitate welding of the field joints will be done, as well as the key personnel and plant to be used.</p>
CMP V1.3	<p>Provide a plan indicating how the welding, coating and lining of the pipe field joints for the various pipe diameters will be coordinated and managed, inclusive of the required inspections and quality control tests, to ensure it will not impact negatively on the pipeline construction train.</p>
CMP V1.4	<p>What measures will be implemented / actions taken to prevent floatation of the laid pipes and/or damage to the pipe bedding, associated with unwanted stormwater ingress into the pipe trenches, or to channel stormwater streamflow across the pipeline construction servitude?</p>
CMP V1.5	<p>Provide details related to the procedures to be implemented during the placement / compaction of the pipeline bedding material to prevent damage to the pipeline coating.</p>
CMP V1.6	<p>What are the most important aspects that should be considered and how they will be taken care of to successfully complete the Matlabas river crossing construction with compliance to health, safety and environmental requirements?</p>

CMP V2: Temporary Works for Abstraction Works Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V2.1	What storm water and flood management measures will be put in place to protect the Works.
CMP V2.2	Illustrate, at a high level with a Gantt chart, how the temporary river diversion sequence will be undertaken to enable safe construction process.
CMP V2.3	Provide details on how the flood risk will be managed to safe guard, personnel and equipment/plant.

CMP V3: Abstraction Works, Excavations and Preparation at the Diversion Weir, Diversion Works and Low Lift Pumping Station Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V3.1	Indicate the specific approach that will be adopted for the proposed site related to the required foundation treatment to support concrete structures located in areas with deep waterlogged sediment, taking account of the known geotechnical conditions, as well as highlighting potentially required additional geotechnical investigations.
CMP V3.2	Indicate the proposed drilling process and jet grouting methodology / methodologies and operations to be employed at the river (abstraction works). Such methodology shall consider technical, social, environmental, legal and the project specifications requirements.
CMP V3.3	Provide details of the resources including the Sub-Contractors (if any) that will be used, as well as any critical plant and equipment requirements.
CMP V3.4	Provide details related to the handling and sourcing of construction materials associated with the platform construction, inclusive of the required concrete production, placement of concrete, management of plant / vehicles at the Site. The Tenderer must also state how the following will be dealt with. <ol style="list-style-type: none"> 1. Material haulage from various sources to respective construction areas 2. Handling and disposal of excess material and waste 3. Water Management to avoid pollution during construction 4. Flood risk management plan

CMP V4: Project Integration Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V4.1	Provide details of how the procurement of long lead items will be integrated with the construction activities to ensure that the project commissioning and trial operations processes will not be delayed.
CMP V4.2	What processes will be implemented / tools utilised to effectively integrate and coordinate project execution, covering; planning, monitoring, reporting, risk management, change management, commissioning, and the management of the construction team/personnel.
CMP V4.3	Provide details, with relevant specification references, related to the integrated approach that will be followed throughout the construction project to achieve successful Test on Completion. It must also be demonstrated that Tests on Completion is a process that commence soon after project start-up.
CMP V4.4	Provide details on how the Suppliers and Sub-Contractors will be integrated and managed as part of the overall construction, commissioning and delivery management approach.

CMP V5: Occupational Health, Safety and Security Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V5.1	What measures will be taken daily to ensure the safety of workers working within and alongside the pipeline trenches?
CMP V5.2	What measures will be taken on a daily basis to ensure the safety of workers working with jet grouting equipment and in close proximity to jet grouting operations.
CMP V5.3	What measures will be taken to ensure the safety of personnel working in proximity to ESKOM powerlines?
CMP V5.4	What measures will be taken to ensure the safety of personnel commuting to and from worksites?
CMP V5.5	What security measures will be implemented throughout the project duration to secure the site office, personnel, National Key Points, Contractors stores, and yard. Contractor’s plant and equipment, and the construction site.



CMP V6: Environmental Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V6.1	Elaborate on how the drift fence approach, for two (2) kilometres (km) at a time, for the rescue and relocation of fauna and flora that may be found during the construction of the pipeline will be implemented and integrated into the normal pipelaying activities. (Note: Search and rescue of fauna and flora species may only commence after acquiring the necessary permits from the National and Provincial Authorities).
CMP V6.2	Provide details on how the hydrocarbons and hazardous waste will be managed to effectively mitigate environmental impact.
CMP V6.3	Provide details on how erosion will be controlled / arrested downstream of stormwater release points.
CMP V6.4	Continuous monitoring of noise, dust, and water quality is the Contractor's responsibility. What provisions will the Contractor make in all noise, dust, and visual, sensitive areas to reduce dust fallout, visual, and noise impacts on sensitive receptors such as schools, game breeding and hunting areas.
CMP V6.5	Elaborate on the environmental themes that will be monitored by the contractor when constructing the pipeline crossing across the Matlabas River, specifically related to water quality and the aquatic themes.
CMP V6.6	Vibration from construction machinery and equipment may cause damage and/or disturbances at nearby structures, especially houses, buildings, ruins, farm dams, water troughs, bat cave etc. Elaborate on what baseline information will be used to identify such structures, and what steps will be taken to record the condition of such structures before and after activities that may cause vibration including the mitigation measures.
CMP V6.7	Provide details on the management and mitigation measures that will be implemented to address excess grout and concrete disposal with a focus on avoiding negative environmental and social impacts.

CMP V7: Social Construction Management Plan

Construction Related	
ITEM	DESCRIPTION
CMP V7.1	Elaborate on Land Access Arrangements to privately owned farms and Interactions with Landowners, before accessing the temporary and permanent servitudes for pre-construction and construction activities. What systems and measures will be put into place to establish and maintain good relationships with property owners, and occupiers adjacent to, including the project area people, needing to cross the pipeline construction servitude.
CMP V7.2	Provide details on how interaction with Landowners and occupiers regarding the management of upstream control of stormwater and downstream release of stormwater will be managed.
CMP V7.3	Elaborate on how complaints (instances in which a landowner or occupier is dissatisfied with any aspect of Contractor behaviour/activities) and claims (instances in which a landowner or occupier demands compensation for damages caused by the Contractor or as restitution for the cause of a complaint) will be handled.
CMP V7.4	Managing security concerns is critical for the success of this Project, especially within the Matlabas area. Considering the extent of construction related activities, including the number of employees, vehicles, equipment, material, and the like, determine and define appropriate security intervention measures.
CMP V7.5	<ul style="list-style-type: none"> • The purpose of stakeholder and community engagement is to give effect to the need for building good relations, transparency, and inclusion in the process of implementing the Project. Considering the duration of activities at the weir construction, as well as the extent and intensity of activities at this location, please indicate: <ul style="list-style-type: none"> • How you will liaise with the project stakeholders and affected communities prior to the commencement of site establishment, including upstream and downstream stakeholders. • Also provide notes on how this will be maintained for the duration of the Project. • What project structures / forums will be used for inclusive communication and information dissemination?



TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE,
RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

**Audited Annual Financial Statements for the past 5 years signed off by a
qualified financial auditor**



TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE,
RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

Projected revenue for the next two years

TENDER NO 054/2024/PMID/MCWAP2/RFB

**ABSTRACTION WORKS, PUMPING STATIONS, RESERVOIRS, PIPELINE,
RELATED MULTIDISCIPLINE WORKS AND ANCILLARY WORKS**

Applicant:

**Statement from Tenderer's Bank(s) of credit facilities currently in place;
and Letter from a registered RSA financial institution acceptable to TCTA
confirming they would provide a 10% of the accepted contract amount as
Performance Security – Demand Guarantee to the Tenderer**

PART T2.2.2: TECHNICAL SCHEDULES

T2.2.2 – Returnable Schedules: Technical Schedules

Preamble to T2.2.2 – Returnable Schedules: Requirements

W. Mechanical Works

- W.1 Preamble: Mechanical Works
- W.2 Mechanical Schedules
 - W2.1 Hydro-Mechanical Plant
 - W2.2 Valves
 - W2.3 Cranes, Hoists and Winches
 - W2.4 Pump-Sets – Low-Lift Pump Station
 - W2.5 Pump Sets – High Lift Pump Station
 - W2.6 HVAC – Low Lift Pump Station
 - W2.7 HVAC – High Lift Pump Station

X. Electrical Works

- X.1 Preamble: Electrical Works
- X.2 Electrical Schedules
 - X2.1 Low Voltage Schedules
 - X2.2 Medium Voltage Schedules
 - X2.3 Security Schedules

Y. Control and Instrumentation (C&I)

- Y.1 Preamble: Control & Instrumentation
- Y.2 C&I Schedules

Z. Cathodic Protection (CP)

- Z.1 Preamble: AC Mitigation& Cathodic Protection
- Z.2 CP Schedules
 - Z.2.1 Mixed Metal Oxide / Precious Metal Oxide Anodes - Tubular
 - Z.2.2 Mixed Metal Oxide / Precious Metal Oxide Anodes – Mesh (Diamond)
 - Z.2.3 Silicon Iron Centrifugally Cast Tubular Anodes
 - Z.2.4 Fully Automatic Temporary CP DV Controller
 - Z.2.5 Carbonaceous Backfill Material
 - Z.2.6 Remote Monitoring Units for the Transformer Rectifier Units
 - Z.2.7 Solid State DC Decoupling Device
 - Z.2.8 Data Loggers

PREAMBLE TO T2.2.2 – RETURNABLE SCHEDULES: REQUIREMENTS

1. INTRODUCTION

- 1.1. The Tenderer is required to submit with his Tender by way of the Schedules in Part T2.2.2, technical information and details relating to the mechanical, electrical and electronic Plant as listed therein.
- 1.2. The information provided in the Schedules in Part T2.2.2, apart from providing material information that will be used in the Contract, is material to the Tender evaluation and to the assessment of the final technical acceptability of the Tender and the competence of the Tenderer and his specialist suppliers and/or subcontractors.
- 1.3. Should the space available on any of the Schedules be inadequate, the Tenderer shall append such supplementary sheets as he deems necessary to comply with the Tender requirements together with any specific product data sheets in support of the information summarised in the Schedules. Each supplementary sheet shall display “Contract No. 054/2024/PMID/MCWAP2/RFB” and shall be properly cross-referenced and firmly appended to the relevant Schedule, or otherwise included, such that they will not inadvertently be detached from the Tender. A complete contents list of all supplementary sheets, including those that may be attached to the Schedule, shall be provided by the Tenderer. References given are for guidance only and not necessarily exclusive of other pertinent information in the Tender Documents. Each page of each Schedule, including any supplementary sheets, shall be signed by the Tenderer.
- 1.4. These Schedules are available in MS Word (Office) format with limited access. The electronic files are included on the CD/DVD issued with the tender documentation.

SCHEDULE W – MECHANICAL WORKS

W. MECHANICAL WORKS

W.1 PREAMBLE – MECHANICAL WORKS

W.1.1 INTRODUCTION

- a) Only Plant based on proven technology and of high reliability shall be considered for use.
- b) All Schedules shall be fully completed in block letters using a black pen or typing. Failure to complete all relevant sections may result in the Tender being rejected and/or disqualified.
- c) Preference shall be given to locally manufactured Plant and components. Should items not be locally manufactured, Tenderers shall clearly identify these in their Tender.
- d) Tenderers shall ensure that they are fully acquainted with the contents of the following:
 - i) Section 28 – “Mechanical General”
 - ii) Section 29 - “Hydro Mechanical Plant”
 - iii) Section 30 – “Pumps and Ancillary Plant”
 - iv) Section 31 – “Cranes, Hoists and Winches”
 - v) Section 35 – “Valves”
 - vi) Section 36 – “Flow meters”
 - vii) Section 37 – “Painting and Corrosion Protection”
- e) The Contractor shall indicate, at tender stage, all variations from the Specification.
- f) The Corrosion Protection Systems offered in terms of Section 37 shall be clearly identified by the Tenderers.
- g) The costs for quality control shall be included in the tendered rates.
- h) Tenderers shall ensure that the proposed Plant will fit into the spaces provided prior to submission of the Tender. Any alteration required for specific Plant shall be submitted with the Tender. If no information is received with the Tender, it will be assumed that the building, space or panel will accommodate the Plant offered.
- i) All Schedules concerning Plant incorporating proprietary brand products or units, shall be fully supplemented by the inclusion of applicable brochures, pamphlets, additional explanatory specifications, descriptions or notes in that order of availability and shall be submitted with the bid in a covering letter and bound separately.
- j) The Tenderer shall complete the Schedules giving details of suppliers of Plant.
- k) Where Tenderers wish to bring special characteristics of Plant offered to the attention of the Engineer, Tenderers shall supply descriptive literature and brochures to supplement information in the Schedules.
- l) Where the Specification calls for specific makes and types of Plant, the Tendered prices shall be based on such Plant.
- m) The Tenderer shall confirm that the materials specified are suitable for the water quality, both in terms of chemical analysis and silt content. If unable to provide this written assurance, the Tenderer shall confirm this and propose possible alternative materials and supply details in a letter accompanying his Tender.

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- n) In order to avoid expiry of the guarantee while Plant are still in storage prior to installation, the Employer will request the reinstatement of the guarantee at final commissioning of the Plant. Tenderers are to make allowance within the Tender sum for the cost of reinstating the guarantee as per original Tender. No additional payment for such reinstatement will be made.
- o) To promote reinstatement, the Tenderer shall, together with his offer, provide the requirements for storage of the Plant, prior to installation, in order for him to honour the implementation of the guarantee at a later stage.
- p) The Tenderer shall be deemed to have taken into account, inter alia, all of the operating requirements and physical conditions in preparing his Tender in addition to the operating and climatic conditions prevailing at the Site as set out in Section 1 - General. Evidence satisfactory to the Engineer shall be provided that the designs offered will meet the design and operating criteria given in the following sections/paragraphs over the design life of the project (45 years).
- q) The Tenderer must immediately bring any discrepancies or misunderstandings, which may cause any doubts, regarding the requirements of the tender documents to the attention of the Engineer. No claims due to any discrepancies or misunderstandings will be valid after the Tender closing date.
- r) One Schedule for each type of Plant is included in the Tender Document. A Schedule should be completed per supplier and where materials and characteristics differ (i.e. size, diameter and pressure rating). Should the space available on any of the Schedules be inadequate, the Tenderer shall append supplementary sheets. Each supplementary sheet shall display "Contract No. 054/2024/PMID/MCWAP2/RFB" and shall be properly cross-referenced and firmly appended to the relevant Schedule, or otherwise included, such that they will not inadvertently be detached from the Tender. A complete contents list of all supplementary sheets, including those that may be attached to the Schedule, shall be provided by the Tenderer. References given are for guidance only and not necessarily exclusive of other pertinent information in the Tender Documents. Each page of each Schedule, including any supplementary sheets, shall be signed by the Tenderer.

W.1.2 VALVES AND FLOW METERS

- a) The Tenderer shall give as a function of the downstream pressure the maximum acceptable discharge of water through the valves of the main circuits without risk of vibration and cavitation. He shall also give the head-loss characteristics of the main valves.
- b) For non-return valves the Tenderer shall submit with his submission the dynamic performance of the valves indicating the reverse velocity at specified decelerations as well as head loss, reliability and wear.
- c) The Tenderer shall provide with his Tender full particulars of the type and construction of the bearings on all valves.
- d) Details of the proposed position indicator/s on all valves shall be submitted with the tender document.
- e) The Tenderer shall submit with his Tender GA drawings of the assembled valve together with details of the seal arrangements.
- f) For each type of valve the corrosion protection and quality control technical sheet as indicated in Section 28 – Mechanical General needs to be completed in conjunction with the valve Schedule as provided in the following paragraphs.
- i. Catalogues for each valve and actuator type must be submitted with the Tender.
 - ii. The Tenderer shall include sufficient technical documentation to verify resistance to cavitation for each type of valves.

W.1.3 CRANES

- a) The Tenderer shall submit with his Tender a GA drawing of the DGEOT crane for the proposed Low and High Lift Pumping Stations as well as the portal crane proposed at the Diversion Works with the following minimum information:
- Wheel loads (min. and max.);
 - Driving and braking forces;
 - Inertial forces for crane travelling;
 - Skewing forces (factor 1.1 incl.);
 - Max. buffer forces;
 - Weights of major components (incl. total mass);
 - Max. lifting height; and
 - Overall dimensions of crane (wheelbase and span incl.)
- b) The Tenderer shall provide details in his Tender regarding the method of power transfer to the DGEOT and portal cranes. A minimum of four conductors with a separate earth conductor will be required.

W.1.4 PUMPS

- a) The Tenderer will be required to prove that the pumps offered will operate safely and free from cavitation by obtaining the characteristics through testing, Q (flowrate), H (pressure head), P(power absorbed) and NPSH relationships at recommended pump speeds for both Low- and High-Lift Pumping Stations..
- b) The Tenderer shall state the total manometric head (TMH) generated by each pumpset at required stated design / operating flowrates in accordance with the two pumping systems designated Low Lift Pumping Station and High Lift Pumping Station.
1. Low-Lift Pumping Station: three (3) number identical pump-sets, single duty and double duty operation; third pump-set as standby. All pump-sets equipped with Variable Speed Drives / Variable Frequency Drives, allowing variable flowrate from minimum allowable to maximum “run-out” under limiting control conditions.
 - i) Duty point group I (initial):
 - Duty point I_{min} ; Q= 0.287 m³/s ; H = 16.66 m;
 - Duty point I_{max} ; Q= 0.287 m³/s ; H = 27.67 m.
 - ii) Duty point group N (nominal):
 - Duty point N_{min} ; Q= 2.378 m³/s ; H = 24.57 m;
 - Duty point N_{max} ; Q= 2.378 m³/s ; H = 37.81 m.
 - iii) Duty point group D (design):
 - Duty point D_{min} ; Q= 3.27 m³/s ; H = 31.27 m;
 - Duty point D_{max} ; Q= 3.27 m³/s ; H = 46.83 m.
 - iv) Run-out Test point pump D (design):
 - Duty point D_{run-out} ; Q= 1.817 m³/s.

2. High-Lift Pumping station: Four (4) number identical pump-sets, single, double, and three-duty operation; fourth pump-set as standby. All pump-sets equipped with Variable Speed Drives / Variable Frequency Drives, allowing variable flowrate from minimum allowable to maximum design under limiting control condition
- i) Duty point group I (initial):
 - Duty point I_{min} ; Q= 0.287 m³/s ; H = 182 m;
 - Duty point I_{max} ; Q= 0.287 m³/s ; H = 190 m.
 - ii) Duty point group N (nominal):
 - Duty point N_{min} ; Q= 2.387 m³/s ; H = 223 m;
 - Duty point N_{max} ; Q= 2.387 m³/s ; H = 243 m.
 - iii) Duty point group D (design):
 - Duty point D_{min} ; Q= 2.97 m³/s ; H = 245 m;
 - Duty point D_{max} ; Q= 2.97 m³/s ; H = 272 m.
- c) The Tenderer shall provide the Specific Speed (NS) and Suction Specific Speed (S) values of impellers for pump selection.
- d) The Tenderer shall submit with his Tender 2D Drawings of the pump and motor layouts as unit with overall dimensions and mounting details, support base, pump/motor coupling, lifting lugs, instrumentation connections, mass and all installation tolerances and essential data.

W.1.5 GENERAL INFORMATION

Catalogues on all Plant in the Schedules shall be submitted with the Tender.

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W.2 MECHANICAL SCHEDULES**W.2.1 HYDRO-MECHANICAL PLANT**

For each Hydro-mechanical components the corrosion protection and quality control technical sheet as indicated in Section 28 - Mechanical General Quality Control needs to be completed in conjunction with the Schedules following:

W.2.1.1 Scour Gates (Radial)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Designer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Location of Workshop		State	
1.1.4	Size of Workshop		State	
1.1.5	Are welders Coded?	Yes/No	Yes	
1.1.6	Number of similar Plant installed in South Africa		State	
1.1.7	Name of hydraulic Subcontractor		State	
1.1.8	Size of gate	m	State	
1.1.9	Number of Gates	No.	State	
1.1.10	Mass of gate	kg	State	
1.1.11	Delivery time per gate	weeks	State	
1.1.12	Operating speed of gate	m/min	0.5	
1.2	DESIGN REQUIREMENTS			
1.2.1	Type of Opening/Close Monitoring Device		State	
1.2.2	Design Head	m	State	
1.2.3	Materials:			
1.2.3.1	– Gate body		3CR12	
1.2.3.2	– Gate (Slide)		SS 316L	
1.2.3.3	– Sealing Frames/guides/yoke		SS 316L	
1.2.3.4	– Fasteners		SS 316	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.3.5	– <i>Trunnion bearing material / type</i>		<i>State</i>	
1.2.4	Flush bottom seal type	Yes/No	Yes	
1.2.5	Is corrosion protection as per Section 29	Yes/No	Yes	
1.2.6	Deviation from specification, if any		<i>State</i>	
1.2.6.1	<i>Number of Amendments (0 if None)</i>		<i>State</i>	

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W.2.1.2 Sluice Gates (Diversion Works)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Manufacturer		State	
1.1.2	Location of Workshop		State	
1.1.3	Size of Workshop		State	
1.1.4	Are welders Coded?	Yes/No	Yes	
1.1.5	Surveying equipment available		State	
1.1.6	Number of similar equipment installed in South Africa		State	
1.1.7	Name of hydraulic Subcontractor		State	
1.1.8	Size of gate	m	State	
1.1.9	Number of Gates	No.	4	
1.1.10	Mass of gate	kg	State	
1.1.11	Delivery time per gate	weeks	State	
1.1.12	Operating speed of gate	m/min	State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Type of Opening/Close Monitoring Device		State	
1.2.2	Design Head	m	State	
1.2.3	Materials:			
1.2.3.1	– Gate (Slide)		SS 316L	
1.2.3.2	– Sealing Frames/guides/yoke		SS 316L	
1.2.3.3	– Tandem/spindles		SS 316L	
1.2.3.4	– Fasteners		SS 316	
1.2.3.5	– Gearboxes		CI Gr. SG42 or CS BS EN 10293	
1.2.4	Gate Frame self-contained embedded type?	Yes/No	Yes	
1.2.5	Flush bottom seal type?	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.6	Is corrosion protection as per Section 29	Yes/No	Yes	
1.2.7	Deviation from specification, if any		State	
1.2.7.1	– <i>Number of Amendments (0 if None)</i>		<i>State</i>	

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W.2.1.3 Sluice Gates (Twin-Lift, Self-Contained Type)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Manufacturer		State	
1.1.2	Location of Workshop		State	
1.1.3	Size of Workshop		State	
1.1.4	Are welders Coded?	Yes/No	Yes	
1.1.5	Surveying equipment available		State	
1.1.6	Number of similar equipment installed in South Africa		State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Rim pull at handwheel	N	100 – 150	
1.2.2	Type of electrical actuator		State	
1.2.3	Manufacturer of electrical actuator		State	
1.2.4	Type of Opening/Close Monitoring Device		State	
1.2.5	Design Head	m	State	
1.2.6	Materials:			
1.2.6.1	– Gate (Slide)		SS 316L	
1.2.6.2	– Sealing Frames/guides/yoke		SS 316L	
1.2.6.3	– Tandem/spindles		SS 316L	
1.2.6.4	– Fasteners		SS 316	
1.2.6.5	– Gearboxes		CI Gr. SG42 or CS BS EN 10293	
1.2.7	Gate Frame self-contained embedded type?	Yes/No	Yes	
1.2.8	Twin-lift	Yes/No	Yes	
1.2.9	Flush bottom seal type?	Yes/No	Yes	
1.2.10	Is corrosion protection as per Section 29	Yes/No	Yes	
1.2.11	Deviation from specification, if any		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
<i>1.2.11.1</i>	<i>Number of Amendments (0 if None)</i>		<i>State</i>	

W.2.1.4 Hydraulic System

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Designer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Size of hydraulic reservoir		State	
1.1.4	Type of oil used		State	
1.1.5	Type of hydraulic pump	Yes/No	Yes	
1.1.6	Manufacturer of hydraulic pump		State	
1.1.7	Operating pressure		State	
1.1.8	Manufacturer of hydraulic control valves		State	
1.1.9	Type / manufacturer of oil filtration and cleaning system			
1.1.10	Size of power pack			
1.2	DESIGN REQUIREMENTS			
1.2.1	Materials:			
1.2.1.1	– <i>Material of hydraulic reservoir</i>			
1.2.1.2	– <i>Material of hydraulic pipes</i>			
1.2.2	Is corrosion protection as per Section 29	Yes/No	Yes	
1.2.3	Deviation from specification, if any		State	
1.2.3.1	<i>Number of Amendments (0 if None)</i>		State	

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W.2.1.5 Screen Frames, Fine Screens and Grapple

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Designer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Location of Workshop		State	
1.1.4	Size of Workshop		State	
1.1.5	Are welders Coded?	Yes/No	Yes	
1.1.6	Surveying equipment available		State	
1.1.7	Number of similar equipment installed in South Africa		State	
1.1.8	Size of frame and screens	m	State	
1.1.9	Number of frames / screens / grapple	No.	State	
1.1.10	Mass of assembled screen	kg	State	
1.1.11	Delivery time per assembled screen	weeks	State	
1.1.12	Mass of grapple	No.	State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Materials:			
1.2.1.1	– Screen frame (type and grade)		316L	
1.2.1.2	– Screen slats (type and grade)		316L	
1.2.1.3	– Are slats commercially available (give full particulars)		State	
1.2.2	Dimensions of Screen Panels	m	State	
1.2.2.1	– Clear opening between slats	mm	25	
1.2.2.2	– Clear screen area		State	
1.2.2.3	– Slat size and profile (provide Drawing / sketch)	mm	16	
1.2.3	Is corrosion protection as per Section 29	Yes/No	Yes	
1.2.4	Deviation from specification, if any		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.4.1	<i>Number of Amendments (0 if None)</i>		<i>State</i>	

W.2.2 VALVES

W.2.2.1 Butterfly Valves (Actuated)

DN: **PN:**.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand and Model		State	
1.1.2	Manufacture’s name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent’s name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/manufacturer have his own manufacturing and service workshop with regards to the Plant offered?	Yes/No	Yes	
1.1.9	Does the Supplier/Manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.4	Flange drilling table		BS EN 1092-2	
1.2.5	Gross mass of completely assembled valve	kg	State	
1.2.6	Maximum flow velocity through valve	m/s	7	
1.2.7	Head loss through valve at maximum flow velocity	mWC	State	
1.2.8	Flange to flange dimension	mm	State	
1.2.9	Risilient Seal (Double eccentric)	Yes/No	Yes	
1.2.10	Are welders coded?	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.11	Materials of construction:			
1.2.11.1	– Valve body		(Section 35)	
1.2.11.2	– Valve blade (disc)		(Section 35)	
1.2.11.3	– Valve shaft		(Section 35)	
1.2.11.4	– Non-drive end cover plate		(Section 35)	
1.2.11.5	– Valve seat		(Section 35)	
1.2.11.6	– Valve seal		(Section 35)	
1.2.11.7	– Seal retaining ring		(Section 35)	
1.2.11.8	– Journal bearing (state type if applicable)		(Section 35)	
1.2.11.9	– Disc shaft pin / key		State	
1.2.11.10	– Shaft bearing seals		(Section 35)	
1.2.11.11	– Internal fasteners		(Section 35)	
1.2.11.12	– External fasteners		(Section 35)	
1.3	DRIVE SYSTEM			
1.3.1	Make and type of actuator		State	
1.3.2	Gross mass of complete unit	kg	State	
1.3.3	Hand wheel diameter	mm	State	
1.3.4	Force on hand wheel rim required for manual operation:			
1.3.4.1	– Seating/Unseating (up to incl DN600)	N	800	
1.3.4.2	– Seating/Unseating (above DN600)			
1.3.4.3	– Intermittent (up to incl DN600)			
1.3.4.4	– Intermittent (above DN600)	N	300	
1.3.5	Numbers of hand wheel turns to open valve manually	No.	State	
1.3.6	Gearbox:			
1.3.6.1	– Worm type gear (360 degree)	Yes/No	Yes	
1.3.6.2	– Gearbox ratio		State	
1.3.6.3	– Is gearbox protected against the ingress of moisture? State IP rating.	Yes/No	Yes, IP 67 (SANS 60529)	
1.3.6.4	– Mechanical stops on low input torque worm shaft?	Yes/No	Yes	
1.3.7	Time to fully open valve electrically	s	State	
1.3.8	Type of position indicator		See C 35.2.16 (Section 35)	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.9	Details of all safety features incorporated		State	
1.3.10	Power rating of electric actuator motor	kW	State	
1.3.11	Is electric actuator protected against the ingress of moisture? State IP rating.	Yes/No	Yes, IP 68 (SANS 1222)	
1.3.12	Automatic phase rotation correction	Yes/No	Yes	
1.3.13	Type of “torque trip” indication		(Section 35)	
1.4	CONTRACTUAL			
1.4.1	Is the Tenderer fully aware of the requirements of Volume 3 Specification 35: Supply of valves?	Yes/No	State	
1.4.2	Deviation from specification, if any		State	
1.4.2.1	<i>Number of Amendments (0 if None)</i>		State	

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W.2.2.2 Butterfly Valves (Hand operated)

DN: PN:.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture's name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent's name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		Sate	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/maker have his own manufacturing and service workshop with regards to the equipment offered?	Yes/No	Yes	
1.1.9	Does the Supplier/Manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.4	Flange drilling table		BS EN 1092-2	
1.2.5	Gross mass of completely assembled valve	kg	State	
1.2.6	Maximum flow velocity through valve	m/s	7	
1.2.7	Head loss through valve at maximum flow velocity	mWC	Sate	
1.2.8	Flange to flange dimension	mm	State	
1.2.9	Risilient Seal (Double eccentric)	Yes/No	Yes	
1.2.10	Are welders coded?	Yes/No	Yes	
1.2.11	Materials of construction:			
1.2.11.1	– Valve body		(Section 35)	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.11.2	– Valve blade (disc)		(Section 35)	
1.2.11.3	– Valve shaft		(Section 35)	
1.2.11.4	– Non-drive end cover plate		(Section 35)	
1.2.11.5	– Valve seat		(Section 35)	
1.2.11.6	– Valve seal		(Section 35)	
1.2.11.7	– Seal retaining ring		(Section 35)	
1.2.11.8	– Journal bearing (state type if applicable)		(Section 35)	
1.2.11.9	– Disc shaft pin / key		State	
1.2.11.10	– Shaft bearing seals		(Section 35)	
1.2.11.11	– Internal fasteners		(Section 35)	
1.2.11.12	– External fasteners		(Section 35)	
1.3	DRIVE SYSTEM			
1.3.1	Hand wheel diameter	mm	State	
1.3.2	Force on hand wheel rim required for manual operation:			
1.3.2.1	– Seating/Unseating (above DN600)	N	800	
1.3.2.2	– Intermittent (above DN600)	N	300	
1.3.3	Numbers of hand wheel turns to open valve manually	No.	State	
1.3.4	Gearbox:			
1.3.4.1	– Worm type gear (360 degree)	Yes/No	Yes	
1.3.4.2	– Gearbox ratio		State	
1.3.4.3	– Is gearbox protected against the ingress of moisture? State IP rating.	Yes/No	Yes, IP 67 (SANS 60529)	
1.3.4.4	– Mechanical stops on low input torque worm shaft?	Yes/No	Yes	
1.3.5	Type of position indicator		See C 35.2.16 (Section 35)	
1.3.6	Details of all safety features incorporated		State	
1.4	CONTRACTUAL			
1.4.1	Is the Tenderer fully aware of the requirements of Volume 3 Specification 35: Supply of valves?	Yes/No	State	
1.4.2	Deviation from Specification		State	
1.4.2.1	Number of Amendments (0 if None)		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED

W.2.2.3 Non-Reverse Flow Check Valve

DN: **PN:**.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture’s name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent’s name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/manufacturer have his own manufacturing and service workshop with regards to the Plant offered?	Yes/No	State	
1.1.9	Does the supplier / manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal (PN 40)	kPa	1.1 x WP _{max}	
1.2.4	Flange drilling table		BS EN 1092-2	
1.2.5	Gross mass of completely assembled valve	kg	State	
1.2.6	Maximum flow velocity through valve	m/s	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.7	Head loss through valve at maximum flow	mWC	State	
1.2.8	Is Dynamic Performance Curves (V_r vs dv/dt) for valve attached?	Yes/No	Yes	
1.2.9	Flange to flange dimension	mm	State	
1.2.10	Metal seated	Yes/No	Yes	
1.2.11	Materials of construction:			
1.2.11.1	– Valve Body		(Section 35)	
1.2.11.2	– Valve Disc		(Section 35)	
1.2.11.3	– Body seat ring		(Section 35)	
1.2.11.4	– Disc/body seal		(Section 35)	
1.2.11.5	– Valve shaft		(Section 35)	
1.2.11.6	– Shaft bearings / bushes		(Section 35)	
1.2.11.7	– External fasteners		(Section 35)	
1.2.11.8	– Internal fasteners		(Section 35)	
1.3	CONTRACTUAL			
1.3.1	Is the Tenderer fully aware of the requirements of Section 35: Supply of valves?	Yes/No	State	
1.3.2	Deviation from Specification		State	
1.3.2.1	– Number of Amendments (0 if None)		State	

W.2.2.4 Air Release And Vacuum Control Valves

DN: **PN:**.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture’s name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent’s name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/manufacturer have his own manufacturing and service workshop with regards to the Plant offered?	Yes/No	State	
1.1.9	Does the supplier / manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Type of valve (i.e. cylinder or ball float)		State	
1.2.2	Nominal bore (DN)	mm	State	
1.2.3	Design Pressure	kPa	1.5 x WP _{max}	
1.2.4	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.5	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.6	Flange drilling table		BS EN 1092-2	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.7	Gross mass of completely assembled valve	kg	State	
1.2.8	Total dimensional height of valve	mm	State	
1.2.9	Is a large intake and exhaust orifice equal to nominal inlet bore of valve?		Yes	
1.2.10	Small orifice size	mm ²	State	
1.2.11	Life expectancy (# open/close cycles)	Qty	State	
1.2.12	Minimum sealing pressure	m	5	
1.2.13	Maximum sealing pressure	m	1.5 x WP _{max}	
1.2.14	Bleeding Nipple (¼" s/s BSP / NPT connection)		Yes	
1.2.15	Materials of construction:			
1.2.15.1	– Valve Body		(Section 35)	
1.2.15.2	– Screen cover		(Section 35)	
1.2.15.3	– Screen		(Section 35)	
1.2.15.4	– Float		(Section 35)	
1.2.15.5	– Nozzle seal		(Section 35)	
1.2.15.6	– Anti-shock orifice		(Section 35)	
1.2.15.7	– External fasteners		(Section 35)	
1.2.15.8	– Internal fasteners		(Section 35)	
1.3	CONTRACTUAL			
1.3.1	Is the Tenderer fully aware of the requirements of Section 35: Supply of valves?	Yes/No	State	
1.3.2	Deviation from Specification	Yes	If Yes, Specify	
1.3.2.1	– Number of Amendments (0 if None)		State	

W.2.2.5 Wedge Gate Valves

DN: **PN:**.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture’s name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent’s name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/manufacturer have his own manufacturing and service workshop with regards to the Plant offered?	Yes/No	State	
1.1.9	Does the supplier / manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.4	Flange drilling table		BS EN 1092-2	
1.2.5	Gross mass of completely assembled valve	kg	State	
1.2.6	Maximum flow velocity through valve	m/s	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.7	Head loss through valve at maximum flow	mWC	State	
1.2.8	Flange to flange dimension	mm	State	
1.2.9	Are horizontal spindles offered?	Yes/No	State	
1.2.10	Are welders coded?	Yes/No	Yes	
1.2.11	Materials of construction:			
1.2.11.1	– Valve Body		(Section 35)	
1.2.11.2	– Valve gate (disc)		(Section 35)	
1.2.11.3	– Valve spindle		(Section 35)	
1.2.11.4	– Spindle nut and yoke		(Section 35)	
1.2.11.5	– Body seat		(Section 35)	
1.2.11.6	– Gate seat		(Section 35)	
1.2.11.7	– Gate nut		(Section 35)	
1.2.11.8	– Bonnet and stuffing box		(Section 35)	
1.2.11.9	– Seals		(Section 35)	
1.2.11.10	– Thrust bearings		(Section 35)	
1.2.11.11	– Gland		(Section 35)	
1.2.11.12	– Pedestal plate		(Section 35)	
1.2.11.13	– Hand wheel		(Section 35)	
1.2.11.14	– Packing		(Section 35)	
1.2.11.15	– Jacking screws		(Section 35)	
1.2.11.16	– Internal fasteners		(Section 35)	
1.2.11.17	– External fasteners		(Section 35)	
1.3	DRIVE SYSTEM			
1.3.1	Hand wheel diameter	mm	State	
1.3.2	Force on hand wheel rim required for manual operation:			
1.3.2.1	– Seating/Unseating (up to incl. DN600)	N	500	
1.3.2.2	– Intermittent (up to incl. DN600)	N	200	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.3	Number of hand wheel turns to open valve manually.	No.	State	
1.4	CONTRACTUAL			
1.4.1	Is the Tenderer fully aware of the requirements of Volume 3 Specification 35: Supply of valves?	Yes/No	State	
1.4.2	Deviation from Specification		State	
1.4.2.1	– <i>Number of Amendments (0 if None)</i>		State	

W.2.2.6 Resilient Seal Valves

DN: **PN:**.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture’s name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent’s name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer supplier/manufacturer have his own manufacturing and service workshop with regards to the equipment offered?	Yes/No	State	
1.1.9	Does the supplier / manufacturer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.4	Flange drilling table		BS EN 1092-2	
1.2.5	Gross mass of completely assembled valve	kg	State	
1.2.6	Maximum flow velocity through valve	m/s	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.7	Head loss through valve at maximum flow	mWC	State	
1.2.8	Flange to flange dimension	mm	State	
1.2.9	Are horizontal spindles offered?	Yes/No	State	
1.2.10	Are welders coded?	Yes/No	Yes	
1.2.11	Materials of construction:			
1.2.11.1	– Valve Body		(Section 35)	
1.2.11.2	– Valve gate (disc)		(Section 35)	
1.2.11.3	– Valve spindle		(Section 35)	
1.2.11.4	– Spindle nut and yoke		(Section 35)	
1.2.11.5	– Body seat		(Section 35)	
1.2.11.6	– Gate seat		(Section 35)	
1.2.11.7	– Gate nut		(Section 35)	
1.2.11.8	– Bonnet and stuffing box		(Section 35)	
1.2.11.9	– Seals		(Section 35)	
1.2.11.10	– Thrust bearings		(Section 35)	
1.2.11.11	– Gland		(Section 35)	
1.2.11.12	– Pedestal plate		(Section 35)	
1.2.11.13	– Hand wheel		(Section 35)	
1.2.11.14	– Packing		(Section 35)	
1.2.11.15	– Jacking screws		(Section 35)	
1.2.11.16	– Internal fasteners		(Section 35)	
1.2.11.17	– External fasteners		(Section 35)	
1.3	DRIVE SYSTEM			
1.3.1	Hand wheel diameter	mm	State	
1.3.2	Force on hand wheel rim / hand pump required for manual operation:			
1.3.2.1	– Seating/Unseating (up to incl. DN600)	N	500	
1.3.2.2	– Intermittent (up to incl. DN600)	N	200	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.3	Number of hand wheel turns to open valve manually.	No.	State	
1.4	CONTRACTUAL			
1.4.1	Is the Tenderer fully aware of the requirements of Volume 3 Specification 35: Supply of valves?	Yes/No	State	
1.4.2	Deviation from Specification		State	
1.4.2.1	– <i>Number of Amendments (0 if None)</i>		State	

W.2.2.7 Spherical / Ball Valves

DN: PN:.....

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Brand or Model		State	
1.1.2	Manufacture's name		State	
1.1.3	Country of manufacture		State	
1.1.4	Agent's name		State	
1.1.5	Is valve manufactured under licence?	Yes/No	State	
1.1.6	Name of firm responsible for licence		State	
1.1.7	Is the Tenderer a bona fide valve dealer?	Yes/No	State	
1.1.8	Does the Tenderer subcontractor have his own manufacturing and service workshop with regards to the equipment offered?	Yes/No	State	
1.1.9	Does the Tenderer offer local service and spare parts network?	Yes/No	Yes	
1.1.10	Number of similar valves manufactured and installed in South Africa		State	
1.2	VALVE			
1.2.1	Design Pressure	kPa	1.5 x WP _{max}	
1.2.2	Test Pressure: Valve body	kPa	1.5 x WP _{max}	
1.2.3	Test Pressure: Seal	kPa	1.1 x WP _{max}	
1.2.4	Does ball plug have main seals on both sides?	Yes/No	Yes	
1.2.5	Flange drilling table		BS EN 1092-2	
1.2.6	Gross mass of completely assembled valve	kg	State	
1.2.7	Maximum flow velocity through valve	m/s	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.8	Head loss through valve at maximum flow	mWC	State	
1.2.9	Flange to flange dimension	mm	State	
1.2.10	Are welders coded?	Yes/No	Yes	
1.2.11	Materials of construction:			
1.2.11.1	– <i>Body Inlet Half</i>		(Section 35)	
1.2.11.2	– <i>Body Outlet Half</i>		(Section 35)	
1.2.11.3	– <i>Ball plug</i>		(Section 35)	
1.2.11.4	– <i>Valve stem</i>		(Section 35)	
1.2.11.5	– <i>Valve seat</i>		(Section 35)	
1.2.11.6	– <i>Thrust washer</i>		(Section 35)	
1.2.11.7	– <i>Body joint gasket</i>		(Section 35)	
1.2.11.8	– <i>Stem packing</i>		(Section 35)	
1.2.11.9	– <i>Gland follower</i>		(Section 35)	
1.2.11.10	– <i>Anti-static device</i>		(Section 35)	
1.2.11.11	– <i>Internal fasteners</i>		(Section 35)	
1.2.11.12	– <i>External fasteners</i>		(Section 35)	
1.3	CONTRACTUAL			
1.3.1	Is the Tenderer fully aware of the requirements of Volume 3 Specification 35: Supply of valves?	Yes/No	State	
1.3.2	Deviation from Specification		State	
1.3.2.1	– <i>Number of Amendments (0 if None)</i>		State	

W.2.3 CRANES, HOISTS AND WINCHES

For each type of crane and hoist the corrosion protection and quality control technical sheet as indicated in Section 28 Mechanical & Electrical Quality control needs to be completed in conjunction with the Schedules following:

W.2.3.1 10 Ton Portal Crane (Diversion Works)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Tenderer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Country of origin		State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Maximum safe working load	kN	State	
1.2.2	Maximum hook travelling paths:			
1.2.2.1	– From RL 893.51 (boulder trap canal level) for hoist (10-ton)	m	State	
1.2.3	Is hook in accordance with DIN 15401, Part 2?	Yes/No	DIN 15401-2	
1.2.4	Are rails in accordance with DIN536, Part1?	Yes/No	DIN536-1 or equivalent	
1.2.5	Load Cell (technical literature to be appended):			
1.2.5.1	– Type		State	
1.2.5.2	– Maximum capacity	kN	State	
1.2.6	Travel:			
1.2.6.1	– Long travel	m	10.6	
1.2.6.2	– Cross travel	m	17.65	
1.2.7	Permissible runway rail tolerance	mm	State	
1.2.8	Overall height of crane	mm	State	
1.2.9	Wheel loads (min. and max.)	kg	State	
1.2.10	Driving and braking forces	kN	State	
1.2.11	Inertial forces crane travelling (min. and max.)	kN	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.12	Skewing forces (factor 1.1 incl.) min. and max.	kN	State	
1.2.13	Buffer forces (max.)	kN	State	
1.2.14	Operating speeds:			
1.2.14.1	– <i>Fast speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>6 – 10</i>	
1.2.14.2	– <i>Creep speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>1.2 – 2</i>	
1.2.14.3	– <i>Long travel speed (fast)</i>	<i>m/min</i>	<i>35 – 40</i>	
1.2.14.4	– <i>Cross travel speed (fast)</i>	<i>m/min</i>	<i>18 – 25</i>	
1.2.14.5	– <i>Long and Cross travel (creep)</i>	<i>m/min</i>	<i>5</i>	
1.2.15	Particulars of Motors:	LONG T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.15.1	– <i>Type</i>		<i>Fan cooled squirrel cage</i>	
1.2.15.2	– <i>Protection</i>		State	
1.2.15.3	– <i>kW and speed at full load</i>		State	
1.2.15.4	– <i>Rating</i>		State	
1.2.16	Details of controls		State	
1.2.17	Particulars of safety devices and brakes	LONG.T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.18	Crane power supply:			
1.2.18.1	– <i>Operating voltage</i>	<i>V</i>	<i>400</i>	
1.2.18.2	– <i>Control voltage</i>	<i>V</i>	<i>230</i>	
1.2.18.3	– <i>Frequency</i>	<i>Hz</i>	<i>50</i>	
1.2.18.4	– <i>Power transfer system</i>		<i>4 conductors plus earth conductor</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.19	Wheel carriages:			
1.2.19.1	– Wheelbase	mm	State	
1.2.19.2	– Diameter, span and dimension of wheels	mm	State	
1.2.19.3	– Maximum load to each travelling wheel	N	State	
1.2.20	Particulars of wire rope		(Section 31)	
1.2.21	Weights:			
1.2.21.1	– Crane (complete)	kg	State	
1.2.21.2	– Trolley (main and aux. hoists incl.)	kg	State	
1.2.21.3	– Crane girders	kg	State	
1.2.21.4	– End trucks	kg	State	
1.2.21.5	– Electrical equipment	kg	State	
1.2.22	Deviation from Specification?	Yes/No	State	
1.2.22.1	– Number of Amendments (0 if None)		State	

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W.2.3.2 10/2 Ton DGEOT Crane (Low Lift Pump Station)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Tenderer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Country of origin		State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Maximum safe working load	kN	State	
1.2.2	Maximum hook travelling paths:			
1.2.2.1	– From RL 895.0 (pump well level) for main hoist (10-ton)	m	20.15	
1.2.2.2	– From RL 894.66 (sump pit level) for auxiliary hoist (2-ton)	m	20.49	
1.2.3	Is hook in accordance with DIN 15401, Part 2?	Yes/No	DIN 15401-2	
1.2.4	Are rails in accordance with DIN536, Part1?	Yes/No	DIN536-1 or equivalent	
1.2.5	Load Cell (technical literature to be appended):			
1.2.5.1	– Type		State	
1.2.5.2	– Maximum capacity	kN	State	
1.2.6	Travel:			
1.2.6.1	– Long travel	m	38	
1.2.6.2	– Cross travel	m	15.0	
1.2.7	Permissible runway rail tolerance	mm	State	
1.2.8	Overall height of crane	mm	State	
1.2.9	Wheel loads (min. and max.)	kg	State	
1.2.10	Driving and braking forces	kN	State	
1.2.11	Inertial forces crane travelling (min. and max.)	kN	State	
1.2.12	Skewing forces (factor 1.1 incl.) min. and max.	kN	State	
1.2.13	Buffer forces (max.)	kN	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.14	Operating speeds:			
1.2.14.1	– <i>Fast speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>6 – 10</i>	
1.2.14.2	– <i>Creep speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>1.2 – 2</i>	
1.2.14.3	– <i>Long travel speed (fast)</i>	<i>m/min</i>	<i>35 – 40</i>	
1.2.14.4	– <i>Cross travel speed (fast)</i>	<i>m/min</i>	<i>18 – 25</i>	
1.2.14.5	– <i>Long and Cross travel (creep)</i>	<i>m/min</i>	<i>5</i>	
1.2.15	Particulars of Motors:	LONG T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.15.1	– <i>Type</i>		<i>Fan cooled squirrel cage</i>	
1.2.15.2	– <i>Protection</i>		<i>State</i>	
1.2.15.3	– <i>kW and speed at full load</i>		<i>State</i>	
1.2.15.4	– <i>Rating</i>		<i>State</i>	
1.2.16	Details of controls		State	
1.2.17	Particulars of safety devices and brakes	LONG.T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.18	Crane power supply:			
1.2.18.1	– <i>Operating voltage</i>	<i>V</i>	<i>400</i>	
1.2.18.2	– <i>Control voltage</i>	<i>V</i>	<i>230</i>	
1.2.18.3	– <i>Frequency</i>	<i>Hz</i>	<i>50</i>	
1.2.18.4	– <i>Power transfer system</i>		<i>4 conductors plus earth conductor</i>	
1.2.19	End Trucks:			
1.2.19.1	– <i>Wheelbase</i>	<i>mm</i>	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.19.2	– Diameter, span and dimension of wheels	mm	State	
1.2.19.3	– Maximum load to each travelling wheel	N	State	
1.2.20	Particulars of wire rope		(Section 31)	
1.2.21	Weights:			
1.2.21.1	– Crane (complete)	kg	State	
1.2.21.2	– Trolley (main and aux. hoists incl.)	kg	State	
1.2.21.3	– Crane girders	kg	State	
1.2.21.4	– End trucks	kg	State	
1.2.21.5	– Electrical equipment	kg	State	
1.2.22	Deviation from Specification?	Yes/No	State	
1.2.22.1	– Number of Amendments (0 if None)		State	

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W.2.3.3 15/2 Ton Dgeot Crane (High-Lift Pump Station)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Name of Tenderer		State	
1.1.2	Name of Manufacturer		State	
1.1.3	Country of origin		State	
1.2	DESIGN REQUIREMENTS			
1.2.1	Maximum safe working load	kN	State	
1.2.2	Maximum hook travelling paths:			
1.2.2.1	– From RL 909.1 (pump well level) for main hoist (10-ton)	m	14.5	
1.2.2.2	– From RL 908.42 (sump pit level) for auxiliary hoist (2-ton)	m	16.7	
1.2.3	Is hook in accordance with DIN 15401, Part 2?	Yes/No	DIN 15401-2	
1.2.4	Are rails in accordance with DIN536, Part1?	Yes/No	DIN536-1 or equivalent	
1.2.5	Load Cell (technical literature to be appended):			
1.2.5.1	– Type		State	
1.2.5.2	– Maximum capacity	kN	State	
1.2.6	Travel:			
1.2.6.1	– Long travel	m	86.5	
1.2.6.2	– Cross travel	m	17.5	
1.2.7	Permissible runway rail tolerance	mm	State	
1.2.8	Overall height of crane	mm	State	
1.2.9	Wheel loads (min. and max.)	kg	State	
1.2.10	Driving and braking forces	kN	State	
1.2.11	Inertial forces crane travelling (min. and max.)	kN	State	
1.2.12	Skewing forces (factor 1.1 incl.) min. and max.	kN	State	
1.2.13	Buffer forces (max.)	kN	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.14	Operating speeds:			
1.2.14.1	– <i>Fast speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>6 – 10</i>	
1.2.14.2	– <i>Creep speed for hoisting and lowering (max. load)</i>	<i>m/min</i>	<i>1.2 – 2</i>	
1.2.14.3	– <i>Long travel speed (fast)</i>	<i>m/min</i>	<i>35 – 40</i>	
1.2.14.4	– <i>Cross travel speed (fast)</i>	<i>m/min</i>	<i>18 – 25</i>	
1.2.14.5	– <i>Long and Cross travel (creep)</i>	<i>m/min</i>	<i>5</i>	
1.2.15	Particulars of Motors:	LONG T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.15.1	– <i>Type</i>		<i>Fan cooled squirrel cage</i>	
1.2.15.2	– <i>Protection</i>		<i>State</i>	
1.2.15.3	– <i>kW and speed at full load</i>		<i>State</i>	
1.2.15.4	– <i>Rating</i>		<i>State</i>	
1.2.16	Details of controls		State	
1.2.17	Particulars of safety devices and brakes	LONG.T:	State	
		CROSS T:	State	
		HOIST:	State	
1.2.18	Crane power supply:			
1.2.18.1	– <i>Operating voltage</i>	<i>V</i>	<i>400</i>	
1.2.18.2	– <i>Control voltage</i>	<i>V</i>	<i>230</i>	
1.2.18.3	– <i>Frequency</i>	<i>Hz</i>	<i>50</i>	
1.2.18.4	– <i>Power transfer system</i>		<i>4 conductors plus earth conductor</i>	
1.2.19	End Trucks:			
1.2.19.1	– <i>Wheelbase</i>	<i>mm</i>	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.19.2	– Diameter, span and dimension of wheels	mm	State	
1.2.19.3	– Maximum load to each travelling wheel	N	State	
1.2.20	Particulars of wire rope		(Section 31)	
1.2.21	Weights:			
1.2.21.1	– Crane (complete)	kg	State	
1.2.21.2	– Trolley (main and aux. hoists incl.)	kg	State	
1.2.21.3	– Crane girders	kg	State	
1.2.21.4	– End trucks	kg	State	
1.2.21.5	– Electrical equipment	kg	State	
1.2.22	Deviation from Specification?	Yes/No	State	
1.2.22.1	– Number of Amendments (0 if None)		State	

W.2.4 PUMP-SETS – LOW LIFT PUMPING STATION**W.2.4.1 Low-Lift Pumps**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Model		State	
1.1.3	Country of origin		State	
1.1.4	Type of pump		Axial Split Volute Casing Centrifugal	
1.1.5	No. of stages		State	
1.1.6	Operating speed	rpm	1500 (max.)	
1.1.7	Critical speed of rotating element (dry)	rpm	1.15 max. running speed	
1.1.8	Maximum safe speed (reverse rotation)	rpm	State	
1.1.9	Pump specific speed	SI	State	
1.1.10	Diameter of pump discharge	mm	State	
1.1.11	Discharge flange drilling pattern, pressure rating (BS 1092-2: 1997)		PN16, FF	
1.1.12	Diameter of pump suction	mm	State	
1.1.13	Suction flange drilling pattern, pressure rating (BS 1092-2: 1997)		PN10, FF	
1.1.14	Maximum diameter solids that can be pumped	mm	State	
1.1.15	Mass of complete pump assembled	kg	State	
1.1.16	Mass of upper half of casing	kg	State	
1.1.17	Mass of rotating element complete	kg	State	
1.1.18	Maximum head before recirculation	m	State	
1.1.19	Inertia of rotating element with water (incl. coupling)	kg.m ²	State	
1.1.20	Load speed-torque characteristics (i.e. square torque law, constant torque, etc.)		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.21	RL for pump centreline	m.a.s.l	898.00	
1.1.22	Total end float for pump rotating element	mm	State	
1.2	CHARACTERISTICS AT BEST EFFICIENCY POINT	Cut impeller		
1.2.1	Total manometric head	m	State	
1.2.2	NPSH required over full range	m	(Section 30)	
1.2.3	Discharge rate per pumpset	m ³ /s	State	
1.2.4	Motor power input	kW	State	
1.2.5	Motor speed	rpm	State	
1.2.6	Does the pump have a non-overloading characteristic?	Yes/No	State	
1.2.7	Pump efficiency	%	89%	
1.3	GUARANTEED CHARACTERISTICS AT “DUTY POINT”			
1.3.1	Design static head adopted	m	27.5	
1.3.2	Total station plant losses	m	19.3	
1.3.3	Total manometric head	m	46.8	
1.3.4	NPSH required at zero % headloss	m	(Section 30)	
1.3.5	0% and 3% drop in efficiency NPSH at most severe duty point	m	(Section 30)	
1.3.6	Required minimum discharge rate per pumpset	m ³ /s	1.635	
1.3.7	Motor power input: One pump (including VSD as applicable)	kW	State	
1.3.8	Pump efficiency	%	State	
1.3.9	Overall efficiency of pump and motorset (including VSD as applicable)	%	State	
1.4	TEST AT WORK			
1.4.1	State clearly the extent to which the combined pumpset including motor (and VSD) will be tested at the manufacturer’s works (or SABS)		Q-H-P-Eff- NPSH Min Q; Nom Q, Des Q	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5	RANGE OVER WHICH PUMP IS CAPABLE OF OPERATING SATISFACTORILY			
1.5.1	From	m ³ /s	State	
1.5.2	To	m ³ /s	State	
1.5.3	Shut-off head	m	State	
1.6	PUMP CASING			
1.6.1	Material		SGI Gr. GGG / EN-GJS-400	
1.6.2	Is casing spit axially or radially?		Axially	
1.6.3	Diffuser rings material (where applicable)		(Section 30)	
1.6.4	Suction/delivery branch fixed to lower part of casing?	Yes/No	Yes	
1.6.5	Dismantling of casing requires disturbing of branch connections?	Yes/No	No	
1.6.6	Casing test pressure	kPa	1.5 x WP _{max}	
1.6.7	Is internal corrosion protection (lining) in accordance with Section 30	Yes/No	Yes	
1.7	CASING WEAR RINGS			
1.7.1	Material		State	
1.7.2	Number		State	
1.8	SHAFT			
1.8.1	Material		SS	
1.8.2	Length	mm	State	
1.8.3	Diameter (max and min)	mm	State	
1.8.4	Diameter at coupling	mm	State	
1.8.5	Diameter at gland seal	mm	State	
1.8.6	First critical speed	rpm	State	
1.8.7	Proposed method of securing rotating elements and shaft sleeve to shaft		State	
1.9	SHAFT SLEEVE			
1.9.1	Material		Bronze	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9.2	Proposed coating on wear surface		State	
1.10	GLAND (where applicable)			
1.10.1	Gland packing material		State	
1.10.2	Size	mm	State	
1.11	MECHANICAL SEAL (where applicable)			
1.11.1	Manufacturer's name		State	
1.11.2	Material:			
1.11.2.1	– Sleeve, outer barrel and set screws		SS 316L	
1.11.2.2	– Springs		SS 316L	
1.11.2.3	– O-rings		State	
1.11.2.4	– Rotating face		(Section 30)	
1.11.2.5	– Stationary face		(Section 30)	
1.12	IMPELLER			
1.12.1	Type		(Section 30)	
1.12.2	Material		SS	
1.12.3	Protective coating on neck wear surfaces		State	
1.12.4	Wear rings?	Yes/No	State	
1.12.5	Protective coating on wear surfaces		State	
1.12.6	Diameter (at duty point)	mm	State	
1.12.7	Diameter (full size)	mm	State	
1.12.8	Impeller eye diameter	mm	State	
1.12.9	No of stages	No	State	
1.12.10	No of vanes	No	State	
1.12.11	Diffusers number of passages	No	State	
1.13	BEARINGS			
1.13.1	Bearing manufacturer		State	
1.13.2	Distance between NDE and DE bearing centres	mm	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.13.3	Total clearance for journal bearings	µm	State	
1.13.4	NDE Bearings:			
1.13.4.1	– Type of bearings		State	
1.13.4.2	– Are bearings bi-directional?	Yes/No	Yes	
1.13.4.3	– Axial length	mm	State	
1.13.4.4	– Diameter	mm	State	
1.13.4.5	– Max. normal working load	N	State	
1.13.4.6	– Type of thrust-bearing		State	
1.13.4.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	
1.13.4.8	– Bearing thermostat setting operation/alarm/ setting		State	
1.13.4.9	– Type and method of lubrication		Oil	
1.13.4.10	– Cooling method		State	
1.13.4.11	– External oil pump required?	Yes/No	State	
1.13.4.12	– External oil cooler required?	Yes/No	State	
1.13.4.13	– Max. permissible bearing temperature	°C	State	
1.13.4.14	– Max. ambient operating temperature	°C	State	
1.13.4.15	– Bearing temperature monitoring method		RTD's	
1.13.5	DE Bearings:			
1.13.5.1	– Type of bearings		State	
1.13.5.2	– Are bearings bi-directional?	Yes/No	Yes	
1.13.5.3	– Axial length	mm	State	
1.13.5.4	– Diameter	mm	State	
1.13.5.5	– Max. normal working load	N	State	
1.13.5.6	– Type of thrust-bearing		State	
1.13.5.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	
1.13.5.8	– Bearing thermostat setting operation/alarm/setting		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.13.5.9	– Are bearings bi-directional?	Yes/No	Yes	
1.13.5.10	– Type and method of lubrication		State	
1.13.5.11	– Cooling method		State	
1.13.5.12	– Max. permissible bearing temperature	°C	State	
1.13.5.13	– Max. ambient operating temperature	°C	State	
1.13.5.14	– Bearing temperature monitoring method		RTD's	
1.14	BREAKAWAY TORQUE	Nm	State	
1.15	IS ROTATING ELEMENT, INCLUDING COUPLING, DYNAMICALLY AND STATISTICALLY BALANCED?	Yes/No	Yes	
1.16	COUPLING			
1.16.1	Manufacturer's name		State	
1.16.2	Country of origin		State	
1.16.3	Type			
1.16.4	Size	mm	State	
1.16.5	Rating	kW	State	
1.17	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.17.1	Number of Amendments (0 if None)		State	
1.17.2				
1.17.3				
1.17.4				
1.17.5				

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W.2.4.2 Low Lift Motors

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Country of Origin		State	
1.1.3	Type		Induction	
1.1.4	Where to be tested		State	
1.1.5	Rotation: uni or bi-directional		State	
1.2	PERFORMANCE DETAILS			
1.2.1	Maximum continuous full load conditions:			
1.2.1.1	– Power rating at Site	kW	(Section 39)	
1.2.1.2	– Speed (fixed)	rpm	1500 (max.)	
1.2.1.3	– Input current to stator	A	State	
1.2.1.4	– Designed efficiency at 100% load	%	State	
1.2.1.5	– Designed efficiency at 75% load	%	State	
1.2.1.6	– Designed efficiency at 50% load	%	State	
1.2.1.7	– Minimum efficiency	%	State	
1.2.1.8	– Power factor at duty point	cos θ	State	
1.2.1.9	– Power factor at ½ load	cos θ	State	
1.2.1.10	– Power factor at full load	cos θ	State	
1.2.1.11	– Power factor at locked rotor	cos θ	State	
1.2.1.12	– Operating voltage	kV	State	
1.2.1.13	– Rotor current	A	State	
1.2.1.14	– Open circuit rotor voltage	V	State	
1.2.1.15	– Magnetising kVAr	kVAr	State	
1.2.2	Rated duty condition:			
1.2.2.1	– Power at Site	kW	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.2	– Voltage	kV	State	
1.2.2.3	– Input current to stator	A	State	
1.2.2.4	– Full load speed	rpm	State	
1.2.2.5	– Critical resonant speed	rpm	State	
1.2.2.6	– Designed efficiency	%	State	
1.2.2.7	– Torque	Nm	State	
1.2.3	Starting conditions:			
1.2.3.1	– Locked rotor current	A	State	
1.2.3.2	– DOL starting current	A	State	
1.2.3.3	– Star/Delta starting current (Max. RMS)	A	State	
1.2.3.4	– Breakaway torque	Nm	State	
1.2.3.5	– Starting time for DOL starting with connected load	sec	State	
1.2.3.6	– Starting time for Star/Delta starting with connected load	sec	State	
1.2.3.7	– Pull-out torque	Nm	State	
1.2.3.8	– Maximum number of starts permissible in one hour when testing the motor connected to its specified load		State	
1.2.3.9	– Number of consecutive starts of the motor at its specified load		State	
1.2.3.10	– Pump inertia starting against closed valve but full of water	kg.m ²	State	
1.2.3.11	– Noise level (Pump/motor set)	dBA	State	
1.3	PHYSICAL DETAIL			
1.3.1	Complete mass	kg	State	
1.3.2	Mass of rotor element	kg	State	
1.3.3	Dimensions:			
1.3.3.1	– Overall: Length	mm	State	
1.3.3.2	– Overall: Width	mm	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.3.3	– Overall: Height	mm	State	
1.3.4	Terminal box protection	IP	State	
1.3.5	Motor protection	IP	State	
1.3.6	Class of insulation		State	
1.3.7	Method of cooling the motor		State	
1.3.8	Form of windings		State	
1.3.9	Temperature detectors in windings:			
1.3.9.1	– Type		State	
1.3.9.2	– Number		State	
1.3.9.3	– Position in winding		State	
1.3.10	Temperature detectors in bearings:			
1.3.10.1	– Type		State	
1.3.10.2	– Number		State	
1.3.11	Anti-condensation heaters:			
1.3.11.1	– Total wattage	W	State	
1.3.11.2	– Voltage	V	State	
1.4	SHAFT			
1.4.1	Material		State	
1.4.2	Length	mm	State	
1.4.3	Diameter (max and min)	mm	State	
1.4.4	Height of shaft centre above base	mm	State	
1.4.5	Weight	kg	State	
1.4.6	Inertia of rotor	kg.m ²	State	
1.5	BEARINGS			
1.5.1	Bearing manufacturer		State	
1.5.2	Distance between NDE and DE bearing centres	mm	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.3	Total clearance for journal bearings	µm	State	
1.5.4	NDE Bearings:			
1.5.4.1	– Type of bearings		State	
1.5.4.2	– Are bearings bi-directional?	Yes/No	Yes	
1.5.4.3	– Axial length	mm	State	
1.5.4.4	– Diameter	mm	State	
1.5.4.5	– Max. normal working load	N	State	
1.5.4.6	– Bearing thermostat setting operation/alarm/setting		State	
1.5.4.7	– Type and method of lubrication		State	
1.5.4.8	– Cooling method		State	
1.5.4.9	– External oil pump required	Yes/No	State	
1.5.4.10	– External oil cooler required?	Yes/No	State	
1.5.4.11	– Max. permissible bearing temperature	°C	State	
1.5.4.12	– Max. ambient operating temperature	°C	State	
1.5.4.13	– Bearing temperature monitoring method		RTD's	
1.5.5	DE Bearings:			
1.5.5.1	– Type of bearings		State	
1.5.5.2	– Are bearings bi-directional?	Yes/No	Yes	
1.5.5.3	– Axial length	mm	State	
1.5.5.4	– Diameter	mm	State	
1.5.5.5	– Max. normal working load	N	State	
1.5.5.6	– Type of thrust-bearing		State	
1.5.5.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	
1.5.5.8	– Bearing thermostat setting operation/alarm/setting		State	
1.5.5.9	– Type and method of lubrication		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.5.10	– <i>Cooling method</i>		<i>State</i>	
1.5.5.11	– <i>Max. permissible bearing temperature</i>	°C	<i>State</i>	
1.5.5.12	– <i>Max. ambient operating temperature</i>	°C	<i>State</i>	
1.5.5.13	– <i>Bearing temperature monitoring method</i>		<i>RTD's</i>	
1.6	DEVIATION FROM SPECIFICATION?	Yes/No	<i>State</i>	
1.6.1	Number of Amendments (0 if None)		<i>State</i>	
1.6.2				
1.6.3				
1.6.4				
1.6.5				

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W.2.4.3 Sump Pump (Drainage)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Section 28	
1.1.4	Rotating speed	rpm	State	
1.1.5	Delivery against 17 m head	ℓ/s	2.7	
1.1.6	Efficiency at 17 m head	%	State	
1.1.7	Max power required by the pump	kW	State	
1.1.8	Power required by the pump at duty point	kW	State	
1.1.9	Motor rated kW	kW	State	
1.1.10	Delivery branch diameter	mm	State	
1.1.11	Automatic-coupling system	Yes/No	Yes	
1.1.12	Motor equipped with cooling jacket?	Yes/No	No	
1.1.13	Does the corrosion protection of the pump, base and pipe work comply fully with the corrosion specification	Yes/No	State	
1.1.14	Materials:			
1.1.14.1	– <i>Impeller</i>		State	
1.1.14.2	– <i>Shaft</i>		State	
1.1.14.3	– <i>Casing</i>		State	
1.2	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.2.1	Number of Amendments (0 if None)		State	
1.2.2				
1.2.3				
1.2.4				
1.2.5				

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W.2.4.4 Sump Pump (Dewatering)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Clause 28	
1.1.4	Rotating speed	rpm	State	
1.1.5	Delivery against 17 m head	ℓ/s	45	
1.1.6	Efficiency at 17 m head	%	State	
1.1.7	Max power required by the pump	kW	State	
1.1.8	Power required by the pump at duty point	kW	State	
1.1.9	Motor rated kW	kW	State	
1.1.10	Delivery branch diameter	mm	State	
1.1.11	Automatic-coupling system	Yes/No	Yes	
1.1.12	Motor equipped with cooling jacket?	Yes/No	No	
1.1.13	Does the corrosion protection of the pump, base and pipe work comply fully with the corrosion specification	Yes/No	State	
1.1.14	Materials:			
1.1.14.1	– Impeller		Grey Cast Iron	
1.1.14.2	– Shaft		SS 316	
1.1.14.3	– Casing		JL 1040	
1.2	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.2.1	Number of Amendments (0 if None)		State	
1.2.2				
1.2.3				
1.2.4				
1.2.5				

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W.2.4.5 Oil Water Separator (OWS)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Hydro-cyclone	
1.2	OPERATING CONDITIONS			
1.2.1	Feed Flow	ℓ/h	3500 (min.)	
1.2.2	Oil Recovery Rate	m ³ /h	State (max.)	
1.2.3	Treated water discharge pressure	kPa	State	
1.2.4	Oil discharge pressure	kPa	State	
1.3	DESIGN DETAILS			
1.3.1	Is floating skimmer of self- adjusting type?	Yes/No	Yes	
1.3.2	Is feed strainer of quick opening type?	Yes/No	Yes	
1.3.3	IP Rating of level controls		State	
1.3.4	IP Rating of Control Box		IP56	
1.3.5	OWS Footprint (LxWxH)		State	
1.3.6	Mass:			
1.3.6.1	– <i>Dry weight</i>	<i>kg</i>	<i>State</i>	
1.3.6.2	– <i>Operating weight</i>	<i>kg</i>	<i>State</i>	
1.3.7	Materials			
1.3.7.1	– <i>Oil Separator body</i>		<i>SS 316</i>	
1.3.7.2	– <i>Elastomers</i>		<i>Viton</i>	
1.3.7.3	– <i>Feed Strainer</i>		<i>SS 316</i>	
1.3.7.4	– <i>Float skimmer body</i>		<i>SS 316</i>	
1.3.7.5	– <i>Hose</i>		<i>Wire reinforced oil and carbon resistant</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.7.6	– Oil Collection Tank		SS 316	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.4.6 Water Filtering Plant (WFP)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Direct Filtration Process	
1.2	OPERATING CONDITIONS			
1.2.1	Feed Flow	ℓ/h	1000 (min.)	
1.2.2	Daily operation per day	hour	20	
1.2.3	Does the treated water comply with Class 1 quality of SANS 241-2006?	Yes/No	Yes	
1.2.4	Can WFP operate between supply pressures of 100kPa to 400kPa?	Yes/No	Yes	
1.3	DESIGN DETAILS			
1.3.1	Filtration rate during backwashing	m ³ /m ² /h	20	
1.3.2	Filtration rate during normal operation	m ³ /m ² /h	5	
1.3.3	Are pumping Plant items manufactured locally?	Yes/No	Yes	
1.3.4	Is WFP supplied in a duty/standby pump configuration?	Yes/No	Yes	
1.3.5	IP Rating of level controls		State	
1.3.6	IP Rating of Control Box		IP56	
1.3.7	WFP Footprint (LxWxH)		State	
1.3.8	Mass:			
1.3.8.1	– <i>Dry weight</i>	kg	State	
1.3.8.2	– <i>Operating weight</i>	kg	State	
1.3.9	Materials			
1.3.9.1	– <i>Local Control Box</i>		SS 316L	
1.3.9.2	– <i>Fasteners</i>		SS 316L	
1.3.9.3	– <i>Size of sand uniformity coefficient 1.4 – 1.6</i>	mm	0.5 to 0.8	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.9.4	– <i>Uniformity coefficient of sand</i>		1.4 to 1.6	
1.3.9.5	– <i>Size of hydro-anthracite 1.2 – 1.4 mm</i>	mm	1.2 to 1.4	
1.3.9.6	– <i>Uniformity coefficient of hydro-anthracite</i>		1.2 to 1.4	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

W.2.5 PUMP SETS - HIGH-LIFT PUMP STATION**W.2.5.1 High Lift Pumps**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Model		State	
1.1.3	Country of origin		State	
1.1.4	Type of pump		Axial Split Casing Centrifugal	
1.1.5	No. of stages		State	
1.1.6	Operating speed	rpm	1500 (max.)	
1.1.7	Critical speed of rotating element (dry)	rpm	1.15 max. running speed	
1.1.8	Maximum safe speed (reverse rotation)	rpm	State	
1.1.9	Pump specific speed	SI	State	
1.1.10	Diameter of pump discharge	mm	State	
1.1.11	Discharge flange drilling pattern, pressure rating (BS 1092-2: 1997)		PN40, RF	
1.1.12	Diameter of pump suction	mm	State	
1.1.13	Suction flange drilling pattern, pressure rating (BS 1092-2: 1997)		PN16, FF	
1.1.14	Maximum diameter solids that can be pumped	mm	State	
1.1.15	Mass of complete pump assembled	kg	State	
1.1.16	Mass of upper half of casing	kg	State	
1.1.17	Mass of rotating element complete	kg	State	
1.1.18	Maximum head before recirculation	m	State	
1.1.19	Inertia of rotating element with water (incl. coupling)	kg.m ²	State	
1.1.20	Load speed-torque characteristics (i.e. square torque law, constant torque, etc.)		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.21	RL for pump centreline	m.a.s.l	910	
1.1.22	Total end float for pump rotating element	mm	State	
1.2	CHARACTERISTICS AT BEST EFFICIENCY POINT	Cut impeller		
1.2.1	Total manometric head	m	State	
1.2.2	NPSH required over full range	m	See C30.5.1.2 (Section 30)	
1.2.3	Discharge rate per pumpset, 3 in parallel	m ³ /s	State	
1.2.4	Motor power input	kW	State	
1.2.5	Motor speed	rpm	State	
1.2.6	Does the pump have a non-overloading characteristic?	Yes/No	State	
1.2.7	Pump efficiency	%	State	
1.3	GUARANTEED CHARACTERISTICS AT “DUTY POINT”- 3 PUMP-SET IN PARALLEL			
1.3.1	Design static head adopted	m	State	
1.3.2	Total station plant losses	m	State	
1.3.3	Total manometric head	m	State	
1.3.4	NPSH required at zero % headloss	m	(Section 30)	
1.3.5	0% and 3% drop in efficiency NPSH at most severe duty point	m	(Section 30)	
1.3.6	Required minimum discharge rate per pumpset	m ³ /s	1.114	
1.3.7	Motor power input: One pump (including Soft Starter and own transformer (TF) where applicable)	kW	State	
1.3.8	Pump efficiency	%	State	
1.3.9	Overall efficiency of pump and motorset (including Soft Starter and TF where applicable)	%	State	
1.4	TEST AT WORK			
1.4.1	State clearly the extent to which the combined pumpset including motor (and		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	soft starter) will be tested at the manufacturer's works (or SABS)			
1.5	RANGE OVER WHICH PUMP IS CAPABLE OF OPERATING SATISFACTORILY			
1.5.1	From	m ³ /s	State	
1.5.2	To	m ³ /s	State	
1.5.3	Shut-off head	m	State	
1.6	PUMP CASING			
1.6.1	Material		SGI Gr. GGG	
1.6.2	Is casing spit axially or radially?		Axially	
1.6.3	Diffuser rings material (where applicable)		(Section 30)	
1.6.4	Suction/delivery branch fixed to lower part of casing?	Yes/No	Yes	
1.6.5	Dismantling of casing requires disturbing of branch connections?	Yes/No	No	
1.6.6	Casing test pressure	kPa	1.5 x WP _{max}	
1.6.7	Is internal corrosion protection (lining) in accordance with Clause 30.5.1.6 (b) Section 30?	Yes/No	Yes	
1.7	CASING WEAR RINGS			
1.7.1	Material		State	
1.7.2	Number		State	
1.8	SHAFT			
1.8.1	Material		SS	
1.8.2	Length	mm	State	
1.8.3	Diameter (max and min)	mm	State	
1.8.4	Diameter at coupling	mm	State	
1.8.5	Diameter at gland seal	mm	State	
1.8.6	First critical speed	rpm	State	
1.8.7	Proposed method of securing rotating elements and shaft sleeve to shaft		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9	SHAFT SLEEVE			
1.9.1	Material		Bronze	
1.9.2	Proposed coating on wear surface		State	
1.10	GLAND (where applicable)			
1.10.1	Gland packing material		State	
1.10.2	Size	mm	State	
1.11	MECHANICAL SEAL (where applicable)			
1.11.1	Manufacturer's name		State	
1.11.2	Material:			
1.11.2.1	– Sleeve, outer barrel and set screws		SS 316L	
1.11.2.2	– Springs		SS 316L	
1.11.2.3	– O-rings		State	
1.11.2.4	– Rotating face		(Section 30)	
1.11.2.5	– Stationary face		(Section 30)	
1.12	IMPELLER			
1.12.1	Type		(Section 30)	
1.12.2	Material		SS	
1.12.3	Protective coating on neck wear surfaces		State	
1.12.4	Wear rings?	Yes/No	State	
1.12.5	Protective coating on wear surfaces		State	
1.12.6	Diameter (at duty point)	mm	State	
1.12.7	Diameter (full size)	mm	State	
1.12.8	Impeller eye diameter	mm	State	
1.12.9	No of stages	No	State	
1.12.10	No of vanes	No	State	
1.12.11	Diffusers number of passages	No	State	
1.13	BEARINGS			
1.13.1	Bearing manufacturer		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.13.2	Distance between NDE and DE bearing centres	mm	State	
1.13.3	Total clearance for journal bearings	µm	State	
1.13.4	NDE Bearings:			
1.13.4.1	– Type of bearings		State	
1.13.4.2	– Are bearings bi-directional?	Yes/No	Yes	
1.13.4.3	– Axial length	mm	State	
1.13.4.4	– Diameter	mm	State	
1.13.4.5	– Max. normal working load	N	State	
1.13.4.6	– Type of thrust-bearing		State	
1.13.4.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	
1.13.4.8	– Bearing thermostat setting operation/alarm/setting		State	
1.13.4.9	– Type and method of lubrication		Oil	
1.13.4.10	– Cooling method		State	
1.13.4.11	– External oil pump required?	Yes/No	State	
1.13.4.12	– External oil cooler required?	Yes/No	State	
1.13.4.13	– Max. permissible bearing temperature	°C	State	
1.13.4.14	– Max. ambient operating temperature	°C	State	
1.13.4.15	– Bearing temperature monitoring method		RTD's	
1.13.5	DE Bearings:			
1.13.5.1	– Type of bearings		State	
1.13.5.2	– Are bearings bi-directional?	Yes/No	Yes	
1.13.5.3	– Axial length	mm	State	
1.13.5.4	– Diameter	mm	State	
1.13.5.5	– Max. normal working load	N	State	
1.13.5.6	– Type of thrust-bearing		State	
1.13.5.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.13.5.8	– Bearing thermostat setting operation/alarm/setting		State	
1.13.5.9	– Are bearings bi-directional?	Yes/No	Yes	
1.13.5.10	– Type and method of lubrication		State	
1.13.5.11	– Cooling method		State	
1.13.5.12	– Max. permissible bearing temperature	°C	State	
1.13.5.13	– Max. ambient operating temperature	°C	State	
1.13.5.14	– Bearing temperature monitoring method		RTD's	
1.14	BREAKAWAY TORQUE	Nm	State	
1.15	IS ROTATING ELEMENT, INCLUDING COUPLING, DYNAMICALLY AND STATISTICALLY BALANCED?	Yes/No	Yes	
1.16	COUPLING			
1.16.1	Manufacturer's name		State	
1.16.2	Country of origin		State	
1.16.3	Type			
1.16.4	Size	mm	State	
1.16.5	Rating	kW	State	
1.17	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.17.1	Number of Amendments (0 if None)		State	
1.17.2				
1.17.3				
1.17.4				
1.17.5				

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W.2.5.2 High Lift Motors

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Country of Origin		State	
1.1.3	Type		Induction	
1.1.4	Where to be tested		State	
1.1.5	Rotation: uni or bi-directional		State	
1.2	PERFORMANCE DETAILS			
1.2.1	Maximum continuous full load conditions:			
1.2.1.1	– Power rating at Site	kW	(Section 39)	
1.2.1.2	– Speed (fixed)	rpm	1500 (max.)	
1.2.1.3	– Input current to stator	A	State	
1.2.1.4	– Designed efficiency at 100% load	%	State	
1.2.1.5	– Designed efficiency at 75% load	%	State	
1.2.1.6	– Designed efficiency at 50% load	%	State	
1.2.1.7	– Minimum efficiency	%	State	
1.2.1.8	– Power factor at duty point	cos θ	State	
1.2.1.9	– Power factor at ½ load	cos θ	State	
1.2.1.10	– Power factor at full load	cos θ	State	
1.2.1.11	– Power factor at locked rotor	cos θ	State	
1.2.1.12	– Operating voltage	kV	State	
1.2.1.13	– Rotor current	A	State	
1.2.1.14	– Open circuit rotor voltage	V	State	
1.2.1.15	– Magnetising kVAr	kVAr	State	
1.2.2	Rated duty condition:			
1.2.2.1	– Power at Site	kW	State	
1.2.2.2	– Voltage	kV	State	
1.2.2.3	– Input current to stator	A	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.4	– Full load speed	rpm	State	
1.2.2.5	– Critical resonant speed	rpm	State	
1.2.2.6	– Designed efficiency	%	State	
1.2.2.7	– Torque	Nm	State	
1.2.3	Starting conditions:			
1.2.3.1	– Locked rotor current	A	State	
1.2.3.2	– DOL starting current	A	State	
1.2.3.3	– Star/Delta starting current (Max. RMS)	A	State	
1.2.3.4	– Breakaway torque	Nm	State	
1.2.3.5	– Starting time for DOL starting with connected load	sec	State	
1.2.3.6	– Starting time for Star/Delta starting with connected load	sec	State	
1.2.3.7	– Pull-out torque	Nm	State	
1.2.3.8	– Maximum number of starts permissible in one hour when testing the motor connected to its specified load		State	
1.2.3.9	– Number of consecutive starts of the motor at its specified load		State	
1.2.3.10	– Pump inertia starting against closed valve but full of water	kg.m ²	State	
1.2.3.11	– Noise level (Pump/motor set)	dBA	State	
1.3	PHYSICAL DETAIL			
1.3.1	Complete mass	kg	State	
1.3.2	Mass of rotor element	kg	State	
1.3.3	Dimensions:			
1.3.3.1	– Overall: Length	mm	State	
1.3.3.2	– Overall: Width	mm	State	
1.3.3.3	– Overall: Height	mm	State	
1.3.4	Terminal box protection	IP	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.5	Motor protection	IP	State	
1.3.6	Class of insulation		State	
1.3.7	Method of cooling the motor		State	
1.3.8	Form of windings		State	
1.3.9	Temperature detectors in windings:			
1.3.9.1	– Type		State	
1.3.9.2	– Number		State	
1.3.9.3	– Position in winding		State	
1.3.10	Temperature detectors in bearings:			
1.3.10.1	– Type		State	
1.3.10.2	– Number		State	
1.3.11	Anti-condensation heaters:			
1.3.11.1	– Total wattage	W	State	
1.3.11.2	– Voltage	V	State	
1.4	SHAFT			
1.4.1	Material		State	
1.4.2	Length	mm	State	
1.4.3	Diameter (max and min)	mm	State	
1.4.4	Height of shaft centre above base	mm	State	
1.4.5	Weight	kg	State	
1.4.6	Inertia of rotor	kg.m ²	State	
1.5	BEARINGS			
1.5.1	Bearing manufacturer		State	
1.5.2	Distance between NDE and DE bearing centres	mm	State	
1.5.3	Total clearance for journal bearings	µm	State	
1.5.4	NDE Bearings:			
1.5.4.1	– Type of bearings		State	
1.5.4.2	– Are bearings bi-directional?	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.4.3	– Axial length	mm	State	
1.5.4.4	– Diameter	mm	State	
1.5.4.5	– Max. normal working load	N	State	
1.5.4.6	– Bearing thermostat setting operation/alarm/setting		State	
1.5.4.7	– Type and method of lubrication		State	
1.5.4.8	– Cooling method		State	
1.5.4.9	– External oil pump required	Yes/No	State	
1.5.4.10	– External oil cooler required?	Yes/No	State	
1.5.4.11	– Max. permissible bearing temperature	°C	State	
1.5.4.12	– Max. ambient operating temperature	°C	State	
1.5.4.13	– Bearing temperature monitoring method		RTD's	
1.5.5	DE Bearings:			
1.5.5.1	– Type of bearings		State	
1.5.5.2	– Are bearings bi-directional?	Yes/No	Yes	
1.5.5.3	– Axial length	mm	State	
1.5.5.4	– Diameter	mm	State	
1.5.5.5	– Max. normal working load	N	State	
1.5.5.6	– Type of thrust-bearing		State	
1.5.5.7	– Is thrust-bearing bi-directional?	Yes/No	Yes	
1.5.5.8	– Bearing thermostat setting operation/alarm/setting		State	
1.5.5.9	– Type and method of lubrication		State	
1.5.5.10	– Cooling method		State	
1.5.5.11	– Max. permissible bearing temperature	°C	State	
1.5.5.12	– Max. ambient operating temperature	°C	State	
1.5.5.13	– Bearing temperature monitoring method		RTD's	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.6.1	Number of Amendments (0 if None)		State	
1.6.2				
1.6.3				
1.6.4				
1.6.5				

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W.2.5.3 Sump Pump (Drainage)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Clause 28.20	
1.1.4	Rotating speed	rpm	State	
1.1.5	Delivery against 19 m head	ℓ/s	4	
1.1.6	Efficiency at 19 m head	%	State	
1.1.7	Max power required by the pump	kW	State	
1.1.8	Power required by the pump at duty point	kW	State	
1.1.9	Motor rated kW	kW	State	
1.1.10	Delivery branch diameter	mm	State	
1.1.11	Automatic-coupling system	Yes/No	Yes	
1.1.12	Motor equipped with cooling jacket?	Yes/No	No	
1.1.13	Does the corrosion protection of the pump, base and pipe work comply fully with the corrosion specification	Yes/No	State	
1.1.14	Materials:			
1.1.14.1	– <i>Impeller</i>		SS 304	
1.1.14.2	– <i>Shaft</i>		SS 316	
1.1.14.3	– <i>Casing</i>		CI BS 1452 Gr. 260	
1.2	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.2.1	Number of Amendments (0 if None)		State	
1.2.2				
1.2.3				
1.2.4				
1.2.5				

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W.2.5.4 Sump Pump (Dewatering)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Section 28	
1.1.4	Rotating speed	rpm	State	
1.1.5	Delivery against 19 m head	ℓ/s	45	
1.1.6	Efficiency at 19 m head	%	State	
1.1.7	Max power required by the pump	kW	State	
1.1.8	Power required by the pump at duty point	kW	State	
1.1.9	Motor rated kW	kW	State	
1.1.10	Delivery branch diameter	mm	State	
1.1.11	Automatic-coupling system	Yes/No	Yes	
1.1.12	Motor equipped with cooling jacket?	Yes/No	No	
1.1.13	Does the corrosion protection of the pump, base and pipe work comply fully with the corrosion specification	Yes/No	State	
1.1.14	Materials:			
1.1.14.1	– <i>Impeller</i>		SS 304L	
1.1.14.2	– <i>Shaft</i>		SS 316L	
1.1.14.3	– <i>Casing</i>		CI BS 1452 Gr. 260	
1.2	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.2.1	Number of Amendments (0 if None)		State	
1.2.2				
1.2.3				
1.2.4				
1.2.5				

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W.2.5.5 Oil Water Separator (OWS)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Hydro-cyclone	
1.2	OPERATING CONDITIONS			
1.2.1	Feed Flow	ℓ/h	3500 (min.)	
1.2.2	Oil Recovery Rate	m ³ /h	State (max.)	
1.2.3	Treated water discharge pressure	kPa	State	
1.2.4	Oil discharge pressure	kPa	State	
1.3	DESIGN DETAILS			
1.3.1	Is floating skimmer of self- adjusting type?	Yes/No	Yes	
1.3.2	Is feed strainer of quick opening type?	Yes/No	Yes	
1.3.3	IP Rating of level controls		State	
1.3.4	IP Rating of Control Box		IP56	
1.3.5	OWS Footprint (LxWxH)		State	
1.3.6	Mass:			
1.3.6.1	– <i>Dry weight</i>	kg	State	
1.3.6.2	– <i>Operating weight</i>	kg	State	
1.3.7	Materials			
1.3.7.1	– <i>Oil Separator body</i>		SS 316L	
1.3.7.2	– <i>Elastomers</i>		Viton	
1.3.7.3	– <i>Feed Strainer</i>		SS 316L	
1.3.7.4	– <i>Float skimmer body</i>		SS 316L	
1.3.7.5	– <i>Hose</i>		Wire reinforced oil and carbon resistant	
1.3.7.6	– <i>Oil Collection Tank</i>		SS 316L	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.5.6 Water Filtering Plant (WFP)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer		State	
1.1.2	Supplier		State	
1.1.3	Type		Direct Filtration Process	
1.2	OPERATING CONDITIONS			
1.2.1	Feed Flow	ℓ/h	1000 (min.)	
1.2.2	Daily operation per day	hour	20	
1.2.3	Does the treated water comply with Class 1 quality of SANS 241-2006?	Yes/No	Yes	
1.2.4	Can WFP operate between supply pressures of 100kPa to 400kPa?	Yes/No	Yes	
1.3	DESIGN DETAILS			
1.3.1	Filtration rate during backwashing	m ³ /m ² /h	20	
1.3.2	Filtration rate during normal operation	m ³ /m ² /h	5	
1.3.3	Are pumping Plant items manufactured locally?	Yes/No	Yes	
1.3.4	Is WFP supplied in a duty/standby pump configuration?	Yes/No	Yes	
1.3.5	IP Rating of level controls		State	
1.3.6	IP Rating of Control Box		IP56	
1.3.7	WFP Footprint (LxWxH)		State	
1.3.8	Mass:			
1.3.8.1	– Dry weight	kg	State	
1.3.8.2	– Operating weight	kg	State	
1.3.9	Materials			
1.3.9.1	– Local Control Box		SS 316L	
1.3.9.2	– Fasteners		SS 316L	
1.3.9.3	– Size of sand uniformity coefficient 1.4 – 1.6	mm	0.5 to 0.8	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.9.4	– <i>Uniformity coefficient of sand</i>		1.4 to 1.6	
1.3.9.5	– <i>Size of hydro-anthracite 1.2 – 1.4mm</i>	mm	1.2 to 1.4	
1.3.9.6	– <i>Uniformity coefficient of hydro-anthracite</i>		1.2 to 1.4	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

W.2.6 HVAC – LOW LIFT PUMP STATION**W.2.6.1 Filtered Fresh Air Pressurisation System (Pump Room)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AXIAL FLOW FANS			
1.1.1	F1			
1.1.1.1	– Type		<i>Axial Flow</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Diameter	<i>mm</i>	<i>1 000</i>	
1.1.1.5	– Speed (max)	<i>rpm</i>	<i>1 460</i>	
1.1.1.6	– Litres per Second	<i>ℓ/s</i>	<i>10 000</i>	
1.1.1.7	– Static Pressure	<i>Pa</i>	<i>250</i>	
1.1.1.8	– Motor Power	<i>kW</i>	<i>5.5</i>	
1.1.1.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.2	WEATHER LOUVRES			
1.2.1	WL1			
1.2.1.1	– Type		<i>Aluminium, fixed blade</i>	
1.2.1.2	– Manufacturer		<i>State</i>	
1.2.1.3	– Model No.		<i>State</i>	
1.2.1.4	– Blade Spacing	<i>mm</i>	<i>50</i>	
1.2.1.5	– Finish		<i>Natural Anodised</i>	
1.2.1.6	– Size (neck)	<i>mm</i>	<i>1800 x 2400</i>	
1.2.1.7	– Plenum		<i>Yes</i>	
1.2.1.8	– Opposed Blade Damper		<i>No</i>	
1.2.2	WL2			
1.2.2.1	– Type		<i>Aluminium, fixed blade</i>	
1.2.2.2	– Manufacturer		<i>State</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.3	– Model No.		State	
1.2.2.4	– Blade Spacing	mm	50	
1.2.2.5	– Finish		Natural Anodised	
1.2.2.6	– Size (neck)	mm	1000 x 1000	
1.2.2.7	– Plenum		No	
1.2.2.8	– Opposed Blade Damper		No	
1.3	WASHABLE FILTERS			
1.3.1	FIL1			
1.3.1.1	– Type		Washable, pleated	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Size	mm	595 x 595	
1.3.1.5	– Efficiency	%	20	
1.3.1.6	– Arrestance	%	90%	
1.3.1.7	– Dirty Pressure Drop	Pa	250	
1.4	SOUND ATTENUATORS (SILENCERS)			
1.4.1	SILENCER FOR F1			
1.4.1.1	– Type		Circular, no pod	
1.4.1.2	– Manufacturer		State	
1.4.1.3	– Model No.		State	
1.4.1.4	– Size	mm	1000	
1.4.1.5	– Exit noise level	dBA	65	
1.5	ALUMINIUM EGG CRATE SUPPLY AIR GRILLE			
1.5.1	G3			
1.5.1.1	– Type		Aluminium	
1.5.1.2	– Manufacturer		State	
1.5.1.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.1.4	– Finish		Natural anodised	
1.5.1.5	– Size (neck)	mm	600 x 1800	
1.5.1.6	– Plenum		Yes	
1.5.1.7	– Opposed Blade Damper		No	
1.5.1.8	– Balanced airflow	ℓ/s	2500	
1.6	PRESSURE RELIEF DAMPERS			
1.6.1	PRD1			
1.6.1.1	– Type		Pressure relief	
1.6.1.2	– Manufacturer		State	
1.6.1.3	– Model No.		State	
1.6.1.4	– Finish		Natural Anodised	
1.6.1.5	– Size	mm	1000 x 1000	
1.6.1.6	– Plenum		No	
1.6.1.7	– Air Speed	m/s	2.5	
1.6.1.8	– Pressure	Pa	30	
1.7	BALANCING DAMPERS			
1.7.1	BD1			
1.7.1.1	– Type		Balancing damper	
1.7.1.2	– Manufacturer		State	
1.7.1.3	– Model No.		State	
1.7.1.4	– Finish		Natural Anodised	
1.7.1.5	– Size	mm	700 x 300	
1.8	MOTORISED BALANCING DAMPERS			
1.8.1	MD1			
1.8.1.1	– Type		Balancing damper	
1.8.1.2	– Manufacturer		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.8.1.3	– <i>Model No.</i>		State	
1.8.1.4	– <i>Finish</i>		Natural Anodised	
1.8.1.5	– <i>Size</i>	mm	950 x 1000	
1.8.2	MD2			
1.8.2.1	– <i>Type</i>		<i>Balancing damper</i>	
1.8.2.2	– <i>Manufacturer</i>		State	
1.8.2.3	– <i>Model No.</i>		State	
1.8.2.4	– <i>Finish</i>		Natural Anodised	
1.8.2.5	– <i>Size</i>	mm	500 x 500	
1.9	ELECTRICAL CONTROL PANEL			
1.9.1	Manufacturer		State	
1.9.2	Size		State	
1.10	LOCK-OUT ISOLATOR			
1.10.1	Manufacturer		State	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

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W.2.6.2 HVAC (MV and LV Rooms)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AXIAL FLOW FANS			
1.1.1	F2			
1.1.1.1	– Type		Plate-axial	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Diameter	mm	560	
1.1.1.5	– Speed (max)	rpm	1400	
1.1.1.6	– Litres per Second	ℓ/s	1350	
1.1.1.7	– Static Pressure	Pa	200	
1.1.1.8	– Motor Power	kW	0.55	
1.1.1.9	– Volt	V	400/3/50	
1.2	WEATHER LOUVRES			
1.2.1	WL3			
1.2.1.1	– Type		Aluminium, fixed blade	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Blade Spacing	mm	50	
1.2.1.5	– Finish		Natural Anodised	
1.2.1.6	– Size (neck)	mm	1200 x 600	
1.2.1.7	– Plenum		Yes	
1.2.1.8	– Opposed Blade Damper		No	
1.2.2	WL5			
1.2.2.1	– Type		Aluminium, fixed blade	
1.2.2.2	– Manufacturer		State	
1.2.2.3	– Model No.		State	
1.2.2.4	– Blade Spacing	mm	50	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.5	– Finish		Natural Anodised	
1.2.2.6	– Size (neck)	mm	700 x 700	
1.2.2.7	– Plenum		No	
1.2.2.8	– Opposed Blade Damper		Aluminium, fixed blade	
1.2.3	WL6			
1.2.3.1	– Type		Aluminium, fixed blade	
1.2.3.2	– Manufacturer		State	
1.2.3.3	– Model No.		State	
1.2.3.4	– Blade Spacing	mm	50	
1.2.3.5	– Finish		Natural Anodised	
1.2.3.6	– Size (neck)	mm	500 x 500	
1.2.3.7	– Plenum		No	
1.2.3.8	– Opposed Blade Damper		No	
1.3	WASHABLE FILTERS			
1.3.1	FIL1			
1.3.1.1	– Type		Washable, pleated	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Size	mm	595 x 595	
1.3.1.5	– Efficiency	%	20	
1.3.1.6	– Arrestance	%	90%	
1.3.1.7	– Dirty Pressure Drop	Pa	250	
1.4	SOUND ATTENUATORS (SILENCERS)			
1.4.1	SILENCER FOR F2			
1.4.1.1	– Type		Circular, no pod	
1.4.1.2	– Manufacturer		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4.1.3	– Model No.		State	
1.4.1.4	– Size	mm	560	
1.4.1.5	– Exit noise level	dB(A)	65	
1.5	ALUMINIUM EGG CRATE SUPPLY AIR GRILLE			
1.5.1	G2			
1.5.1.1	– Type		Aluminium	
1.5.1.2	– Manufacturer		State	
1.5.1.3	– Model No.		State	
1.5.1.4	– Finish		Natural anodised	
1.5.1.5	– Size (neck)	mm	400 x 200	
1.5.1.6	– Plenum		Yes	
1.5.1.7	– Opposed Blade Damper		Yes	
1.5.1.8	– Balanced airflow	l/s	200	
1.6	PRESSURE RELIEF DAMPERS			
1.6.1	PRD2			
1.6.1.1	– Type		Pressure relief	
1.6.1.2	– Manufacturer		State	
1.6.1.3	– Model No.		State	
1.6.1.4	– Finish		Natural Anodised	
1.6.1.5	– Size	mm	700 x 700	
1.6.1.6	– Plenum		No	
1.6.1.7	– Air Speed	m/s	2.5	
1.6.1.8	– Pressure	Pa	30	
1.6.2	PRD3			
1.6.2.1	– Type		Pressure relief	
1.6.2.2	– Manufacturer		State	
1.6.2.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.2.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.6.2.5	– <i>Size</i>	<i>mm</i>	<i>500 x 500</i>	
1.6.2.6	– <i>Plenum</i>		<i>No</i>	
1.6.2.7	– <i>Air Speed</i>	<i>m/s</i>	<i>2.5</i>	
1.6.2.8	– <i>Pressure</i>	<i>Pa</i>	<i>30</i>	
1.7	ELECTRICAL CONTROL PANEL			
1.7.1	Manufacturer		State	
1.7.2	Size		State	
1.8	LOCK-OUT ISOLATOR			
1.8.1	Manufacturer		State	
1.9	DOOR GRILLES			
1.9.1	DG1			
1.9.1.1	– <i>Type</i>		<i>Aluminium, fixed blade, non-vision</i>	
1.9.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.9.1.3	– <i>Model No.</i>		<i>State</i>	
1.9.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.9.1.5	– <i>Size (neck)</i>	<i>mm</i>	<i>500 x 400</i>	
1.10	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.10.1	Number of Amendments (0 if None)		State	
1.10.2				
1.10.3				
1.10.4				
1.10.5				

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W.2.6.3 HVAC (Control, PLC and Server Room)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	SPLIT TYPE AIR CONDITIONING UNITS			
1.1.1	MW1 & OU1			
1.1.1.1	– Type		Mid-wall	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Heat Pump		Yes	
1.1.1.5	– Refrigerant		R-410A	
1.1.1.6	– Nominal Cooling	kWr	5.6	
1.1.1.7	– Nominal Heating	kWr	5.6	
1.1.1.8	– Power	kWe	3.15	
1.1.1.9	– Volt	V	220/1/50	
1.2	UC1 & OU2			
1.2.1	Type		Under ceiling	
1.2.2	Manufacturer		State	
1.2.3	Model No.		State	
1.2.4	Heat Pump		Yes	
1.2.5	Refrigerant		R-410A	
1.2.6	Nominal Cooling	kWr	16.11	
1.2.7	Power	kWe	16.11	
1.2.8	Volt	V	400/3/50	
1.3	CIRCULAR DUCT FANS			
1.3.1	F3			
1.3.1.1	– Type		Circular duct	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Diameter	mm	150	
1.3.1.5	– Speed (max)	rpm	2160	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.1.6	– Litres per Second	ℓ/s	100	
1.3.1.7	– Static Pressure	Pa	100	
1.3.1.8	– Motor Power	kW	0.2	
1.3.1.9	– Volt	V	220/1/50	
1.4	WEATHER LOUVRES			
1.4.1	WL7			
1.4.1.1	– Type		Aluminium, fixed blade	
1.4.1.2	– Manufacturer		State	
1.4.1.3	– Model No.		State	
1.4.1.4	– Blade Spacing	mm	50	
1.4.1.5	– Finish		Natural Anodised	
1.4.1.6	– Size (neck)	mm	200 x 200	
1.4.1.7	– Plenum		Yes	
1.4.1.8	– Opposed Blade Damper		No	
1.5	EXTRACT DISC VALVE			
1.5.1	EDV1			
1.5.1.1	– Type		Steel	
1.5.1.2	– Manufacturer		State	
1.5.1.3	– Model No.		State	
1.5.1.4	– Finish		Powder coated white	
1.5.1.5	– Size (neck)	mm	Ø200	
1.6	DOOR GRILLES			
1.6.1	DG1			
1.6.1.1	– Type		Aluminium, fixed blade, non-vision	
1.6.1.2	– Manufacturer		State	
1.6.1.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.6.1.5	– <i>Size (neck)</i>	<i>mm</i>	<i>500 x 400</i>	
1.7	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.7.1	Number of Amendments (0 if None)		State	
1.7.2				
1.7.3				
1.7.4				
1.7.5				

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W.2.6.4 HVAC (Battery Room)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	PLATE AXIAL FANS (WALL FANS)			
1.1.1	WF2			
1.1.1.1	– Type		<i>Plate-axial, flame-proof</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Diameter	<i>mm</i>	<i>315</i>	
1.1.1.5	– Speed (max)	<i>rpm</i>	<i>1380</i>	
1.1.1.6	– Litres per Second	<i>ℓ/s</i>	<i>400</i>	
1.1.1.7	– Static Pressure	<i>Pa</i>	<i>50</i>	
1.1.1.8	– Motor Power	<i>kW</i>	<i>0.5</i>	
1.1.1.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.2	FAN SWITCH			
1.2.1	Manufacturer		<i>State</i>	
1.3	DOOR GRILLES			
1.3.1	DG1			
1.3.1.1	– Type		<i>Aluminium, fixed blade, non-vision</i>	
1.3.1.2	– Manufacturer		<i>State</i>	
1.3.1.3	– Model No.		<i>State</i>	
1.3.1.4	– Finish		<i>Natural Anodised</i>	
1.3.1.5	– Size (neck)	<i>mm</i>	<i>500 x 400</i>	
1.4	DEVIATION FROM SPECIFICATION?		<i>State</i>	
1.4.1	Number of Amendments (0 if None)		<i>State</i>	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.6.5 HVAC (VSD Room Air Conditioning System)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AIR COOLED CHILLER			
1.1.1	CH1 & CH2			
1.1.1.1	– Type		<i>Air Cooled</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Heat Pump		<i>Yes</i>	
1.1.1.5	– Compressor		<i>Scroll</i>	
1.1.1.6	– Refrigerant		<i>R-410A</i>	
1.1.1.7	– Nominal Cooling	<i>kWr</i>	<i>175</i>	
1.1.1.8	– Flow	<i>ℓ/s</i>	<i>7.0</i>	
1.1.1.9	– Supply/Return temperature	<i>°C</i>	<i>10/16</i>	
1.1.1.10	– Power	<i>A</i>	<i>142</i>	
1.1.1.11	– Volt	<i>V</i>	<i>400/3/50</i>	
1.1.1.12	– Factory assembled dual VSD pumps with expansion tank		<i>Yes</i>	
1.2	CHILLED WATER AIR HANDLING UNITS			
1.2.1	AHU 1			
1.2.1.1	– Type		<i>Top discharge & return</i>	
1.2.1.2	– Manufacturer		<i>State</i>	
1.2.1.3	– Model No.		<i>State</i>	
1.2.1.4	– Litres per Second	<i>ℓ/s</i>	<i>14 000</i>	
1.2.1.5	– Water Inlet and return temperature	<i>°C</i>	<i>10/16</i>	
1.2.1.6	– On/Off coil temperature	<i>°C</i>	<i>24/13</i>	
1.2.1.7	– Plug fans		<i>Yes</i>	
1.2.1.8	– BacNet Controller		<i>Yes</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.1.9	– <i>Distribution/Control Board</i>		Yes	
1.2.1.10	– <i>Volt</i>	V	400/3/50	
1.3	PRESSURE RELIEF DAMPERS			
1.3.1	PRD3			
1.3.1.1	– <i>Type</i>		<i>Pressure relief</i>	
1.3.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.3.1.3	– <i>Model No.</i>		<i>State</i>	
1.3.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.3.1.5	– <i>Size</i>	<i>mm</i>	<i>500 x 500</i>	
1.3.1.6	– <i>Plenum</i>		<i>No</i>	
1.3.1.7	– <i>Air Speed</i>	<i>m/s</i>	<i>2.5</i>	
1.3.1.8	– <i>Pressure</i>	<i>Pa</i>	<i>30</i>	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	<i>State</i>	
1.4.1	Number of Amendments (0 if None)		<i>State</i>	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.6.6 HVAC (Guard House)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	SPLIT TYPE AIR CONDITIONING UNITS			
1.1.1	MW1 (GUARD ROOM & SERVER ROOM))			
1.1.1.1	– Type		Mid wall	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Heat Pump		Yes	
1.1.1.5	– Refrigerant		R-410A	
1.1.1.6	– Nominal Cooling	kWr	5.6	
1.1.1.7	– Nominal Heating	kWr	5.6	
1.1.1.8	– Power	kWe	3.15	
1.1.1.9	– Volts	V	220/1/50	
1.2	WALL/WINDOW MOUNTED FANS			
1.2.1	WF1			
1.2.1.1	– Type		Window/wall mounted	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Diameter	mm	200	
1.2.1.5	– Litres per Second	ℓ/s	45	
1.2.1.6	– Static Pressure	Pa	60	
1.2.1.7	– Motor Power	kW	0.1	
1.2.1.8	– Volt	V	220/1/50	
1.2.2	WF2			
1.2.2.1	– Type		Window/wall mounted	
1.2.2.2	– Manufacturer		State	
1.2.2.3	– Model No.		State	
1.2.2.4	– Diameter	mm	260	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.5	– <i>Litres per Second</i>	<i>l/s</i>	120	
1.2.2.6	– <i>Static Pressure</i>	<i>Pa</i>	30	
1.2.2.7	– <i>Motor Power</i>	<i>kW</i>	0.1	
1.2.2.8	– <i>Volt</i>	<i>V</i>	220/1/50	
1.3	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.3.1	Number of Amendments (0 if None)		State	
1.3.2				
1.3.3				
1.3.4				
1.3.5				

W.2.6.7 HVAC Plant (Corrosion Protection)

For each HVAC item and pieces of Plant supplied under this Contract, a separate form needs to be completed and returned.

ITEM no / Description Applicator proposed	
	Name:
	Contact person:
	Tel.:
	Address:
Value of corrosion protection	R
Material	
Finish	
Surface Preparation	
Coating Thickness	
Coating Application	
Quality of Coating	
Testing of Coating	
Remarks/Deviations	

W.2.7 HVAC – HIGH LIFT PUMP STATION**W.2.7.1 Filtered Fresh Air Pressurisation System (Pump Room)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AXIAL FLOW FANS			
1.1.1	F1 & F2			
1.1.1.1	– Type		<i>Axial Flow</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Diameter	<i>mm</i>	<i>1 000</i>	
1.1.1.5	– Speed (max)	<i>rpm</i>	<i>1 460</i>	
1.1.1.6	– Litres per Second	<i>ℓ/s</i>	<i>10 000</i>	
1.1.1.7	– Static Pressure	<i>Pa</i>	<i>250</i>	
1.1.1.8	– Motor Power	<i>kW</i>	<i>5.5</i>	
1.1.1.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.2	WEATHER LOUVRES			
1.2.1	WL1			
1.2.1.1	– Type		<i>Aluminium, fixed blade</i>	
1.2.1.2	– Manufacturer		<i>State</i>	
1.2.1.3	– Model No.		<i>State</i>	
1.2.1.4	– Blade Spacing	<i>mm</i>	<i>50</i>	
1.2.1.5	– Finish		<i>Natural Anodised</i>	
1.2.1.6	– Size (neck)	<i>mm</i>	<i>1800 x 2400</i>	
1.2.1.7	– Plenum		<i>Yes</i>	
1.2.1.8	– Opposed Blade Damper		<i>No</i>	
1.2.2	WL2			
1.2.2.1	– Type		<i>Aluminium, fixed blade</i>	
1.2.2.2	– Manufacturer		<i>State</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.3	– Model No.		State	
1.2.2.4	– Blade Spacing	mm	50	
1.2.2.5	– Finish		Natural Anodised	
1.2.2.6	– Size (neck)	mm	1000 x 1000	
1.2.2.7	– Plenum		No	
1.2.2.8	– Opposed Blade Damper		No	
1.3	WASHABLE FILTERS			
1.3.1	WF1			
1.3.1.1	– Type		Washable, pleated	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Size	mm	595 x 595	
1.3.1.5	– Efficiency	%	20	
1.3.1.6	– Arrestance	%	90%	
1.3.1.7	– Dirty Pressure Drop	Pa	250	
1.4	SOUND ATTENUATORS (SILENCERS)			
1.4.1	SILENCER FOR F1 AND F2			
1.4.1.1	– Type		Circular, no pod	
1.4.1.2	– Manufacturer		State	
1.4.1.3	– Model No.		State	
1.4.1.4	– Size	mm	1000	
1.4.1.5	– Exit noise level	dBA	65	
1.5	INDUSTRIAL TYPE DRUM LOUVRE			
1.5.1	DL1			
1.5.1.1	– Type		Circular, no pod	
1.5.1.2	– Manufacturer		State	
1.5.1.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.1.4	– Finish		Powder coated white	
1.5.1.5	– Size (neck)	mm	600 x 1200	
1.5.1.6	– Plenum		Yes	
1.5.1.7	– Opposed Blade Damper		Yes	
1.5.1.8	– Balanced airflow	l/s	830	
1.6	PRESSURE RELIEF DAMPERS			
1.6.1	PRD1			
1.6.1.1	– Type		Pressure relief	
1.6.1.2	– Manufacturer		State	
1.6.1.3	– Model No.		State	
1.6.1.4	– Finish		Natural Anodised	
1.6.1.5	– Size	mm	1000 x 1000	
1.6.1.6	– Plenum		No	
1.6.1.7	– Air Speed	m/s	2.5	
1.6.1.8	– Pressure	Pa	30	
1.7	MOTORISED BALANCING DAMPERS			
1.7.1	MD1			
1.7.1.1	– Type		Balancing damper	
1.7.1.2	– Manufacturer		State	
1.7.1.3	– Model No.		State	
1.7.1.4	– Finish		Natural Anodised	
1.7.1.5	– Size	mm	950 x 1 000	
1.7.2	MD2			
1.7.2.1	– Type		Balancing damper	
1.7.2.2	– Manufacturer		State	
1.7.2.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.7.2.4	– <i>Finish</i>		Natural Anodised	
1.7.2.5	– <i>Size</i>	mm	500 x 500	
1.8	ELECTRICAL CONTROL PANEL			
1.8.1	Manufacturer		State	
1.8.2	Size		State	
1.9	LOCK-OUT ISOLATOR			
1.9.1	Manufacturer		State	
1.10	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.10.1	Number of Amendments (0 if None)		State	
1.10.2				
1.10.3				
1.10.4				
1.10.5				

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W.2.7.2 HVAC (MV and LV Rooms)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	PLATE AXIAL FLOW FANS (WALL FANS)			
1.1.1	F3			
1.1.1.1	– Type		Plate-axial	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Diameter	mm	630	
1.1.1.5	– Speed (max)	rpm	1445	
1.1.1.6	– Litres per Second	ℓ/s	2250	
1.1.1.7	– Static Pressure	Pa	200	
1.1.1.8	– Motor Power	kW	1.5	
1.1.1.9	– Volt	V	400/3/50	
1.2	WEATHER LOUVRES			
1.2.1	WL3			
1.2.1.1	– Type		Aluminium, fixed blade	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Blade Spacing	mm	50	
1.2.1.5	– Finish		Natural Anodised	
1.2.1.6	– Size (neck)	mm	1200 x 1200	
1.2.1.7	– Plenum		Yes	
1.2.1.8	– Opposed Blade Damper		No	
1.2.2	WL2			
1.2.2.1	– Type		Plate-Axial	
1.2.2.2	– Manufacturer		State	
1.2.2.3	– Model No.		State	
1.2.2.4	– Blade Spacing	mm	50	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.5	– Finish		Natural Anodised	
1.2.2.6	– Size (neck)	mm	1000 x 1000	
1.2.2.7	– Plenum		No	
1.3	WASHABLE FILTERS			
1.3.1	FIL1			
1.3.1.1	– Type		Washable, pleated	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Size	mm	595 x 595	
1.3.1.5	– Efficiency	%	20	
1.3.1.6	– Arrestance	%	90%	
1.3.1.7	– Dirty Pressure Drop	Pa	250	
1.4	SOUND ATTENUATORS (SILENCERS)			
1.4.1	SILENCER FOR F3			
1.4.1.1	– Type		Window-wall	
1.4.1.2	– Manufacturer		State	
1.4.1.3	– Model No.		State	
1.4.1.4	– Size	mm	60	
1.4.1.5	– Exit noise level	dBA	65	
1.5	SUPPLY AIR GRILLE, HORIZONTAL, SINGLE DEFLECTION			
1.5.1	G1			
1.5.1.1	– Type		Aluminium	
1.5.1.2	– Manufacturer		State	
1.5.1.3	– Model No.		State	
1.5.1.4	– Finish		Natural anodised	
1.5.1.5	– Size (neck)	mm	300 x 150	
1.5.1.6	– Plenum		Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.1.7	– <i>Opposed Blade Damper</i>		Yes	
1.5.1.8	– <i>Balanced airflow</i>	<i>l/s</i>	200	
1.5.2	G2			
1.5.2.1	– <i>Type</i>		<i>Aluminium</i>	
1.5.2.2	– <i>Manufacturer</i>		<i>State</i>	
1.5.2.3	– <i>Model No.</i>		<i>State</i>	
1.5.2.4	– <i>Finish</i>		<i>Natural anodised</i>	
1.5.2.5	– <i>Size (neck)</i>	<i>mm</i>	<i>400 x 200</i>	
1.5.2.6	– <i>Plenum</i>		Yes	
1.5.2.7	– <i>Opposed Blade Damper</i>		Yes	
1.5.2.8	– <i>Balanced airflow</i>	<i>l/s</i>	200	
1.6	PRESSURE RELIEF DAMPERS			
1.6.1	PRD1			
1.6.1.1	– <i>Type</i>		<i>Pressure relief</i>	
1.6.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.6.1.3	– <i>Model No.</i>		<i>State</i>	
1.6.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.6.1.5	– <i>Size</i>	<i>mm</i>	<i>1000 x 1000</i>	
1.6.1.6	– <i>Plenum</i>		No	
1.6.1.7	– <i>Air Speed</i>	<i>m/s</i>	2.5	
1.6.1.8	– <i>Pressure</i>	<i>Pa</i>	30	
1.7	ELECTRICAL CONTROL PANEL			
1.7.1	Manufacturer		State	
1.7.2	Size		State	
1.8	LOCK-OUT ISOLATOR			
1.8.1	Manufacturer		State	
1.9	DOOR GRILLES			

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9.1	DG1			
1.9.1.1	– <i>Type</i>		<i>Aluminium, fixed blade, non-vision</i>	
1.9.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.9.1.3	– <i>Model No.</i>		<i>State</i>	
1.9.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.9.1.5	– <i>Size (neck)</i>	mm	<i>500 x 400</i>	
1.10	DEVIATION FROM SPECIFICATION?	Yes/No	<i>State</i>	
1.10.1	Number of Amendments (0 if None)		<i>State</i>	
1.10.2				
1.10.3				
1.10.4				
1.10.5				

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W.2.7.3 HVAC (Control, PLC and Server Room)

TEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	SPLIT TYPE AIR CONDITIONING UNITS			
1.1.1	UC1 & OU1			
1.1.1.1	– Type		Mid-wall	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Heat Pump		Yes	
1.1.1.5	– Refrigerant		R-410A	
1.1.1.6	– Nominal Cooling	kWr	16.11	
1.1.1.7	– Power	kWe	16.11	
1.1.1.8	– Volt	V	400/3/50	
1.2	WALL/WINDOW MOUNTED FANS			
1.2.1	WF1			
1.2.1.1	– Type		Mid-wall	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Diameter	mm	200	
1.2.1.5	– Litres per Second	ℓ/s	75	
1.2.1.6	– Static Pressure	Pa	30	
1.2.1.7	– Motor Power	kW	0.1	
1.2.1.8	– Volt	V	220/1/50	
1.3	DOOR GRILLES			
1.3.1	DG1			
1.3.1.1	– Type		Aluminium, fixed blade, non-vision	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.1.4	– <i>Finish</i>		<i>Natural Anodised</i>	
1.3.1.5	– <i>Size (neck)</i>	<i>mm</i>	<i>500 x 400</i>	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.7.4 HVAC (UPS Room)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	SPLIT TYPE AIR CONDITIONING UNITS			
1.1.1	MW1 & OU1			
1.1.1.1	– Type		Mid-wall	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Heat Pump		Yes	
1.1.1.5	– Refrigerant		R-410A	
1.1.1.6	– Nominal Cooling	kWr	5.6	
1.1.1.7	– Nominal Heating	kWr	5.6	
1.1.1.8	– Power	kWe	3.15	
1.1.1.9	– Volt	V	220/1/50	
1.2	DOOR GRILLES			
1.2.1	DG1			
1.2.1.1	– Type		Aluminium, fixed blade, non-vision	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Finish		Natural Anodised	
1.2.1.5	– Size (neck)	mm	500 x 400	
1.3	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.3.1	Number of Amendments (0 if None)		State	
1.3.2				
1.3.3				
1.3.4				
1.3.5				

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W.2.7.5 HVAC (Battery Room)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	PLATE AXIAL FANS (WALL FANS)			
1.1.1	WF2			
1.1.1.1	– Type		<i>Plate-axial, flame-proof</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Diameter	<i>mm</i>	<i>315</i>	
1.1.1.5	– Speed (max)	<i>rpm</i>	<i>1 380</i>	
1.1.1.6	– Litres per Second	<i>ℓ/s</i>	<i>400</i>	
1.1.1.7	– Static Pressure	<i>Pa</i>	<i>50</i>	
1.1.1.8	– Motor Power	<i>kW</i>	<i>0.5</i>	
1.1.1.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.2	FAN SWITCH			
1.2.1	Manufacturer		<i>State</i>	
1.3	DOOR GRILLES			
1.3.1	DG1			
1.3.1.1	– Type		<i>Aluminium, fixed blade, non-vision</i>	
1.3.1.2	– Manufacturer		<i>State</i>	
1.3.1.3	– Model No.		<i>State</i>	
1.3.1.4	– Finish		<i>Natural Anodised</i>	
1.3.1.5	– Size (neck)	<i>mm</i>	<i>500 x 400</i>	
1.4	DEVIATION FROM SPECIFICATION?		<i>State</i>	
1.4.1	Number of Amendments (0 if None)		<i>State</i>	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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W.2.7.6 HVAC (VSD Room Air Conditioning System)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AIR COOLED CHILLER			
1.1.1	CH1 & CH2			
1.1.1.1	– Type		<i>Air Cooled</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Heat Pump		<i>Yes</i>	
1.1.1.5	– Compressor		<i>Scroll</i>	
1.1.1.6	– Refrigerant		<i>R-410A</i>	
1.1.1.7	– Nominal Cooling	<i>kWr</i>	<i>780</i>	
1.1.1.8	– Flow	<i>ℓ/s</i>	<i>36.9</i>	
1.1.1.9	– Supply/Return temperature	<i>°C</i>	<i>7/12</i>	
1.1.1.10	– Power	<i>A</i>	<i>636</i>	
1.1.1.11	– Volt	<i>V</i>	<i>400/3/50</i>	
1.1.1.12	– Bacnet Interface		<i>Yes</i>	
1.2	CHILLED WATER AIR HANDLING UNITS			
1.2.1	AHU 1 & AHU 2			
1.2.1.1	– Type		<i>Top discharge & return</i>	
1.2.1.2	– Manufacturer		<i>State</i>	
1.2.1.3	– Model No.		<i>State</i>	
1.2.1.4	– Litres per Second	<i>ℓ/s</i>	<i>23 000</i>	
1.2.1.5	– Water Inlet and return temperature	<i>°C</i>	<i>7/12</i>	
1.2.1.6	– On/Off coil temperature	<i>°C</i>	<i>28/12</i>	
1.2.1.7	– Plug fans		<i>Yes</i>	
1.2.1.8	– BacNet Controller		<i>Yes</i>	
1.2.1.9	– Distribution/Control Board		<i>Yes</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.1.10	– Volt	V	400/3/50	
1.3	CHILLED WATER PUMPS			
1.3.1	PRD3			
1.3.1.1	– Type		Vsd Pump Set	
1.3.1.2	– Manufacturer		State	
1.3.1.3	– Model No.		State	
1.3.1.4	– Pressure	kPa	116	
1.3.1.5	– Flow	l/s	36.9	
1.4	PRESSURE RELIEF DAMPERS			
1.4.1	PRD3			
1.4.1.1	– Type		Pressure Relief	
1.4.1.2	– Manufacturer		State	
1.4.1.3	– Model No.		State	
1.4.1.4	– Finish		Natural Anodised	
1.4.1.5	– Size	mm	500 x 500	
1.4.1.6	– Plenum		No	
1.4.1.7	– Air Speed	m/s	2.5	
1.4.1.8	– Pressure	Pa	30	
1.5	DEVIATION FROM SPECIFICATION?		Yes/No	State
1.5.1	Number of Amendments (0 if None)			State
1.5.2				
1.5.3				
1.5.4				
1.5.5				

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W.2.7.7 HVAC (Guard House)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	SPLIT TYPE AIR CONDITIONING UNITS			
1.1.1	MW1 (GUARD ROOM & SERVER ROOM))			
1.1.1.1	– Type		Ceiling Cassette	
1.1.1.2	– Manufacturer		State	
1.1.1.3	– Model No.		State	
1.1.1.4	– Heat Pump		Yes	
1.1.1.5	– Refrigerant		R-410A	
1.1.1.6	– Nominal Cooling	kWr	5.6	
1.1.1.7	– Nominal Heating	kWr	5.6	
1.1.1.8	– Power	kWe	3.15	
1.1.1.9	– Volts	V	220/1/50	
1.2	WALL/WINDOW MOUNTED FANS			
1.2.1	WF1			
1.2.1.1	– Type		Mid-wall	
1.2.1.2	– Manufacturer		State	
1.2.1.3	– Model No.		State	
1.2.1.4	– Diameter	mm	200	
1.2.1.5	– Litres per Second	ℓ/s	45	
1.2.1.6	– Static Pressure	Pa	60	
1.2.1.7	– Motor Power	kW	0.1	
1.2.1.8	– Volt	V	220/1/50	
1.2.2	WF2			
1.2.2.1	– Type		Ceiling Cassette	
1.2.2.2	– Manufacturer		State	
1.2.2.3	– Model No.		State	
1.2.2.4	– Diameter	mm	260	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.2.5	– <i>Litres per Second</i>	<i>l/s</i>	<i>120</i>	
1.2.2.6	– <i>Static Pressure</i>	<i>Pa</i>	<i>30</i>	
1.2.2.7	– <i>Motor Power</i>	<i>kW</i>	<i>0.1</i>	
1.2.2.8	– <i>Volt</i>	<i>V</i>	<i>220/1/50</i>	
1.3	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.3.1	Number of Amendments (0 if None)		State	
1.3.2				
1.3.3				
1.3.4				
1.3.5				

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W.2.7.8 HVAC (Operation and Control Centre)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	AXIAL FLOW FANS			
1.1.1	F1			
1.1.1.1	– Type		<i>Axial Flow</i>	
1.1.1.2	– Manufacturer		<i>State</i>	
1.1.1.3	– Model No.		<i>State</i>	
1.1.1.4	– Diameter	<i>mm</i>	<i>400</i>	
1.1.1.5	– Speed (max)	<i>rpm</i>	<i>1008</i>	
1.1.1.6	– Litres per Second	<i>ℓ/s</i>	<i>528</i>	
1.1.1.7	– Static Pressure	<i>Pa</i>	<i>100</i>	
1.1.1.8	– Motor Power	<i>kW</i>	<i>0.8</i>	
1.1.1.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.1.2	F2			
1.1.2.1	– Type		<i>Axial Flow</i>	
1.1.2.2	– Manufacturer		<i>State</i>	
1.1.2.3	– Model No.		<i>State</i>	
1.1.2.4	– Diameter	<i>mm</i>	<i>450</i>	
1.1.2.5	– Speed (max)	<i>rpm</i>	<i>2880</i>	
1.1.2.6	– Litres per Second	<i>ℓ/s</i>	<i>1500</i>	
1.1.2.7	– Static Pressure	<i>Pa</i>	<i>350</i>	
1.1.2.8	– Motor Power	<i>kW</i>	<i>1.5</i>	
1.1.2.9	– Volt	<i>V</i>	<i>400/3/50</i>	
1.2	WEATHER LOUVRES			
1.2.1	WL1			
1.2.1.1	– Type		<i>Aluminium, fixed blade</i>	
1.2.1.2	– Manufacturer		<i>State</i>	
1.2.1.3	– Model No.		<i>State</i>	
1.2.1.4	– Blade Spacing	<i>mm</i>	<i>50</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.1.5	– Finish		Natural Anodised	
1.2.1.6	– Size (neck)	mm	600 x 400	
1.2.1.7	– Plenum		Yes	
1.2.1.8	– Opposed Blade Damper		No	
1.2.2	WL2			
1.2.2.1	– Type		Aluminium, fixed blade	
1.2.2.2	– Manufacturer		State	
1.2.2.3	– Model No.		State	
1.2.2.4	– Blade Spacing	mm	50	
1.2.2.5	– Finish		Natural Anodised	
1.2.2.6	– Size (neck)	mm	600 x 1200	
1.2.2.7	– Plenum		No	
1.2.2.8	– Opposed Blade Damper		No	
1.2.3	WL3			
1.2.3.1	– Type		Aluminium, fixed blade	
1.2.3.2	– Manufacturer		State	
1.2.3.3	– Model No.		State	
1.2.3.4	– Blade Spacing	mm	50	
1.2.3.5	– Finish		Natural Anodised	
1.2.3.6	– Size (neck)	mm	350 x 300	
1.2.3.7	– Plenum		No	
1.2.3.8	– Opposed Blade Damper		No	
1.3	WASHABLE FILTERS			
1.3.1	WF1			
1.3.1.1	– Type		Washable, pleated	

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1.3.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.3.1.3	– <i>Model No.</i>		<i>State</i>	
1.3.1.4	– <i>Size</i>	<i>mm</i>	<i>595 x 595</i>	
1.3.1.5	– <i>Efficiency</i>	<i>%</i>	<i>20</i>	
1.3.1.6	– <i>Arrestance</i>	<i>%</i>	<i>90%</i>	
1.3.1.7	– <i>Dirty Pressure Drop</i>	<i>Pa</i>	<i>250</i>	
1.4	SOUND ATTENUATORS (SILENCERS)			
1.4.1	SILENCER FOR F1			
1.4.1.1	– <i>Type</i>		<i>Circular, no pod</i>	
1.4.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.4.1.3	– <i>Model No.</i>		<i>State</i>	
1.4.1.4	– <i>Size</i>	<i>mm</i>	<i>400</i>	
1.4.1.5	– <i>Exit noise level</i>	<i>dBA</i>	<i>65</i>	
1.4.2	SILENCER FOR F2			
1.4.2.1	– <i>Type</i>		<i>Circular, no pod</i>	
1.4.2.2	– <i>Manufacturer</i>		<i>State</i>	
1.4.2.3	– <i>Model No.</i>		<i>State</i>	
1.4.2.4	– <i>Size</i>	<i>mm</i>	<i>450</i>	
1.4.2.5	– <i>Exit noise level</i>	<i>dBA</i>	<i>65</i>	
1.5	CIRCULAR DUCT FANS			
1.5.1	F3			
1.5.1.1	– <i>Type</i>		<i>Silent circular duct</i>	
1.5.1.2	– <i>Manufacturer</i>		<i>State</i>	
1.5.1.3	– <i>Model No.</i>		<i>State</i>	
1.5.1.4	– <i>Diameter</i>	<i>mm</i>	<i>200</i>	
1.5.1.5	– <i>Speed (max)</i>	<i>rpm</i>	<i>2780</i>	
1.5.1.6	– <i>Litres per Second</i>	<i>ℓ/s</i>	<i>200</i>	
1.5.1.7	– <i>Static Pressure</i>	<i>Pa</i>	<i>70</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.1.8	– Motor Power	kW	0.2	
1.5.1.9	– Volt	V	220/1/50	
1.6	SPLIT TYPE AIR CONDITIONING UNITS			
1.6.1	MW1 & OU1			
1.6.1.1	– Type		Under ceiling	
1.6.1.2	– Manufacturer		State	
1.6.1.3	– Model No.		State	
1.6.1.4	– Heat Pump		Yes	
1.6.1.5	– Refrigerant		R-410A	
1.6.1.6	– Nominal Cooling	kWr	16.11	
1.6.1.7	– Power	kWe	16.11	
1.6.1.8	– Volt	V	220/1/50	
1.7	MULTI SPLIT TYPE AIR CONDITIONING SYSTEM (VRF HEAT RECOVERY)			
1.7.1	INDOOR UNIT CA1			
1.7.1.1	– Type		Cassette	
1.7.1.2	– Manufacturer		State	
1.7.1.3	– Model No.		State	
1.7.1.4	– Nominal Cooling	kWr	3.6	
1.7.1.5	– Nominal Heating	kWr	3.6	
1.7.2	INDOOR UNIT CA2			
1.7.2.1	– Type		Cassette	
1.7.2.2	– Manufacturer		State	
1.7.2.3	– Model No.		State	
1.7.2.4	– Nominal Cooling	kWr	4.5	
1.7.2.5	– Nominal Heating	kWr	4.5	
1.7.2.6	– Type		Balancing damper	
1.7.3	INDOOR UNIT CA3			
1.7.3.1	– Type		Cassette	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.7.3.2	– <i>Manufacturer</i>		<i>State</i>	
1.7.3.3	– <i>Model No.</i>		<i>State</i>	
1.7.3.4	– <i>Nominal Cooling</i>	<i>kWr</i>	8.2	
1.7.3.5	– <i>Nominal Heating</i>	<i>kWr</i>	8.2	
1.7.4	INDOOR UNIT HA2			
1.7.4.1	– <i>Type</i>		<i>Ducted split</i>	
1.7.4.2	– <i>Manufacturer</i>		<i>State</i>	
1.7.4.3	– <i>Model No.</i>		<i>State</i>	
1.7.4.4	– <i>Nominal Cooling</i>	<i>kWr</i>	10.6	
1.7.4.5	– <i>Nominal Heating</i>	<i>kWr</i>	10.6	
1.7.4.6	– <i>Manufacturer</i>		<i>State</i>	
1.7.5	INDOOR UNIT HA3			
1.7.5.1	– <i>Type</i>		<i>Ducted split</i>	
1.7.5.2	– <i>Manufacturer</i>		<i>State</i>	
1.7.5.3	– <i>Model No.</i>		<i>State</i>	
1.7.5.4	– <i>Nominal Cooling</i>	<i>kWr</i>	15.8	
1.7.5.5	– <i>Nominal Heating</i>	<i>kWr</i>	15.8	
1.7.6	INDOOR UNIT HA3			
1.7.6.1	– <i>Type</i>		<i>Ducted split</i>	
1.7.6.2	– <i>Manufacturer</i>		<i>State</i>	
1.7.6.3	– <i>Model No.</i>		<i>State</i>	
1.7.6.4	– <i>Nominal Cooling</i>	<i>kWr</i>	28.0	
1.7.6.5	– <i>Nominal Heating</i>	<i>kWr</i>	28.0	
1.7.7	OUTDOOR UNIT (OU1 & OU2)			
1.7.7.1	– <i>Type</i>		<i>Heat recovery</i>	
1.7.7.2	– <i>Manufacturer</i>		<i>State</i>	
1.7.7.3	– <i>Model No.</i>		<i>State</i>	
1.7.7.4	– <i>Heat Pump</i>		Yes	
1.7.7.5	– <i>Refrigerant</i>		R-410A	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.7.7.6	– Nominal Cooling	kWr	84	
1.7.7.7	– Power	kWe	20.2	
1.7.7.8	– Volt	V	400/3/50	
1.7.8	OUTDOOR UNIT (OU1 & OU2)			
1.7.8.1	– BS1		2 Port	
1.7.8.2	– BS2		3 Port	
1.7.8.3	– BS3		4 Port	
1.8	EXTRACT DISC VALVE			
1.8.1	EDV1			
1.8.1.1	– Type		Steel	
1.8.1.2	– Manufacturer		State	
1.8.1.3	– Model No.		State	
1.8.1.4	– Finish		Powder Coated White	
1.8.1.5	– Size (neck)	mm	Ø 200	
1.8.2	EDV2			
1.8.2.1	– Type		Plastic	
1.8.2.2	– Manufacturer		State	
1.8.2.3	– Model No.		State	
1.8.2.4	– Finish		White	
1.8.2.5	– Size (neck)	mm	Ø 200	
1.9	SUPPLY DISC VALVE			
1.9.1	EDV1			
1.9.1.1	– Type		Steel	
1.9.1.2	– Manufacturer		State	
1.9.1.3	– Model No.		State	
1.9.1.4	– Finish		Powder coated white	
1.9.1.5	– Size (neck)	mm	Ø150	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9.2	EDV2			
1.9.2.1	– Type		Steel	
1.9.2.2	– Manufacturer		State	
1.9.2.3	– Model No.		State	
1.9.2.4	– Finish		Powder coated white	
1.9.2.5	– Size (neck)	mm	Ø200	
1.10	SUPPLY AIR GRILLE			
1.10.1	SAG1			
1.10.1.1	– Type		Aluminium	
1.10.1.2	– Manufacturer		State	
1.10.1.3	– Model No.		State	
1.10.1.4	– Finish		Powder coated white	
1.10.1.5	– Size (neck)	mm	300×300	
1.11	RETURN AIR GRILLE			
1.11.1	RAG1			
1.11.1.1	– Type		Hinged	
1.11.1.2	– Manufacturer		State	
1.11.1.3	– Model No.		State	
1.11.1.4	– Finish		Powder coated white	
1.11.1.5	– Size (neck)	mm	600×600	
1.11.2	RAG2			
1.11.2.1	– Type		Hinged	
1.11.2.2	– Manufacturer		State	
1.11.2.3	– Model No.		State	
1.11.2.4	– Finish		Powder coated white	
1.11.2.5	– Size (neck)	mm	1200×600	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.12	CONSTANT AIR VOLUME DIFFUSER			
1.12.1	CAV1			
1.12.1.1	– Type		Square plate	
1.12.1.2	– Manufacturer		State	
1.12.1.3	– Model No.		State	
1.12.1.4	– Finish		Powder coated white	
1.12.1.5	– Size (neck)	mm	Ø 150	
1.12.2	CAV2			
1.12.2.1	– Type		Square plate	
1.12.2.2	– Manufacturer		State	
1.12.2.3	– Model No.		State	
1.12.2.4	– Finish		Powder coated white	
1.12.2.5	– Size (neck)	mm	Ø 175	
1.13	CROSS TALK ATTENUATORS			
1.13.1	TAG 1			
1.13.1.1	– Type		Attenuator	
1.13.1.2	– Manufacturer		State	
1.13.1.3	– Model No.		State	
1.13.1.4	– Finish		Powder coated white	
1.13.1.5	– Size (neck)	mm	300 x 200	
1.13.2	CAV2			
1.13.2.1	– Type		Attenuator	
1.13.2.2	– Manufacturer		State	
1.13.2.3	– Model No.		State	
1.13.3	– Finish		Powder coated white	
1.13.4	– Size (neck)	mm	600×200	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.14	DOOR GRILLES			
1.14.1	DG1			
1.14.1.1	– Type		<i>Aluminium, fixed blade, non-vision</i>	
1.14.1.2	– Manufacturer		State	
1.14.1.3	– Model No.		State	
1.14.1.4	– Finish		<i>Natural Anodised</i>	
1.14.1.5	– Size (neck)	mm	400 x 400	
1.15	ELECTRICAL CONTROL PANEL			
1.15.1	Manufacturer		State	
1.15.2	Size		State	
1.16	LOCK-OUT ISOLATOR			
1.16.1	Manufacturer		State	
1.17	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.17.1	Number of Amendments (0 if None)		State	
1.17.2				
1.17.3				
1.17.4				
1.17.5				

W.2.7.9 HVAC Plant (Corrosion Protection)

For each HVAC item and piece of Plant supplied under this Contract, a separate form needs to be completed and returned.

Item No / Description Applicator proposed	Name:
	Contact person:
	Tel.:
	Address:
Value of corrosion protection	R
Material	
Finish	
Surface Preparation	
Coating Thickness	
Coating Application	
Quality of Coating	
Testing of Coating	
Remarks/Deviations	

SCHEDULE X – ELECTRICAL WORKS

X. ELECTRICAL WORKS

X.1 PREAMBLE – ELECTRICAL WORKS

X.1.1 INTRODUCTION

- a) Only Plant based on proven technology and of high reliability shall be considered for use.
- b) All Schedules shall be fully completed in block letters using a black pen or typing. Failure to complete all relevant sections may result in the Tender being rejected and/or disqualified.
- c) Preference shall be given to locally manufactured plant and components. Should items not be locally manufactured, Tenderers shall clearly identify these in their Tender.
- d) Tenderers shall ensure that they are fully acquainted with the contents of Section 38 – “Electrical General” and Section 39 – “Electrical Plant and Installation” of the Specification. The Contractor shall indicate, at tender stage, all variations from the Specification.
- e) Tenderers shall ensure that the proposed Plant will fit into the spaces provided prior to submission of the Tender. Any alteration required for specific Plant shall be submitted with the Tender. If no information is received with the Tender, it will be assumed that the building, space or panel will accommodate the Plant offered.
- f) All Schedules concerning Plant incorporating proprietary brand products or units, shall be fully supplemented by the inclusion of applicable brochures, pamphlets, additional explanatory specifications, descriptions or notes in that order of availability and shall be submitted with the bid in a covering letter and bound separately.
- g) The Tenderer shall complete the Schedules giving details of suppliers of Plant.
- h) Where Tenderers wish to bring special characteristics of Plant offered to the attention of the Engineer, Tenderers shall supply descriptive literature and brochures to supplement information in the Technical Data Sheets.
- i) Where the Specification calls for specific makes and types of Plant, the Tendered prices shall be based on such Plant.

X.2 ELECTRICAL SCHEDULES**X.2.1 LOW VOLTAGE SCHEDULES (Low Lift and High Lift Pumping Stations)****X.2.1.1 Low Voltage Distribution Boards (DB) and Motor Control Centres (MCC)****(TO BE COMPLETED FOR EACH DB AND MCC)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER AND TYPE NO		State	
1.2	APPLICABLE STANDARD		State	
1.3	ISO9001 CERTIFICATION		State	
1.4	TYPE TESTED DESIGN CERTIFICATION		State	
1.5	SEGREGATION		State	
1.6	ASSEMBLY TYPE		State	
1.7	PROTECTION CLASS: IP		IP31	
1.8	MODULE CONSTRUCTION TYPE		State	
1.9	CABLE ENTRY		State	
1.10	MOUNTING		State	
1.11	BUSBAR DIMENSIONS (W, T)	mm	State	
1.12	OVERALL DIMENSIONS (H, W, D)	mm	State	
1.13	OVERALL MASS	kg	State	
1.14	FREQUENCY	Hz	State	
1.15	PHASES		State	
1.16	RATED OPERATING VOLTAGE	V	State	
1.17	RATED INSULATION VOLTAGE	kV	State	
1.18	RATED IMPULSE WITHSTAND VOLTAGE	kV	State	
1.19	RATED NORMAL CURRENT OF THE BUSBAR			
1.19.1	Main Feeders	A	State	
1.19.2	Other Feeders	A	State	
1.20	RATED SHORT TIME WITHSTAND CURRENT	kA	State	
1.21	INTERNAL ARC WITHSTAND RATING	kA	State	
1.22	CONTROL TRANSFORMER RATING	kVA	State	
1.23	CONTROL VOLTAGE	V	220 V	
1.24	INCOMER CIRCUIT BREAKER MANUFACTURER AND TYPE NO		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.25	SUPPLY CIRCUIT BREAKERS MANUFACTURER AND TYPE NO		State	
1.26	SWITCH FUSES MANUFACTURER AND TYPE NO		State	
1.27	FUSE LINKS MANUFACTURER AND TYPE NO		State	
1.28	FUSES MANUFACTURER AND TYPE NO		State	
1.29	CONTACTORS MANUFACTURER AND TYPE NO		State	
1.30	INCOMER CIRCUIT BREAKER MANUFACTURER AND TYPE NO		State	
1.31	EARTH LEAKAGE CIRCUIT BREAKER WITH OVERLOAD PROTECTION MANUFACTURER AND TYPE NO		State	
1.32	OVERLOAD RELAYS (THERMAL) MANUFACTURER AND TYPE NO		State	
1.33	OVERLOAD RELAYS (ELECTRONIC) MANUFACTURER AND TYPE NO		State	
1.34	THERMISTOR RELAYS MANUFACTURER AND TYPE NO		State	
1.35	SELECTOR SWITCHES MANUFACTURER AND TYPE NO		State	
1.36	ISOLATING SWITCHES MANUFACTURER AND TYPE NO		State	
1.37	CURRENT TRANSFORMERS MANUFACTURER AND TYPE NO		State	
1.38	AMMETERS MANUFACTURER AND TYPE NO		State	
1.39	VOLTMETERS MANUFACTURER AND TYPE NO		State	
1.40	INDICATOR LIGHTS MANUFACTURER AND TYPE NO		State	
1.41	HOURS RUN METERS MANUFACTURER AND TYPE NO		State	
1.42	METERING MANUFACTURER AND TYPE NO		State	
1.43	PUSHBUTTONS MANUFACTURER AND TYPE NO		State	
1.44	POWER TRANSDUCER MANUFACTURER AND TYPE NO		State	
1.45	RELAYS (AC) MANUFACTURER AND TYPE NO		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.46	RELAYS (DC) MANUFACTURER AND TYPE NO		State	
1.47	PHASE FAILURE RELAYS MANUFACTURER AND TYPE NO		State	
1.48	SURGE SUPPRESSORS MANUFACTURER AND TYPE NO		State	
1.49	TERMINALS (POWER) MANUFACTURER AND TYPE NO		State	
1.50	TERMINALS (CONTROL) MANUFACTURER AND TYPE NO		State	
1.51	FERRULES MANUFACTURER AND TYPE NO		State	
1.52	TIMING RELAYS MANUFACTURER AND TYPE NO		State	
1.53	MOULDED CASE CIRCUIT BREAKERS MANUFACTURER AND TYPE NO		State	
1.54	CONTROL TRANSFORMER MANUFACTURER AND TYPE NO		State	
1.55	MOTOR STARTERS TYPES COORDINATION TYPE TO IEC 947		State	
1.56	PROTECTIVE COATING SYSTEM		State	
1.57	INTERNAL PAINT COLOUR		White	
1.58	EXTERNAL PAINT COLOUR		Electric orange	
1.59				
1.60	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.60.1	Number of Amendments (0 if None)		State	
1.60.2				
1.60.3				
1.60.4				
1.60.5				

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X.2.1.2 Diesel Standby Generator**(TO BE COMPLETED FOR EACH SIZE)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER AND TYPE NUMBER		State	
1.2	APPLICABLE STANDARD		State	
1.3	ISO 9001 CERTIFICATION		State	
1.4	TYPE TESTED DESIGN CERTIFICATION		State	
1.5	OPEN/CANOPY SET REQUIRED		Weatherproof Canopy	
1.6	MAKE AND MODEL NUMBER OF ENGINE		State	
1.7	MAKE AND MODEL NUMBER OF ALTERNATOR		State	
1.8	MAKE AND MODEL NUMBER OF CONTROLLERS		State	
1.9	FREQUENCY	Hz	50	
1.10	TERMINAL VOLTAGE	V	230/400	
1.11	MAXIMUM VOLTAGE VARIATION		< 5%	
1.12	MAXIMUM FREQUENCY VARIATION		< 2.5%	
1.13	TRANSIENT VOLTAGE DIP ON APPLICATION OF FULL LOAD		±2.5%	
1.14	VOLTAGE RECOVERY ON APPLICATION OF FULL LOAD	sec	< 3	
1.15	MAXIMUM HARMONIC DISTRIBUTION		< 3%	
1.16	NUMBER OF CYLINDERS		State	
1.17	BORE	mm	State	
1.18	STROKE	mm	State	
1.19	COMPRESSION RATIO		State	
1.20	PISTON DISPLACEMENT	litres	State	
1.21	PISTON SPEED, AT RATED RPM	r/min	State	
1.22	BMEP @ RATED KW OUTPUT	m/min	State	
1.23	MAKE AND TYPE OF GENERATOR		State	
1.24	STANDBY POWER RATING AT 0.8 PF	kW	State	
1.25	MAXIMUM PERIOD AT STANDBY RATING	hrs	State	
1.26	CONTINUOUS POWER RATING ON SITE AT 0.8 PF	kW	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.27	NET OUTPUT ON SITE	kW	State	
1.28	FUEL CONSUMPTION AT			
1.28.1	100% load	ℓ/h	State	
1.28.2	75% load	ℓ/h	State	
1.28.3	50% load	ℓ/h	State	
1.29	STARTING MOTOR LOAD INRUSH FOR 15% VOLT DIP	kVA	State	
1.30	MAKE OF FUEL INJECTION SYSTEM		State	
1.31	STARTING METHOD		Electric Starter	
1.32	STARTING SYSTEM VOLTAGE	V	State	
1.33	EXCITER TYPE		State	
1.34	EFFICIENCY AT 0.8 PF			
1.34.1	100% load		State	
1.34.2	75% load		State	
1.34.3	50% load		State	
1.35	GENERATOR INSULATION CLASS AND TEMPERATURE RISE	°C	State	
1.36	THREE PHASE VOLTAGE FAILURE RELAY RANGE	% to %	State	
1.37	THREE PHASE AUTOMATIC RECOVERY RELAY RANGE	% to %	State	
1.38	MAXIMUM AUTOMATIC ENGINE CRANKING	sec	State	
1.39	MAXIMUM NUMBER OF AUTO START ATTEMPTS TO ALARM		State	
1.40	ELECTRIC PUMP FOR FILLING FUEL TANK REQUIRED	Yes/No	Yes	
1.41	TIME DELAY RANGES		State	
1.41.1	From normal supply failure to automatic start delay	sec to sec	State	
1.41.2	From automatic start to emergency supply connected	sec to sec	State	
1.41.3	From normal supply available to normal supply connected	sec to sec	State	
1.42	MANUAL TEST START AND CHANGE OVER AVAILABLE	Yes/No	Yes	
1.43	DIESEL TANK CAPACITY (DOUBLE SKINNED)	litres	12 hours at full load	
1.44	METHOD OF COOLING		State	
1.45	METHOD OF PROTECTION AGAINST HIGH TEMPERATURE		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.46	METHOD OF PROTECTION AGAINST LOW OIL PRESSURE		State	
1.47	MINIMUM TIME REQUIRED TO ACCEPT FULL LOAD	sec	State	
1.48	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.48.1	Number of Amendments (0 if None)		State	
1.48.2				
1.48.3				
1.48.4				
1.48.5				

ENGINE MAINTENANCE

ITEM	TIME	FREQUENCY
TENDERER TO LIST (but shall include)		
Oil & Filter Change		(run hours/months):
Controls & W/Pump		(run hours/months):
Head Service		(run hours/months):
Minor Overhaul		(run hours/months):
Major Overhaul		(run hours/months):

X.2.1.3 Uninterruptible Power Supply

(TO BE COMPLETED FOR EACH UNIT)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER AND TYPE NUMBER		State	
1.2	APPLICABLE STANDARD		State	
1.3	ISO 9001 CERTIFICATION		State	
1.4	TYPE TESTED DESIGN CERTIFICATION		State	
1.5	INVERTER OUTPUT			
1.5.1	Voltage	V ± %	State	
1.5.2	Frequency	Hz ±. %	State	
1.5.3	Phases in / Phases out		State	
1.5.4	Power	kVA	State	
1.5.5	Power factor		State	
1.6	UPS PERFORMANCE LOAD DUTY			
1.6.1	Long-time overcurrent	% for....min	State	
1.6.2	Short time overcurrent	% for.....s	State	
1.6.3	Short circuit protection level	kA	State	
1.6.4	Output power factor range		State	
1.7	OUTPUT VOLTAGE HARMONICS			
1.7.1	Resistive no load to full load	% max THD	State	
1.7.2	Non-linear with crest factor of up to 3.0, no load to full load	% max THD	State	
1.7.3	UPS AC/AC efficiency at rated output	%	State	
1.8	BATTERY			
1.8.1	Type		State	
1.8.2	Guaranteed battery life	yrs	State	
1.8.3	Discharge period	hrs	State	
1.8.4	Battery bank isolation		State	
1.9	DEVIATION FROM SPECIFICATION?			
1.9.1	Number of Amendments (0 if None)	Yes/No	State	
1.9.2				
1.9.3				
1.9.4				
1.9.5				

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X.2.2 MEDIUM VOLTAGE SCHEDULES (Low Lift and High Lift Pumping Station)**X.2.2.1 Medium Voltage VSD's****(TO BE COMPLETED FOR EACH VSD)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER AND COUNTRY OF MANUFACTURING		State	
1.2	PRODUCT NUMBER		State	
1.3	APPLICABLE STANDARD		State	
1.4	ISO 9001 CERTIFICATION		State	
1.5	TYPE TESTED DESIGN CERTIFICATION		State	
1.6	POWER SUPPLY			
1.6.1	Rated VSD voltage	kV	11	
1.6.2	Rated supply (motor) voltage at Low lift pump Station	kV	3.3	
1.6.3	Rated supply (motor) voltage at High-Lift Pumping Station	kV	6.6	
1.6.4	Rated motor load at Low-Lift Pumping Station	kW	1250	
1.6.5	Rated motor load at High-Lift Pumping Station	kW	4500	
1.6.6				
1.6.7	Tolerance of input voltage	%	State	
1.6.8	Rated input frequency	Hz	50	
1.6.9	Supply frequency tolerance	±%	State	
1.6.10	Input cos ϕ (displacement factor)		>0.95	
1.6.11	Input total current harmonic distortion (THDi)	%	≤ 5 (meets or exceeds IEEE 519)	
1.6.12	Basic impulse level (BIL)	kV	State	
1.6.13	Short circuit capacity	kA	State	
1.6.14	Voltage class	kV	State	
1.7	ELECTRICAL DETAILS			
1.7.1	Type of converter		State	
1.7.2	Topology		State	
1.7.3	Type of motor		State	
1.7.4	Rectifier section		State	
1.7.5	Inverter section		State	
1.7.6	Control method		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.7.7	Control mode		State	
1.7.8	Control type		State	
1.7.9	Number of pulse		State	
1.7.10	Output frequency range	Hz	State	
1.7.11	Number of input phase-shifting transformer	No.	State	
1.7.12	LV IGBTs switching frequency	Hz	State	
1.7.13	Power cell switching frequency (complete bridge)	Hz	State	
1.7.14	Output Switching Frequency (applied on the motor)	Hz	State	
1.7.15	Output voltage range	kV	State	
1.7.16	Output current	A	State	
1.7.17	Overload capacity (Normal Duty)		State	
1.7.18	Phase shift transformer windings	Al/Cu	State	
1.7.19	Efficiency	%	State	
1.7.20	Total losses for transformer	kW	State	
1.7.21	Total losses for transformer plus output filter	kW	State	
1.7.22	Peak voltage (phase-ground)	V	State	
1.7.23	Peak voltage (phase-phase)	V	State	
1.7.24	Control voltage	V	State	
1.7.25	Motor temperature controller		State	
1.7.26	Communication protocols		State	
1.7.27	Number of starts per hour	starts/hr	State	
1.7.28	Derating at 50°C ambient		State	
1.7.29	By-pass contactor fitted?	Yes/No	Yes	
1.8	INPUTS/OUTPUTS			
1.8.1	Number of analog inputs		State	
1.8.2	Number of analog outputs		State	
1.8.3	Number of digital inputs		State	
1.8.4	Number of digital outputs		State	
1.8.5	PID regulator	Yes/No	State	
1.8.6	Serial interface	RS232/R S485	State	
1.9	DRIVE DETAILS			
1.9.1	MTBF	hrs	State	
1.9.2	MTTR	min	State	
1.9.3	Speed regulation	%	State	
1.9.4	Starting current limit % FLC	%	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9.5	Maximum ramp-up time	s	State	
1.9.6	Maximum ramp-down time	s	State	
1.9.7	Slip compensation	%	State	
1.9.8	Skip frequency	No.	State	
1.9.9	Number of acceleration/deceleration ramps	No.	State	
1.9.10	Self diagnostic trip status required	Yes/No	Yes	
1.9.11	History of trips	No.	State	
1.9.12	Auto re-start required	Yes/No	Yes	
1.9.13	Start voltage boost range	%	State	
1.9.14	Maximum ride-through volts dip	%	State	
1.9.15	Maximum ride-through time	sec	State	
1.10	DRIVE PROTECTION			
1.10.1	Recommended upstream protection		State	
1.10.2	Input overvoltage	Yes/No	Yes	
1.10.3	Internal overtemperature	Yes/No	Yes	
1.10.4	Overload	Yes/No	Yes	
1.10.5	Output short-circuit	Yes/No	Yes	
1.10.6	Earth fault	Yes/No	Yes	
1.10.7	Single-phase fault	Yes/No	Yes	
1.10.8	Cooling fan alarm	Yes/No	Yes	
1.10.9	Input phase loss	Yes/No	Yes	
1.10.10	Arc detection system	Yes/No	Yes	
1.11	MOTOR PROTECTION			
1.11.1	Stalled	Yes/No	Yes	
1.11.2	Overload	Yes/No	Yes	
1.11.3	Short-circuit	Yes/No	Yes	
1.11.4	Motor phase unbalance	Yes/No	Yes	
1.11.5	Earth fault	Yes/No	Yes	
1.11.6	Motor winding thermistor protection	Yes/No	Yes	
1.12	HMI/LOCAL CONTROL			
1.12.1	Stop/start control method		State	
1.12.2	HMI touch screen commands required	Yes/No	Yes	
1.12.3	HMI touch screen supervision/reading required	Yes/No	Yes	
1.12.4	Local control required	Yes/No	Yes	
1.12.5	Remote diagnostics and control required?	Yes/No	Yes	
1.12.6	POWER FACTOR CORRECTION		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.12.7	Power factor Correction size – Booster Pumps	kVAr	State	
1.12.8	Power factor Correction size – Main Pumps	kVAr	State	
1.13	SURGE PROTECTION		State	
1.14	POWER CABLES			
1.14.1	Cable type		State	
1.14.2	Cable size		State	
1.14.3	Maximum allowable cable length		State	
1.15	MECHANICAL DETAILS			
1.15.1	Enclosure IP Rating	IP31	State	
1.15.2	Overall dimensions (H, W, D)	mm	State	
1.15.3	Overall Mass	kg	State	
1.15.4	Line cable entry	top/bottom	State	
1.15.5	Motor cable entry	top/bottom	State	
1.15.6	Cooling method		State	
1.15.7	Mechanical interlocking between MV and LV required	Yes/No	Yes	
1.15.8	Sound pressure level at 1m	dB	State	
1.15.9	Minimum front door clearance	mm	State	
1.15.10	Minimum ceiling clearance	mm	State	
1.15.11	Air flow rate	m ³ /hr	State	
1.15.12	List all possible panel displays		State	
1.16	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.16.1	Number of Amendments (0 if None)		State	
1.16.2				
1.16.3				
1.16.4				
1.16.5				

List all VSD Protection provided:

List all Motor Protection provided:

List all I/O's:

List all communication options:

Power Factor Correction connection detail:

Surge Protection connection detail:

X.2.2.2 Power Factor Correction (Only at High Lift Pumping Station)

(TO BE COMPLETED FOR EACH SUPPLIER)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER AND TYPE NUMBER		State	
1.2	APPLICABLE STANDARD		State	
1.3	ISO 9001 CERTIFICATION		State	
1.4	TYPE TESTED DESIGN CERTIFICATION		State	
1.5	OVERALL DIMENSIONS (H, W, D)	mm	State	
1.6	OVERALL MASS	kg	State	
1.7	SIZE	kVAr	State	
1.8	VOLTAGE RATING	V	State	
1.9	TYPE OF OVER CURRENT PROTECTION		State	
1.10	TYPE OF OVER CURRENT PROTECTION		State	
1.11	TYPE OF OVER CURRENT PROTECTION		State	
1.12	TYPE OF OVER CURRENT PROTECTION		State	
1.13	TYPE OF OVER CURRENT PROTECTION		State	
1.14	TYPE OF INSULATION		State	
1.15	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.15.1	Number of Amendments (0 if None)		State	
1.15.2				
1.15.3				
1.15.4				
1.15.5				

Power Factor Correction connection detail:

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X.2.2.3 Protection Relays**(TO BE COMPLETED FOR EACH SUPPLIER)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	OVER CURRENT AND EARTH FAULT			
1.1.1	Manufacturer		State	
1.1.2	Type		Micro Processor Based	
1.1.3	Ordering Code		State	
1.1.4	Power Supply Arrangement		Standard DC	
1.1.5	Auxiliary Power Voltage	V	110 DC	
1.1.6	Auxiliary Power Consumption	W	State	
1.1.7	Minimum Number of Communication Ports	No.	2	
1.1.8	Protocol		IEC61850 (MMS & GOOSE)	
1.1.9	Communication Hardware Interface Type		Fibre Optic	
1.1.10	Communication Speed	mbps	10	
1.2	DIFFERENTIAL PROTECTION			
1.2.1	Manufacturer		State	
1.2.2	Type		Micro Processor Based	
1.2.3	Ordering Code		State	
1.2.4	Power Supply Arrangement		Standard DC	
1.2.5	Auxiliary Power Voltage	V	110 DC	
1.2.6	Auxiliary Power Consumption	W	State	
1.2.7	Minimum Number of Communication Ports		2	
1.2.8	Protocol		IEC61850 (MMS & GOOSE)	
1.2.9	Communication Hardware Interface Type		Fibre Optic	
1.2.10	Communication Speed	mbps	10	
1.3	ARC PROTECTION (If not part of O/C and E/F Protection)			
1.3.1	Manufacturer		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.2	Type		Micro Processor Based	
1.3.3	Ordering Code		State	
1.3.4	Power Supply Arrangement		Standard DC	
1.3.5	Auxiliary Power Voltage	V	110 DC	
1.3.6	Auxiliary Power Consumption	W	State	
1.3.7	Minimum Number of Communication Ports		2	
1.3.8	Protocol		IEC61850 (MMS & GOOSE)	
1.3.9	Communication Hardware Interface Type		Fibre Optic	
1.3.10	Communication Speed	mbps	10	
1.4	AUXILIARY RELAYS (Where required)			
1.4.1	Manufacturer		State	
1.4.2	Type		State	
1.4.3	Ordering Code		State	
1.5	ADDITIONAL INFORMATION			

X.2.2.4 DC Power Supply and Distribution Board**(TO BE COMPLETED FOR EACH SUPPLIER)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	BATTERY CHARGERS			
1.1.1	Is a Dual DC distribution board to be supplied?	Yes/No	State	
1.1.2	Application for which chargers are required		Floating, boost and trickle charging of station batteries	
1.1.3	Type of load connected		Relays, control modules, instruments, indications, solenoids, motors, emergency lighting	
1.1.4	Are chargers to operate in parallel?		No	
1.1.5	Type of battery of cells required		Sealed Nickel-Cadmium	
1.1.6	Number of cells		State	
1.1.7	Nominal battery DC voltage	V	110	
1.1.8	Amphere-hour capacity	Ah	State	
1.1.9	Type of battery chargers		Rectifier, automatic regulated type	
1.1.10	Type of voltage output adjustment		Automatic	
1.1.11	AC supply:			
1.1.11.1	– Number of phases		Three	
1.1.11.2	– Nominal AC supply voltage	V	400/230	
1.1.11.3	– Full load current	A	State	
1.1.11.4	– Nominal system frequency	Hz	50	
1.1.12	Limits of AC supply variations expressed as a percentage of nominal values of 400/230 V AC :			
1.1.12.1	– Maximum supply voltage	%	110	
1.1.12.2	– Minimum supply voltage	%	90	
1.1.12.3	– Variation in system frequency	%	2	
1.1.12.4	– Rated load current	A	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.12.5	– Allowable time for batteries to sustain power after failure	hrs	8	
1.1.12.6	– Battery fault level	kA	State	
1.1.12.7	– Input circuit fault level	kA	5	
1.1.12.8	– Maximum r.m.s. ripple voltage on DC output	mV	100	
1.1.12.9	– Maximum r.m.s. ripple current	%	1	
1.1.13	Insulation material used on transformer windings		TBA	
1.1.14	Type and method of surge suppression employed		TBA	
1.1.15	Type of voltage regulator used and principle of operation		TBA	
1.1.16	Type of voltage / current sensing element used		TBA	
1.1.17	Type of regulation element used (thyrist or, transistor, etc.)		TBA	
1.1.18	Limits of voltage regulation (expressed as a percentage of no-load output voltage with nominal input with nominal input voltage supplied) with :	%	State	
1.1.19	Is constant output voltage adjustable?	Yes/No	Yes	
1.1.20	Limits of adjustment of output voltage:			
1.1.20.1	– Maximum output voltage	V	132,0	
1.1.20.2	– Minimum output voltage	V	101,75	
1.1.21	Rated output current of charger	A	State	
1.1.22	Maximum output current for :			
1.1.22.1	– float charge	A	State	
1.1.22.2	– boost charge	A	State	
1.1.22.3	– equalize charge	A	State	
1.1.22.4	– initial charge	A	State	
1.1.22.5	– No. of output circuits			
	– 20A	No.	State	
	– 10A	No.	State	
	– DC Board		On Charger	
1.1.22.6	– Maximum output current into short circuit	A	State	
1.1.23	Method of current limiting		State	
1.1.24	Output current of charger at nominal voltage when supplying load plus discharged battery	A	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.25	Time taken to recharge battery under condition above	h	< 24 hours	
1.1.26	Type of protection and setting provided on input side		State	
1.1.27	Type of protection and setting provided on output		State	
1.1.28	Means of isolation on input side		State	
1.1.29	Means of isolating load from charger		State	
1.1.30	Type of charger fail protection		State	
1.1.31	Type of under voltage relay		State	
1.1.32	Type of earth relay		State	
1.1.33	Voltage setting range under voltage relay	V	State	
1.1.33.1	– Principle and type of earth fault relay		State	
1.1.33.2	– Type of ammeter used to indicate charger output	Analogu e/Digital	State	
1.1.33.3	– Surge arresting device required		Yes	
1.1.33.4	– Are key-operated locks on the disconnect device required?		Yes	
1.1.33.5	– Are boost charging facilities provided on charger?		Manual / SCADA	
1.1.33.6	– Earthing arrangement		Battery centre tap earthed through high resistance	
1.1.33.7	– Method of indicating abnormal operating conditions		Both visual and audible	
1.1.33.8	– Is a test facility for LEDs required?	Yes/No	Yes	
1.1.33.9	– Are alarm indications to remain until manually reset?	Yes/No	Yes	
1.1.33.10	– Are Battery charger alarms to be forwarded to SCADA?		Yes	
1.1.33.11	– Is the system fully automated and maintenance free?		Yes	
1.1.33.12	– Audible alarm requirements		By beeper	
1.1.33.13	– Type of alarm display required or proposed by the supplier, e.g. LCD, VDUs, print-outs Supervisory alarms and indicators required		As proposed by supplier	
1.1.33.14	– number of alarm changeover contacts required	No.	2	
1.1.33.15	– type of contacts		N/C N/O	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.33.16	– <i>rating of contacts</i>		5A/DC	
1.1.34	Overall dimensions of cubicle:			
1.1.34.1	– <i>Overall height</i>	mm	State	
1.1.34.2	– <i>Overall length</i>	mm	State	
1.1.34.3	– <i>Overall depth</i>	mm	State	
1.1.35	Type of cubicle		Free standing floor mounted over cable duct	
1.1.36	Width of cable duct	mm		
1.1.37	Position of cable duct		Nearest edge 500 mm from back wall	
1.1.38	Position of cable entry		bottom	
1.1.39	Position of cable gland plate		bottom	
1.1.40	Type of access to charger for maintenance:		hinged door	
1.1.40.1	– <i>Front, rear, side or all</i>		<i>front</i>	
1.1.41	Is enclosure to be lockable?	Yes/No	Yes	
1.1.42	Is forced ventilation acceptable?	Yes/No	No	
1.1.43	Thickness of sheet steel of which cubicle is made	mm	2	
1.1.44	Mass of cubicle with charging equipment	kg	State	
1.1.45	Finish of cubicle		Cloud Grey F48 to SABS 1091 of 1975	
1.1.46	Is reversed battery connection protection required? If YES, details of protection method.	Yes/No	Yes	
1.1.47	Duration of peak current loading	sec	1,0 sec	
1.1.48	Location of batteries		Onboard/separ ate	
1.1.49	Battery stand or a battery cabinet?		State	
1.1.50	Battery stand material		Wood/Plastic	
1.1.51	Battery deterioration factor		0,8	
1.2	ADDITIONAL INFORMATION			

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X.2.2.5 Supervisory Control System**(TO BE COMPLETED FOR EACH SUPPLIER)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GATEWAY EQUIPMENT			
1.1.1	Manufacturer		State	
1.1.2	Type		State	
1.1.3	Power Supply Arrangement		Dual Redundant	
1.1.4	Auxiliary Power Voltage	V	110 DC	
1.1.5	Auxiliary Power Consumption	W	State	
1.2	MASTER SCADA INTERFACE			
1.2.1	Number of Channels	No.	2	
1.2.2	Channel A Protocol		IEC60870-5-101	
1.2.3	Channel A Hardware Interface type		Fibre Optic	
1.2.4	Channel A Communication speed		State	
1.2.5	Channel B Protocol		IEC60870-5-104	
1.2.6	Channel B Hardware Interface Type		Fibre Optic	
1.2.7	Channel B Communication Speed		State	
1.2.8	Other Channels Protocol		State	
1.2.9	Other Channels Hardware Interface Type		State	
1.2.10	Other Channel Communication Speed		State	
1.3	SIED / RTU INTERFACE			
1.3.1	Protocol		IEC 61850, IEC 60870-5-103 or DNP3	
1.3.2	Hardware Interface Type		Fibre Optic	
1.3.3	Communication Speed		State	
1.4	PROTECTION/CONTROL IED INTERFACE			
1.4.1	Protocol		IEC 61850	
1.4.2	Hardware Interface Type		Fibre Optic	
1.4.3	Communication Speed		State	
1.5	SIED / RTU EQUIPMENT			
1.5.1	Manufacturer		State	
1.5.2	Type		State	
1.5.3	Power Supply Arrangement		Dual Redundant	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.4	Auxiliary Power Voltage	V	110 DC	
1.5.5	Auxiliary Power Consumption	W	State	
1.5.6	Analogue signals input type		4-20mA	
1.5.7	Number of Analogue signals	No.	4	
1.5.8	Status signals input type		110V DC	
1.5.9	Number of Status signals	No.	16	
1.5.10	Control signals output type		110 V DC Single pole	
1.5.11	Number of Control signals	No.	4	
1.6	S-LAN EQUIPMENT			
1.6.1	Manufacturer		State	
1.6.2	Type		State	
1.6.3	Power Supply Arrangement		Dual Redundant	
1.6.4	Auxiliary Power Voltage	V	110 DC	
1.6.5	Auxiliary Power Consumption	W	State	
1.6.6	Number of Communication Ports	No.	State	
1.6.7	Protocol		State	
1.6.8	Hardware Interface Type		State	
1.6.9	Communication Speed	Mbit/s	State	
1.7	POWER SUPPLY			
1.7.1	Power Supply Arrangement		Dual Redundant 110V DC, direct input	
1.7.2	Additional Power Converters		None	
1.7.3	Total Consumption of Gateway, SIED, LAN and other SCADA interface Equipment	W	State	
1.8	ADDITIONAL INFORMATION			

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X.2.2.6 11 kV Switchboard**(TO BE COMPLETED FOR EACH SUPPLIER)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Manufacturer of switchboard		State	
1.1.1.1	– Type		State	
1.1.1.2	– Country of origin		State	
1.1.1.3	– Catalogue/type designation		State	
1.1.1.4	– Is installation and on site testing to be carried out by supplier	Yes/No	Yes	
1.1.2	Busbar pattern			
1.1.2.1	Type		Double	
1.1.2.2	– What is the 11kV earth fault current:	kA	State	
1.1.2.3	– Primary substations with NER (where applicable)	A	300	
1.1.2.4	– D.C Circuit protection		D.C. MCB's	
1.1.2.5	– State requirements for main circuit designation labels		White traffolite with black letters	
1.1.2.6	– State method used to attach labels		Mechanical (screws)	
1.1.2.7	– Where are main circuit labels to be placed?		On the front and back of each switchgear panel	
1.1.3	Dimensions Double bus:			
1.1.3.1	– Height	mm	State	
1.1.3.2	– Depth	mm	State	
1.1.3.3	– Width (400 A, 630 A & 800 A panel)	mm	State	
1.1.3.4	– Width (2 500 A, 2 000 A & 1250 A panel)	mm	State	
1.2	RATINGS			
1.2.1	Switchboard rating plate		In compliance with SANS 1885 clause 4.16.2	
1.2.2	Number of phases	No.	3	
1.2.3	Frequency	Hz	50	
1.2.3.1	– Rated (Design) Voltage	kV	12	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.3.2	– Highest equipment voltage	kV	12	
1.2.3.3	– Nominal Voltage	kV	11	
1.2.4	Fault capacity			
1.2.4.1	– Rated r.m.s. short time withstand current	kA	28	
1.2.4.2	– Making capacity	kA	50	
1.2.4.3	– Through-fault rating for 3 seconds	kA	25	
1.2.4.4	– Rated peak withstand current	kA	63	
1.2.4.5	– Internal arc withstand current @ 200 ms	kA	25	
1.2.4.6	– Rated peak insulation level (BIL)	kV	95	
1.2.4.7	– Corona extinction voltage:			
1.2.4.8	– To earth	kV	8	
1.2.4.9	– Between phases	kV	14	
1.2.5	Auxiliary supply voltage?	V DC	110	
1.2.6	Rated operating sequence		O-0,3s-CO-3min-Co	
1.2.7	Internal arc classification		AFLR	
1.2.8	Internal arc detection sensors (IAC)		Yes	
1.2.9	Internal arc protection using arc-light and current	Required	Yes	
1.2.10	Degree of protection - Compartment		IP2X	
1.2.11	Degree of protection - Enclosure		IP4X	
1.2.12	Pre-drill cable entries and vermin proofed		Yes	
1.3	BUSBARS			
1.3.1	Current rating at Low Lift Pump Station	A	1250	
1.3.2	Current rating at High-Lift Pumping Station	A	2500	
1.3.3	Insulating medium	-	Air / Epoxy	
1.3.4	Dimensions of busbar chamber			
1.3.4.1	– Height	mm	State	
1.3.4.2	– Depth	mm	State	
1.3.5	Clear access to busbars by removal of cover plate only	Yes/No	Yes	
1.3.6	Creepage distance	mm/kV	20	
1.3.7	Dimensions of access opening			
1.3.7.1	– Width	mm	State	
1.3.7.2	– Depth	mm	State	
1.4	CIRCUIT-BREAKERS			

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4.1	Relevant standard	-	State	
1.4.1.1	– Circuit-breaker rating plate		<i>In compliance with SANS 1885 clause 4.16.3</i>	
1.4.2	Type			
1.4.2.1	– Interrupting medium vacuum or SF6	-	<i>Vacuum preferred</i>	
1.4.2.2	– Is a device for monitoring the SF6 pressure required?	Yes/No	Yes	
1.4.2.3	– Are earthing facilities required for all main circuits?	Yes/No	Yes	
1.4.2.4	– Details of earthing facilities offered		State	
1.4.2.5	– Is an integral 3 pole earth switch on switch disconnecter required	Yes/No	Yes	
1.4.2.6	– Is an integral earthing facility on the circuit side of the switch disconnecter required?	Yes/No	Yes	
1.4.2.7	– Type of switch disconnecter offered		State	
1.4.2.8	– Are open/close switches for local electrical operation required?	Yes/No	Yes	
1.4.2.9	– Breaker position indication provided	Yes/No	Yes	
1.4.2.10	– Interlocks – Full operation behind closed doors	Yes/No	Yes	
1.4.2.11	– Supply voltage of spring charge motor	DC	110V	
	– Type of circuit breaker closing mechanism offered		State	
	Peak power	kW	T.B.A.	
	Steady power	KW	T.B.A	
	Current	A	T.B.A	
	Voltage	V	110	
1.4.2.12	– Minimum number of contacts:			
	SF6/Vacuum Alarm		2b	
	Lock- out SF6		2b	
	Circuit-breaker auxiliary 'a'		4	
	Circuit-breaker auxiliary 'b'		4	
	Spring limit		1	
	Circuit breaker earthed		1b	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	<i>Should the circuit breaker auxiliary contacts be wired to the multi-core cable compartment behind the switchgear</i>	Yes/No	Yes	
	<i>Number of spare contacts</i>			
	<i>- "a" contacts</i>		2	
	<i>- "b" contacts</i>		2	
1.4.2.13	– <i>Circuit breaker details</i>			
	<i>Manufacturer</i>		State	
	<i>Country of origin</i>		State	
	<i>Model/type designation</i>		State	
	<i>Total mass</i>		State	
	<i>Rating nameplate position</i>		State	
1.4.2.14	– <i>Isolation displacement of circuit-breaker</i>		<i>Horizontal/ Vertical</i>	
1.4.2.15	– <i>Is three pole integral earthing on the circuit side required?</i>	Yes/No	Yes	
1.4.2.16	– <i>Maximum current from battery</i>	A	State	
1.4.3	Current rating			
1.4.3.1	– <i>Incomer and Inter-connector rated nominal current</i>	A	2500	
1.4.3.2	– <i>Feeder: rated nominal current</i>	A	800	
1.4.4	Closing mechanism	-		
1.4.4.1	– <i>Type</i>		<i>Motor wound spring preferred</i>	
1.4.4.2	– <i>ON, OFF, EARTH and SERVICE position labels</i>		<i>In compliance with clause 4.17.4 of SANS 1885</i>	
1.4.5	Hand closing mechanism			
1.4.5.1	– <i>To be provided</i>	Yes/No	Yes	
1.4.6	Trip and closing coil voltage	V	110 DC	
1.4.6.1	– <i>Trip operating voltage limit</i>	V	<i>60% of 110V DC</i>	
1.4.6.2	– <i>Close operating limits</i>	V	<i>90% and 110% of 110V DC</i>	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4.6.3	– Number of trip coils per mechanism for incomers, inter-connectors, bus-sections /couplers panels	No.	2	
1.4.6.4	– Number of close coils per mechanism	No.	1	
1.4.7	Protection of auxiliary circuits		Double pole MCB	
1.4.8	Voltmeter on incomer panel for battery voltage indication provided?	Yes/No	Yes	
1.4.9	Auxiliary termination boxes at the back of panel	Yes/No	Yes	
1.4.10	Mass of Switchgear panels			
1.4.11	Total mass/panel	kg	To be advised by tenderer	
1.4.12	Maintenance			
1.4.12.1	– Number of operations under normal load conditions between maintenance services on mechanism	No.	10 000	
1.4.12.2	– Number of operations under rated fault conditions between maintenance services on mechanism	No.	10 000	
1.4.12.3	– Is a circuit-breaker maintenance trolley required?	Yes/No	State	
1.5	CABLE END BOXES			
1.5.1	Clearance: Phase to phase	mm	120mm minimum	NRS 12
1.5.2	Clearance: Phase to earth	mm	120mm minimum	NRS 008-1991
1.5.3	Type of cable end box		Air with heat shrink termination	
1.5.4	Number of glands			
1.5.4.1	– Main incomer	No.	4 per phase	
1.5.4.2	– Feeders	No.	3 per panel	
1.5.5	Types of glands		Insulated	
1.5.6	Type of cable termination required (NRS 0012)		Air, Heat shrink Bottom entry	
1.6	SPRING WINDING MOTOR			
1.6.1	Rated voltage	V	110V DC	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.2	kW	kW	1.5	
1.6.3	Starting current	A	-T.B.A	
1.6.4	Running/Current	A	-T.B.A	
1.7	PAINT FINISH			
1.7.1	Switchgear			
1.7.1.1	– Exterior		Cloud grey (SABS 1091 Colour No F48)	
1.7.1.2	– Interior		Cloud grey (SABS 1091 Colour No F48)	
1.8	JUGGLE BOX			
1.8.1	Double bus			
1.8.1.1	– Dimensions			
	Height	mm	State	
	Depth	mm	State	
	Width	mm	State	
1.9	ADDITIONAL INFORMATION			

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X.2.2.7 11 kV Protection Equipment**(TO BE COMPLETED FOR SUPPLIER)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	INCOMER			
1.1.1	Relay			
1.1.1.1	– Over-current & earth fault relay with automation and Arc protection functionality		State	
1.1.2	Current transformers: (CT)			
1.1.2.1	– Current transformer rating plates		Attached On CT	
1.1.2.2	– Current transformers for Cable differential protection to ESKOM:			
	Number of cores	No.	1 per phase	
	Class	-	X	
1.1.2.3	– Ratios:		800/400/200/1	
	Knee-point voltage	V	> 300	
	Excitation current at knee-point voltage	mA	Less than 20	
	Resistance of secondary winding	Ohm	2.5	
1.1.2.4	– Current transformers for O/C and earth fault protection and indication:			
	Number of cores	No.	1 per phase	
	Class	-	5P20	
1.1.2.5	– Ratios:	-	800/400/200/1	
	Burden	VA	15	
1.1.2.6	– Current transformers for metering TRF panels. Red and blue phase:			
	Number of cores	No.	1 per phase	
	Relevant standard		NRS 057-2	
	Class <10VA	-	0.5	
	Class 10VA – 100VA		0.2	
1.1.2.7	– Ratio:	-	800/400/200/1	
	Burden	VA	15	
1.1.3	Control & Indication & Test:			
1.1.3.1	– Voltage transformers:			
	Relevant standard	-	NRS 057-2	SABS
	One or three phase		Three phase	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.3.2	– Ratio:	V	11000/110	
	Accuracy class 10VA – 200VA	-	0.2	
	Accuracy class <10VA		0.5	
1.1.3.3	– Rated burden per phase	VA	50	
1.1.3.4	– Voltage factor		1.9	
1.1.3.5	– 3 or 5 limb		5 Limb	
1.1.3.6	– Connection		Cable Side	
1.1.3.7	– Insulating medium	-	Epoxy resin	
1.1.3.8	– Required location of fuses		On VT	
1.1.3.9	– Is removal of VT possible without affecting associated circuit required?	Yes/No	State	
1.1.3.10	– Are lockable metal shutters required to automatically cover the fixed contacts with the VT withdrawn?	Yes/No	Yes	
1.1.3.11	– Where are secondary circuit fuses of the VT required to be situated?		At rear of VT	
1.1.3.12	– Must the White phase on 3 limb VT be brought out and earthed through a solid link?	Yes/No	Yes	
1.1.3.13	– Internal VT connection?		Star/Star	
1.1.3.14	– Detail of voltmeter selector switches offered		State	
1.1.3.15	– Voltage dividers:			
	Make		State	
	type		State	
	dielectric		State	
1.1.3.16	– Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Switchgear panel door	
	Types of test block		State	
1.1.3.17	– Cable alive lamps:			
	What type of live circuit indication of the circuit side is required?		Neon lamps	
	Make		State	
1.1.3.18	– Control:			
	Trip, close and neutral switch		1	
	Local / Supv. switch		1	
	Switch lead (Chicken lead) required?	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1.4	Operating & Maintenance Manuals (O&M M)	Yes/No	Yes, 2 Sets	
1.2	BUS SECTION PANEL (BSP)			
1.2.1	Protection for the BSP:			
1.2.1.1	– Relay			
	Automation and Arc Protection		State	
1.2.2	Control & Indication & Test:			
1.2.2.1	– Instruments & Test:			
	Are test blocks required?	Yes/No	No	
1.2.2.2	– Control:			
	Trip, close and neutral switch		1	
	Local / Supv. switch		1	
	Switch lead (Chicken lead) required?	Yes/No	Yes	
1.2.3	Operating & Maintenance Manuals (O&M M)	Yes/No	Yes, 2 sets	
1.3	BUS COUPLER PANEL (BCP)			
1.3.1	Protection for the BCP:			
1.3.1.1	– Relay			
	Automation and Arc Protection		State	
1.3.2	Control & Indication & Test:			
1.3.2.1	– Instruments & Test:			
	Are test blocks required?	Yes/No	No	
1.3.2.2	– Control:			
	Trip, close and neutral switch		1	
	Local / Supv. switch		1	
	Switch lead (Chicken lead) required?	Yes/No	Yes	
1.3.3	Operating & Maintenance Manuals (O&M M)	Yes/No	Yes, 2 sets	
1.4	VSD FEEDER PANEL			
1.4.1	Relay			
1.4.1.1	– Over-current & earth fault relay with automation and Arc protection functionality		State	
1.4.2	Current transformers: (CT)			
1.4.2.1	– Current transformer rating plates		Attached On CT	
1.4.2.2	– Current transformers for Cable differential protection:			
	Number of cores	No.	1 per phase	
	Class	-	X	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4.2.3	– Ratios (Low-Lift Pumping Station): – Ratios (High-Lift Pumping Station):		400/200/100/1 800/400/200/1	
	Knee-point voltage	V	> 300	
	Excitation current at knee-point voltage	mA	Less than 20	
	Resistance of secondary winding	Ohm	2.5	
1.4.2.4	– Current transformers for O/C and earth fault protection and indication:			
	Number of cores	No.	1 per phase	
	Class	-	5P20	
1.4.2.5	– Ratios (Low-Lift Pumping Station): – Ratios (High-Lift Pumping Station):	-	400/200/100/1 800/400/200/1	
	Burden	VA	15	
1.4.2.6	– Current transformers for metering. Red and blue phase:			
	Number of cores	No.	1 per phase	
	Relevant standard		NRS 057-2	
	Class <10VA	-	0.5	
	Class 10VA – 100VA		0.2	
1.4.2.7	– Ratio (Low-Lift Pumping Station): – Ratios (High-Lift Pumping Station):	-	400/200/100/1 800/400/200/1	
	Burden	VA	15	
1.4.3	Control & Indication & Test:			
1.4.3.1	– Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Switchgear panel door	
	Types of test block		State	
1.4.3.2	– Cable alive lamps:			
	What type of live circuit indication of the circuit side is required?		Neon lamps	
	Make		State	
1.4.3.3	– Control:			
	Trip, close and neutral switch		1	
	Local / Supv. switch		1	
	Switch lead (Chicken lead) required?	Yes/No	Yes	
1.4.4	Operating & Maintenance Manuals (O&M M)	Yes/No	Yes, 2 Sets	
1.5	SITE RING FEEDER PANEL			
1.5.1	Relay			

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.1.1	– Over-current & earth fault relay with automation and Arc protection functionality		State	
1.5.2	Current transformers: (CT)			
1.5.2.1	– Current transformer rating plates		Attached On CT	
1.5.2.2	– Current transformers for Cable differential protection:			
	Number of cores	No.	1 per phase	
	Class	-	X	
1.5.2.3	– Ratios:		400/200/100/ 1	
	Knee-point voltage	V	> 300	
	Excitation current at knee-point voltage	mA	Less than 20	
	Resistance of secondary winding	Ohm	2.5	
1.5.2.4	– Current transformers for O/C and earth fault protection and indication:			
	Number of cores	No.	1 per phase	
	Class	-	5P20	
1.5.2.5	– Ratios:	-	400/200/100/ 1	
	Burden	VA	15	
1.5.2.6	– Current transformers for metering. Red and blue phase:			
	Number of cores	No.	1 per phase	
	Relevant standard		NRS 057-2	
	Class <10VA	-	0.5	
	Class 10VA – 100VA		0.2	
1.5.2.7	– Ratio:	-	400/200/100/ 1	
	Burden	VA	15	
1.5.3	Control & Indication & Test:			
1.5.3.1	– Instruments & Test:			
	Are test blocks required?		Yes	
	Location of test block		Switchgear panel door	
	Types of test block		State	
1.5.3.2	– Cable alive lamps:			
	What type of live circuit indication of the circuit side is required?		Neon lamps	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	<i>Make</i>		<i>State</i>	
1.5.3.3	– <i>Control:</i>			
	<i>Trip, close and neutral switch</i>		1	
1.5.3.4	– <i>Local / Supv. switch</i>		1	
1.5.3.5	– <i>Switch lead (Chicken lead) required?</i>	Yes/No	Yes	
1.5.4	Operating & Maintenance Manuals (O&M M)	Yes/No	Yes, 2 Sets	
1.6	ADDITIONAL INFORMATION			

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X.2.2.8 Control Ancillaries

Item No	Description	Unit	Specified	Offered
1.1	CONTROL CABLING			
1.1.1	Cross-sectional area			
1.1.1.1	– Control wires	mm ²	2.5	
1.1.1.2	– CT & VT wires	mm ²	4	
1.1.2	Minimum number of strands	No.	7 min	
1.1.3	Colour			
1.1.3.1	– Earth wires		Green and Yellow	
1.1.3.2	– All other wires		Grey	
1.1.4	Screening in main circuit compartments	Yes/No	Yes	
1.1.5	Insulated gland plates - cable screens	Yes/No	Yes	
1.1.6	Wiring to separate external terminal box	Yes/No	Yes	
1.2	EXTERNAL TERMINAL BOX			
1.2.1	External terminal box position		Rear of board cable trench side	
1.2.2	Access to terminal strip in external box		Completely	
1.2.3	Contacts/facilities wired to individual (grouped together) terminals in external box:			
1.2.3.1	– Breaker auxiliary "a" and "b" contacts	Yes/No	Yes	
1.2.3.2	– Spring-limit-switch contacts	Yes/No	Yes	
1.2.3.3	– Breaker earthed	Yes/No	Yes	
1.2.3.4	– Motor protection MCCB's	Yes/No	Yes	
1.2.3.5	– Busbar in service	Yes/No	Yes	
1.2.3.6	– Breaker control trip	Yes/No	Yes	
1.2.3.7	– Breaker control close		If applicable	
1.2.3.8	– Lockout – SF6/ Vacuum contacts		If applicable	
1.2.3.9	– Alarm SF6/Vacuum contacts	Yes/No	Yes	
1.2.3.10	– Other alarm circuits (DC fail, etc.)	Yes/No	Yes	
1.2.3.11	– All protection and metering transducer outputs with removable links between all terminals		State	

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Item No	Description	Unit	Specified	Offered
1.3	TERMINATION			
1.3.1	Spare terminals	%	10	
1.3.2	Standard wire numbering		NRS 003-1 Annex A (T.A.1)	
1.3.3	Lugs		Crimped	
1.3.4	Earth sliding link types/equivalents		Weidmuller TVP SAKA10	
1.3.5	Front and rear terminal types:			
1.3.5.1	– Lockout - SF6 contacts		Klippon RSF1	
1.3.5.2	– Breaker auxiliary "a" and "b" contacts		Klippon RSF1	
1.3.5.3	– Spring-limit-switch contacts		Klippon RSF1	
1.3.5.4	– Motor control (spring charge) contacts		Klippon RSF1	
1.3.5.5	– Breaker earthed		Klippon RSF1	
1.3.5.6	– Motor protection MCCB's		Klippon RSF1	
1.3.5.7	– Busbar in service		Klippon RSF1	
1.3.5.8	– Breaker control trip		Klippon RSF1	
1.3.5.9	– Breaker control close		Klippon SAK4	
1.3.5.10	– Alarm SF6 contacts		Klippon SAK S3/32	
1.3.5.11	– Other alarm circuits		Klippon RSF1	
1.3.5.12	– VT secondary circuits		Klippon RSF2	
1.3.5.13	– Metering CT secondary circuits		Klippon SAK4	
1.3.5.14	– Protection CT secondary circuits		Klippon SAK4	
1.3.5.15	– All transducer outputs (removable links)		State	
1.3.5.16	– All supervisory control & indication circuits		State	
1.4	CONTACT RATING			

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Item No	Description	Unit	Specified	Offered
1.4.1	DC category duty rating	A V_{dc}	10 110	
1.4.2	AC category duty rating	A V_{ac}	10 240	
1.5	FUSES			
1.5.1	Type		HRC	
1.5.2	Location		Relay chamber VT fuses may fit in VT compartment	
1.6	Indicators			
1.6.1	Type		Luminous	
1.6.2	Location		Front of panels	
1.6.3	Equipment status:			
1.6.3.1	– <i>Protection fail</i>		<i>White</i>	
1.6.3.2	– <i>Breaker closed</i>		<i>Red</i>	
1.6.3.3	– <i>Breaker open</i>		<i>Green</i>	
1.6.3.4	– <i>Breaker earthed</i>		<i>Amber</i>	
1.6.4	Busbar section/s in-service		Per phase	
1.6.5	Live circuit-side indication		Per phase	
1.7	ADDITIONAL INFORMATION			

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X.2.2.9 Miscellaneous

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Guarantee period		State	
1.1.2	Maintenance trolley (if applicable)	Yes/No	State	
1.1.3	Required period for spares	years	10	
1.2	ACCESSORIES (WHERE APPLICABLE)			
1.2.1	Racking, charging and closing handles	Sets	1	
1.2.2	Ramp/alignment plates	Sets	0	
1.2.3	Special and custom tools	Sets	0	
1.2.4	Accessories cabinet	Qty	0	
1.2.5	Maintenance trolley	Qty	0	
1.2.6	Spares for routine maintenance	Sets	1	
1.3	DOCUMENTATION			
1.3.1	Type test certificates	Sets	3	
1.3.2	Routine test certificates for each panel	Sets	3	
1.3.3	General arrangement as-built drawing	Sets	3	
1.3.4	Schematic and wiring diagrams	Sets	3	
1.3.5	Replacement part lists	Sets	3	
1.3.6	Operation & maintenance manuals	Sets	3	
1.3.7	Units used in Republic of South Africa		In tender/offer	
1.3.8	Spare lists, if applicable		3	
1.3.9	Pack lists, if applicable		3	
1.4	ADDITIONAL INFORMATION			

X.2.2.10 11 kV/400 V Miniature Substation**(TO BE COMPLETED FOR EACH SUPPLIER AND RATING)**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	RATINGS			
1.1.1	Transformer power rating	kVA	200/315/500/ 1000	
1.1.2	Primary rated voltage	kV	11	
1.1.3	Secondary rated voltage	V	400	
1.1.4	System frequency	Hz	50	
1.1.5	Number of Phases	No.	3	
1.1.6	Rated power frequency voltage	kV	12	
1.1.7	Rated lightning impulse withstand voltage	kV	95	
1.1.8	Rated short-duration power frequency withstand voltage [50 Hz: 1 min]	kV	28	
1.1.9	Induced voltage withstand level	kV	22	
1.1.10	Internal arc classification		AF-BFLR	
1.1.11	Internal arc current and duration		20kA/500ms	
1.1.12	Cooling		ONAN	
1.2	CONSTRUCTION DESIGN			
1.2.1	Construction		Modular	
1.2.2	Removable base sections adjacent to MV compartment (sections to be lap bolted with nuts on the inside of the channel and housing)	Yes/No	Yes	
1.2.3	Compartment fastening / locking (Pad lockable) three point locking with 1 additional 10mm sunken captive Allen cap screw	Yes/No	Yes	
1.2.4	Total mass of miniature substation	kg	State	
1.2.5	Overall dimensions			
1.2.5.1	– MV compartment length	mm	State	
1.2.5.2	– LV compartment length	mm	State	
1.2.5.3	– Overall length	mm	State	
1.2.5.4	– Overall width	mm	State	
1.2.5.5	– Overall height	mm	State	
1.2.5.6	– Base width	mm	State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.6	Provision for lifting of complete mini-sub onto a concrete plinth without need for dismantling	Yes/No	Yes	
1.2.7	Provision of lifting lugs on roof for ease of removal	Yes/No	Yes	
1.2.8	MV switchgear, LV panel and transformer confined to separate compartments	Yes/No	Yes	
1.2.9	Mini-sub housing sections and doors bonded	Yes/No	Yes	
1.3	TRANSFORMER UNIT (Oil immersed/Dry-Type)			
1.3.1	Electrical requirements		SANS 780/SANS 60076(dry type)	
1.3.2	Vector group		Dyn 11	
1.3.3	MV system earthing		Effective	
1.3.4	LV transformer neutral earthing		Solid – connection to insulated LV neutral/earth bar	
1.3.5	MV system fault level	kA	25	
1.3.6	Temperature rise limits		SANS 780 Table 6/SANS 60076	
1.3.7	Secondary voltage regulation (Off-load on the 11 kV supply voltage windings)	%	+6.0, + 3.0, 0, -3.0, -6.0	
1.3.8	No-load losses	W	State	
1.3.9	Load losses	W	State	
1.3.10	Impedance	%	State	
1.3.11	Audio-sound level	dB(A)	State	
1.3.12	Sealed transformer unit required	Yes/No	Yes	
1.3.13	Transformer MV bushings (NB internal screen to be earthed)		BS 7215 – Type C with M16x2 thread	
1.3.14	MV bushing-centre clearances (minimum)	mm	135	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.15	Clearances between outer bushing-centres and mini-sub metal enclosure (minimum)	mm	90	
1.3.16	Transformer overload protection facility required	Yes/No	Yes	
1.3.17	MV winding material		State	
1.3.18	LV winding material		State	
1.3.19	Manufacturer		State	
1.4	MV COMPARTMENT			
1.4.1	Equipment in MV compartment		Ring Main Unit	
1.4.2	– <i>Ring Main Unit</i>			
1.4.2.1	– <i>Ring Main Unit manufacturer</i>		State	
1.4.2.2	– <i>Configuration</i>		2SD&CB	
1.4.2.3	– <i>Rated normal current of ring-main busbars</i>	A	630	
1.4.2.4	– <i>Rated normal current of switch disconnectors</i>	A	630	
1.4.2.5	– <i>Rated normal current of circuit breaker</i>	A	200	
1.4.2.6	– <i>Rated short-circuit breaking current of circuit breaker (3 second)</i>	kA	20	
1.4.2.7	– <i>Internal arc classification</i>		A-FLR	
1.4.2.8	– <i>Internal arc current and duration</i>		20kA/500ms	
1.4.2.9	– <i>Indoor or outdoor unit required?</i>		Indoor	
1.4.2.10	– <i>Extensible or non-extensible unit required?</i>		Non-extensible	
1.4.2.11	– <i>Degree of protection of unit offered</i>		State	
1.4.2.12	– <i>Type of cable testing facility offered</i>		State	
1.4.2.13	– <i>Insulating medium of busbars</i>		SF ₆	
1.4.2.14	– <i>Insulating medium of switch disconnectors</i>		SF ₆	
1.4.2.15	– <i>Insulating medium of circuit breaker</i>		SF ₆	
1.4.2.16	– <i>Interrupting medium of switch disconnectors</i>		SF ₆ /Vacuum	
1.4.2.17	– <i>Interrupting medium of circuit breaker</i>		SF ₆ /Vacuum	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.4.2.18	– Is earth fault indication required?	Yes/No	Yes	
1.4.2.19	– List of recommended spares attached	Yes/No	Yes	
1.4.2.20	– Provision of SF6 pressure gauge required	Yes/No	Yes	
1.4.2.21	– SF6 pressure gauge visible from the operating side of RMU (front of RMU)	Yes/No	Yes	
1.4.2.22	– Is a cable box required?	Yes/No	Yes	
1.4.2.23	– Compound-filled or air-filled cable box		Air	
1.4.2.24	– Are VPIS/VDS required for all circuits?	Yes/No	Yes	
1.4.3	Incoming MV cable requirements			
1.4.3.1	– 185 mm ² 3 core Cu XLPE required	Yes/No	Yes	
1.4.3.2	– Cable support (clamping) required	Yes/No	Yes	
1.4.3.3	– Minimum distance from cable clamp to centre-line of RMU bushings	mm	800	
1.4.3.4	– Type of connection		Screened	
1.4.4	Mini-sub earth bar (accessible in front of RMU) required	Yes/No	Yes	
1.4.5	Interconnection arrangement between RMU and transformer MV bushings		State	
1.4.6	Unscreened interconnecting equipment and connections between ring main unit and transformer to be barricaded	Yes/No	Yes	
1.4.7	Type of earth fault indicator		State	
1.4.8	Voltage detecting system (VDS) required	Yes/No	Yes	
1.5	LV COMPARTMENT			
1.5.1	Bus-bar rating		1,2 times the kVA capacity	
1.5.2	Bus-bar insulation		Air	
1.5.3	Bus-bars		3 + one identical neutral-earth bus-bar (insulated from frame)	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.4	Current density of bus-bars	A/mm ²	1,8 maximum	
1.5.5	Rated withstand current – 1 s (25 kA for up to 630 kVA & 45 kA for 1000 kVA)	kA	State	
1.5.6	Min clearance to earth and between phases	mm	20	
1.5.7	Provision of a LV neutral surge arrester fitted between mini-sub earth bar and LV neutral-earth bus-bar	Yes/No	Yes	
1.5.8	LV neutral-earth bus-bar to be earthed (via an electrical bridge to the mini-sub earth bar)	Yes/No	Yes	
1.5.9	Neutral isolating links required	Yes/No	No	
1.5.10	Provision of LV main isolating switch	Yes/No	No	
1.5.11	Number of outgoing LV feeders to be provided for (drill bus-bar Ø14mm holes)	No	6	
1.5.12	Spacing between holes	mm	110	
1.5.13	LV panel designed for large frame MCCBs required	Yes/No	Yes	
1.5.14	Vertical spacing between phase bus-bars	mm	185	
1.5.15	Vertical spacing between lowest LV bus-bar and LV neutral	mm	300	
1.5.16	Minimum distance between LV neutral and uni-strut	mm	200	
1.5.17	LV maximum demand ammeters		On all three phases	
1.5.18	Ammeter type		Thermal integrating over 15 min period	
1.5.19	LV indicating voltmeter with a selector switch required	Yes/No	Yes	
1.5.20	Ammeter and voltmeter size and display	mm	96 x 96, 90°	
1.5.21	Ammeter and voltmeter position		Top right hand side in LV compartment	
1.5.22	Analogue meter capable of reading current and voltage		State	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.23	Provision of removable non flammable barrier to separate LV end compartment and front LV compartment required	Yes/No	Yes	
1.5.24	Main MCCB manufacturer		State	
1.5.25	Catalogue/model code of main MCCB		State	
1.5.26	Size of main MCCB	A	State	
1.6	LV AUXILIARIES			
1.6.1	Provision of three point socket outlet in LV compartment (with instantaneous-trip earth leakage unit [20 A; 5 kA rupturing capacity; 30 mA sensitivity] and 20 A HRC fuse with neutral fuse link) required	Yes/No	Yes	
1.6.2	Numbering ferrules for auxiliary wiring required	Yes/No	Yes	
1.7	MATERIALS AND CORROSION PROTECTION			
1.7.1	Mini-sub enclosure and transformer tank thickness 3 or 6mm (mild steel)	mm	State	
1.7.2	Radiator thickness (mild steel)	mm	6	
1.7.3	Tinned copper bus-bars required	Yes/No	Yes	
1.7.4	Mini-sub base material		Steel	
1.7.5	5 mm cork packing (between ends and tank, base and ends, base and tank) required	Yes/No	Yes	
1.7.6	Colour		Avocado Green (12)	
1.8	NOTICES, SIGNS AND LABELS			
1.8.1	Transformer rating plate required	Yes/No	Yes	
1.8.2	Treatment and Full First Aid Instructions on inside of MV and LV compartment doors required	Yes/No	Yes	
1.8.3	Elec. warning signs on all doors and barriers required	Yes/No	Yes	
1.8.4	Transformer phase labels below bushings required	Yes/No	Yes	
1.8.5	Colour-coded LV bus-bars required	Yes/No	Yes	
1.8.6	Stenciled labeling of MV and LV compartment doors (both inside and outside) required	Yes/No	Yes	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.8.7	kVA, Prim V, Sec V & Corrosion Class required	Yes/No	Yes	
1.8.8	ID markings linking roof to body per batch required	Yes/No	Yes	
1.8.9	Provision for the safe-keeping of documents required	Yes/No	Yes	
1.9	DOCUMENTATION			
1.9.1	Type test certificates (provide ref. numbers of reports)	Sets	3	
1.9.2	Routine test certificates	Sets	3	
1.9.3	Drawings	Sets	3	
1.9.4	Circuit diagrams (LV auxiliary wiring and equipment)	Sets	3	
1.10	ADDITIONAL INFORMATION			

X.2.2.11 11 kV/400 V Distribution Transformer

(TO BE COMPLETED FOR EACH SUPPLIER AND RATED OUTPUT)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	PRIMARY RATED VOLTAGE	kV	11	
1.2	SECONDARY RATED VOLTAGE	V	400	
1.3	RATED OUTPUT	kVA	25/50/100/200	
1.4	MOUNTING CONFIGURATION		Ground	
1.5	LOSSES			
1.5.1	No load	W	State	
1.5.2	Full load	W	State	
1.6	INSULATION LEVEL (BIL)	kV	State	
1.7	VECTOR GROUP		Dyn 11	
1.8	CORE OR SHELL TYPE		State	
1.9	MANUFACTURER		State	
1.10	HIGH VOLTAGE FUSE RATING	A	State	
1.11	LOW VOLTAGE CIRCUIT BREAKER			
1.11.1	Circuit breaking capacity	kA	10kA	
1.11.2	Current trip rating	A	State	
1.11.3	Number of phases		3	
1.11.4	Voltage	V	400	
1.12	COOLING		ONAN	
1.13	CABLE ENTRIES (MV & LV)		Enclosed	
1.14	ADDITIONAL INFORMATION			

X.2.2.12 Metering System

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	VOLTAGE	V (AC)	110	
1.4	CURRENT	I	5	
1.5	TARIFF STRUCTURE WITH SEASONAL CAPABILITY AND EXCLUSION DATES	Energy	16 Time of Use Registers	
		Demand	4 Demand Registers	
1.6	ACCURACY CLASS		0.2	
1.7	FOUR QUADRANT METERING		State	
1.8	CLEAR LCD DISPLAY		Specify size	
1.9	INSTANTANEOUS INSTRUMENTATION VALUES		State	
1.10	VOLTAGE UNBALANCE DETECTION		State	
1.11	COMMUNICATION PORT		Front	
1.12	ALARM CONTACTS (VOLTAGE UNBALANCE)		State	
1.13	LOAD PROFILE DATA STORAGE (2 CHANNELS)	Days	360	
1.14	HISTORICAL DATA BILLING SETS	set	12	
1.15	INTERNAL CLOCK AND CALENDAR WITH BATTERY BACKUP	Yes/No	Yes	
1.16	SEALABLE RESET BUTTON		State	
1.17	ADDITIONAL INFORMATION			

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X.2.3 SECURITY SCHEDULES**X.2.3.1 CCTV – Bullet Camera**

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	IMAGER		State	
1.4	SHUTTER	seconds	1 to 1/10000	
1.5	EXPOSURE		Auto	
1.6	DAY/NIGHT FUNCTIONALITY		Yes	
1.7	WHITE BALANCE		Auto	
1.8	IRIS		Auto	
1.9	FOCUS		Auto	
1.10	ZOOM		Motorized	
1.11	LENS SIZE	mm	3 - 22	
1.12	FOCAL RANGE	m	40m	
1.13	IR LED's		Yes	
1.14	IP PROTECTION RATING	IP	IP66	
1.15	NOISE REDUCTION		YES	
1.16	INTERNAL MEMORY		MicroSD/SD HC, SDXC	
1.17	PTZ FUNCTIONALITY		No	
1.18	MIMO FUNCTIONALITY		Yes	
1.19	COMMUNICATION OUTPUT		Ethernet	
1.20	RESOLUTION	Pixels	4MP or better	
1.21	CODEC TYPES		H-264, M- JPEG, etc.	
1.22	FRAME RATE CHANGES	FPS/Pixels	Yes	
1.23	PROTOCOLS		TCP/IP, HTTP, FTP, SMTP	
1.24	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC	
1.25	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount/Pole mount	
1.26	OPERATING TEMPERATURE	°C	-10 to 60	
1.27	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.27.1	Number of Amendments (0 if None)		State	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.27.2				
1.27.3				
1.27.4				
1.27.5				

X.2.3.2 CCTV – Digital Camera: Outdoor Type

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	IMAGER		CMOS	
1.4	DAY/NIGHT FUNCTIONALITY		Yes	
1.5	LENS TYPE – SINGLE/DUAL		Dual	
1.6	LENS INTERCHANGEABLE		Yes	
1.7	IRIS		Auto	
1.8	IP RATING	IP	IP66	
1.9	LENS SELECTION		180° Panoramic, 180° Fisheye, 8° Telescopic	
1.10	INTERNAL DVR		4GB microSD	
1.11	MIMO FUNCTIONALITY		Yes	
1.12	COMMUNICATION OUTPUT		Ethernet	
1.13	RECORD WITH AUDIO		Yes	
1.14	VIDEO CODECS		MxPEG, MJPEG,	
1.15	PAN/ZOOM	Digital	Yes	
1.16	SHOCK DETECTION		Yes	
1.17	PROTOCOLS		IPv4, IPv6, UDP, DHCP, TCP/IP, HTTP, FTP, SMTP, SIP, NTP	
1.18	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC, 110 VAC	
1.19	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount/Pole mount	
1.20	OPERATING TEMPERATURE	°C	-30 to 60	
1.21	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.21.1	Number of Amendments (0 if None)		State	
1.21.2				
1.21.3				

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.21.4				
1.21.5				

X.2.3.3 CCTV – Digital Camera: Indoor Type

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	IMAGER		CMOS	
1.4	DAY/NIGHT FUNCTIONALITY		Yes	
1.5	LENS TYPE – SINGLE/DUAL		Dual	
1.6	LENS INTERCHANGEABLE		Yes	
1.7	IRIS		Auto	
1.8	IP RATING	IP	IP20	
1.9	LENS SELECTION		180° Panoramic, 180° Fisheye, 8° Telescopic	
1.10	INTERNAL DVR		4GB microSD	
1.11	MIMO FUNCTIONALITY		Yes	
1.12	COMMUNICATION OUTPUT		Ethernet	
1.13	RECORD WITH AUDIO		Yes	
1.14	VIDEO CODECS		MxPEG, MJPEG,	
1.15	PAN/ZOOM	Digital	Yes	
1.16	SHOCK DETECTION		Yes	
1.17	PROTOCOLS		IPv4, IPv6, UDP, DHCP, TCP/IP, HTTP, FTP, SMTP, SIP, NTP	
1.18	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC, 110 VAC	
1.19	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount/Pole mount	
1.20	OPERATING TEMPERATURE	°C	-30 to 60	
1.21	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.21.1	Number of Amendments (0 if None)		State	
1.21.2				
1.21.3				

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.21.4				
1.21.5				

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X.2.3.4 CCTV – Digital Camera: Outdoor Vandal Type

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	CERTIFICATIONS		EN55032, EN55022, EN55024, EN50121-4, EN61000-6-1, EN61000-6-2	
1.4	DAY/NIGHT FUNCTIONALITY		Yes	
1.5	VANDAL PROOF		Yes	
1.6	LENS INTERCHANGEABLE		Yes	
1.7	IRIS		Auto	
1.8	IP RATING	IP	IP66	
1.9	LENS SELECTION		180° Panoramic, 180° Fisheye, 8° Telescopic	
1.10	INTERNAL DVR		4GB microSD	
1.11	MIMO FUNCTIONALITY		Yes	
1.12	COMMUNICATION OUTPUT		Ethernet	
1.13	RECORD WITH AUDIO		Yes	
1.14	VIDEO CODECS		MxPEG, MJPEG,	
1.15	PAN/ZOOM	Digital	Yes	
1.16	SHOCK DETECTION		Yes	
1.17	PROTOCOLS		IPv4, IPv6, UDP, DHCP, TCP/IP, HTTP, FTP, SMTP, SIP, NTP	
1.18	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC, 110 VAC	
1.19	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount/Pole mount	
1.20	OPERATING TEMPERATURE	°C	-30 to 60	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.21	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.21.1	Number of Amendments (0 if None)		State	
1.21.2				
1.21.3				
1.21.4				
1.21.5				

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X.2.3.5 CCTV – Digital Camera: Indoor Vandal Type

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	CERTIFICATIONS		EN55032, EN55022, EN55024, EN50121-4, EN61000-6-1, EN61000-6-2	
1.4	DAY/NIGHT FUNCTIONALITY		Yes	
1.5	VANDAL PROOF		Yes	
1.6	LENS INTERCHANGEABLE		Yes	
1.7	AUX SENSORS		Vibration and Temperature	
1.8	IP RATING	IP	IP20	
1.9	LENS SELECTION	Degrees	15° to 103°	
1.10	INTERNAL DVR		4GB microSD	
1.11	MIMO FUNCTIONALITY		Yes	
1.12	COMMUNICATION OUTPUT		Ethernet	
1.13	RECORD WITH AUDIO		Yes	
1.14	VIDEO CODECS		MxPEG, MJPEG, H264	
1.15	PAN/ZOOM	Digital	Yes	
1.16	SHOCK DETECTION		Yes	
1.17	PROTOCOLS		IPv4, IPv6, UDP, DHCP, TCP/IP, HTTP, FTP, SMTP, SIP, NTP	
1.18	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC, 110 VAC	
1.19	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount	
1.20	OPERATING TEMPERATURE	°C	-30 to 60	
1.21	DEVIATION FROM SPECIFICATION?	Yes/No	State	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.21.1	Number of Amendments (0 if None)		State	
1.21.2				
1.21.3				
1.21.4				
1.21.5				

X.2.3.6 CCTV – Digital Camera: Thermal Type

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	SENSOR TYPE		Thermal Imager	
1.4	FIELD OF VIEW	Degrees	17, 25, 45	
1.5	ANALYTICS		Both Thermal and Optical	
1.6	OVERLAY FUNCTIONALITY		Thermal	
1.7	MOTION DETECTION		Night Video	
1.8	IP RATING	IP	IP66	
1.9	OPTION FOR ADDITIONAL IMAGE SENSOR		Yes	
1.10	INTERNAL DVR		4GB microSD	
1.11	MIMO FUNCTIONALITY		Yes	
1.12	COMMUNICATION OUTPUT		Ethernet	
1.13	RECORD WITH AUDIO		Yes	
1.14	VIDEO CODECS		MxPEG, MJPEG,	
1.15	PAN/ZOOM	Digital	Yes	
1.16	SHOCK DETECTION		Yes	
1.17	PROTOCOLS		IPv4, IPv6, UDP, DHCP, TCP/IP, HTTP, FTP, SMTP, SIP, NTP	
1.18	POWER REQUIREMENTS	Volts	PoE, 12VDC, 24VAC, 110 VAC	
1.19	MOUNTING REQUIREMENTS		Wall mount /Ceiling mount/Pole mount	
1.20	OPERATING TEMPERATURE	°C	-30 to 60	
1.21	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.21.1	Number of Amendments (0 if None)		State	
1.21.2				
1.21.3				

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.21.4				
1.21.5				

X.2.3.7 Managed Network Ethernet Switch

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	ETHERNET PORTS			
1.5.1	Fibre Ports	1000BaseX	4/6/8	
1.5.2	Copper Ports	10/100Base TX	8/16/24	
1.5.3	Connector Types		LC, SC, SFP Pluggable Optics	
1.6	CYBER SECURITY FEATURES			
1.6.1	Password Protection		Multi-level	
1.6.2	Encryption		SSH/SSL	
1.6.3	Port Security		MAC Based	
1.6.4	Access Security		SNMPv3 encrypted authentication	
1.7	INTERNATIONAL STANDARDS			
1.7.1	Electric utility Substation		IEEE 1613	
1.7.2	Substation automation Systems		IEC 61850-3	
1.7.3	Variable Speed drive Systems		IEEE 61800-3	
1.7.4	Generic Industrial		IEC 61000-6-2	
1.7.5	Traffic Control Equipment		NEMA TS-2	
1.7.6	Hazardous Location Certification		Class 1 Division 2	
1.7.7	Operating Temperature		-40 Deg to +85 Deg C	
1.8	POWER REQUIREMENTS			
1.8.1	Power Consumption		10W Max	
1.8.2	Power Supply	Hi-Voltage	230 VAC	
1.9	GENERAL			
1.9.1	Ingress Protection	IP	40	
1.9.2	Enclosure	Galvanized Steel	20 AWG	
1.9.3	Mounting		DIN Rail	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.9.4	Warranty	Year	5	
1.10	SWITCH PROPERTIES			
1.10.1	Switching Method		Store and forward	
1.10.2	Switching Latency		7 micro Sec	
1.10.3	Switching Bandwidth		5.6 Gbps	
1.10.4	MAC Addresses		4096	
1.10.5	MAC Address table size		32 kbytes	
1.10.6	Priority Queues		4	
1.10.7	Frame Buffer Memory		2 Mbit	
1.10.8	VLANS		4096	
1.10.9	IGMP Multicast Groups		256	
1.10.10	Port Rate Limiting		128kbps, 256, 512, 4, 8 Mbps	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

X.2.3.8 CCTV Server

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	PROCESSOR CORE		16/18/20/22/ 24	
1.6	PROCESSOR TYPE	Hz	Intel Xeon 8100 Series/ Intel Xeon 6100 Series/ Intel Xeon 5100 Series	
1.7	MEMORY TYPE	RAM	DDR4	
1.8	PROCESSOR SPEED		3.6GHz	
1.9	MEMORY SLOTS	Number	48 DIMM Slots	
1.10	MEMORY LIMIT	TB	3	
1.11	SYSTEM FAN		Hot Standby redundant	
1.12	EXPANSION SLOTS	Number	8	
1.13	PROCESSOR CACHE	MB	30.25MB L3 / 33.00MB L3/35.75MB L3	
1.14	MOUNTING TYPE		Rack mount	
1.15	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.15.1	Number of Amendments (0 if None)		State	
1.15.2				
1.15.3				
1.15.4				
1.15.5				

X.2.3.9 CCTV Client

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	PROCESSOR TYPE	Type	Intel C622 Chipset	
1.6	CPU BUS SPEED	Hz	10.4GT per second	
1.7	MEMORY TYPE	GB RAM	DDR4-DIMM 16/32/64	
1.8	MEMORY EXPANSION		24 Slots	
1.9	MEMORY SPEED	MT	2133MT/s, 2400MT/s, 2666MT/s & 2933MT/s	
1.10	I/O CONTROLLER		Nuvoton SIO15	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

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X.2.3.10 Biometric Readers (Indoor Type)

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	DATABASE		Up to 500 users	
1.6	INTERFACES		Ethernet, RS485	
1.7	TERMINAL MANAGEMENT		TCP/IP or USB	
1.8	CERTIFICATIONS		IP 53, CE, UL	
1.9	OPERATING TEMPERATURES	°C	-10 to 40	
1.10	POWER SUPPLY	Volts	12	
1.11				
1.12	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.12.1	Number of Amendments (0 if None)		State	
1.12.2				
1.12.3				
1.12.4				
1.12.5				

X.2.3.11 Biometric Readers (Outdoor Type)

Item	Description	Unit	Specified	Offered
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	DATABASE		Up to 10 000 users	
1.6	INTERFACES		Ethernet, RS485	
1.7	TERMINAL MANAGEMENT		TCP/IP or USB	
1.8	CERTIFICATIONS		IP 65, CE, UL	
1.9	OPERATING TEMPERATURES	°C	-10 to 40	
1.10	POWER SUPPLY	Volts	12	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

SCHEDULE Y – CONTROL AND INSTRUMENTATION

Y. CONTROL AND INSTRUMENTATION (C&I)

Y.1 PREAMBLE – CONTROL AND INSTRUMENTATION

Y.1.1 INTRODUCTION

- a) Only Plant based on proven technology and of high reliability shall be considered for use.
- b) All Schedules shall be fully completed in block letters using a black pen or typing. Failure to complete all relevant sections may result in the Tender being rejected and/or disqualified.
- c) Preference shall be given to locally manufactured plant and components. Should items not be locally manufactured, Tenderers shall clearly identify these in their Tender.
- d) Tenderers shall ensure that they are fully acquainted with the contents of Section 40 – “Control and Instrumentation General” and Section 41 – “Control and Instrumentation Plant and Installation” of the Specification. The Contractor shall indicate, at tender stage, all variations from the Specification.
- e) Tenderers shall ensure that the proposed Plant will fit into the spaces provided prior to submission of the Tender. Any alteration required for specific Plant shall be submitted with the Tender. If no information is received with the Tender, it will be assumed that the building, space or panel will accommodate the Plant offered.
- f) All Schedules concerning Plant incorporating proprietary brand products or units, shall be fully supplemented by the inclusion of applicable brochures, pamphlets, additional explanatory specifications, descriptions or notes in that order of availability and shall be submitted with the bid in a covering letter and bound separately.
- g) The Tenderer shall complete the Schedules giving details of suppliers of Plant.
- h) Where Tenderers wish to bring special characteristics of Plant offered to the attention of the Engineer, Tenderers shall supply descriptive literature and brochures to supplement information in the Technical Data Sheets.
- i) Where the Specification calls for specific makes and types of Plant, the Tendered prices shall be based on such Plant.

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Y.2 CONTROL AND INSTRUMENTATION SCHEDULES**Y.2.1 Pressure Transmitters – Guage and Absolute**

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	TYPE		State	
1.4	TECHNICAL SPECIFICATIONS			
1.4.1	Field of application	Type of pressure	Gauge and absolute, level	
1.4.2	Process connection		Diverse thread, DN32-DN80, ANSI 1 ½ - 4 inch, JIS 50 A – 100 A	
1.4.3	Measuring ranges	Bar	-1 to 32	
1.4.4	Over pressure limit	Bar	100	
1.4.5	Process temperature range	°C	-5 to 50	
1.4.6	Ambient temperature range	°C	-10 to 60	
1.4.7	Reference accuracy	%	0.1 of set span	
1.4.8	Supply voltage	VDC	10.5 to 40	
1.4.9	Reverse polarity protection	Yes/No	State	
1.4.10	Communication output	Analogue	4 – 20mA with HART protocol	
1.4.11	Measuring type of diaphragm	Ceramic or metallic	State	
1.4.12	Overvoltage protection	Yes/No	Yes	
1.5	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.5.1	Number of Amendments (0 if None)		State	
1.5.2				
1.5.3				
1.5.4				
1.5.5				

Y.2.2 Pressure Transmitters – Differential Pressure

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	TYPE		State	
1.4	TECHNICAL SPECIFICATIONS			
1.4.1	Field of application	Bar	Differential pressure, flow, level	
1.4.2	Process connection		¼ - 18 NPT RC ¼	
1.4.3	Measuring ranges	Bar	- 40 to 40	
1.4.4	Over pressure limit	Bar	On the one side up to 200 Bar, on both sides up to 400	
1.4.5	Process temperature range	°C	-5 to 50	
1.4.6	Ambient temperature range	°C	-10 to 60	
1.4.7	Reference accuracy	%	0.1 of set span	
1.4.8	Supply voltage	VDC	10.5 to 40	
1.4.9	Reverse polarity protection	Yes/No	Yes	
1.4.10	Communication output	Analogue	4 – 20mA with HART protocol	
1.4.11	Measuring type of diaphragm	Ceramic or metallic	State	
1.4.12	Overvoltage protection	Yes/No	Yes	
1.5	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.5.1	Number of Amendments (0 if None)		State	
1.5.2				
1.5.3				
1.5.4				
1.5.5				

Y.2.3 Level Transmitter – Radar

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER		State	
1.2	MODEL		State	
1.3	TYPE		Radar	
1.4	TECHNICAL SPECIFICATIONS			
1.4.1	Process connection		Thread G1 ^{1/2} A PN3/PVDF	
1.4.2	Measuring range	Meters	< than 20m	
1.4.3	Material-mounting bracket		State	
1.4.4	Temperature range	°C	-5 to 50	
1.4.5	Manifold-specifications		State	
1.4.6	Pressure rating	Bar	16	
1.4.7	Antennas		Encapsulated Horn	
1.4.8	Air purging	Yes/No	State	
1.4.9	Flange sizing		State	
1.4.10	Communication module	Analogue	4 – 20mA	
1.4.11	Repeatability	%	State	
1.4.12	Linearity		State	
1.5	POWER SUPPLY			
1.5.1	Supply voltage	VDC	State	
1.5.2	Supply voltage variation effect		State	
1.5.3	Reverse polarity protection	Yes/No	Yes	
1.6	DEVIATION FROM SPECIFICATION?			
1.6.1	Number of Amendments (0 if None)		State	
1.6.2				
1.6.3				
1.6.4				
1.6.5				

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Y.2.4 Flow Switch

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	TECHNICAL DATA			
1.4.1	Power supply	VDC	24	
1.4.2	Power consumption	W	<2.5	
1.4.3	Outputs	mA	4 – 20, relay contact for detecting flow in reverse direction, measurement of flow in forward and reverse direction	
1.4.4	Ambient temperature	°C	-20 to 60	
1.4.5	Process temperature	°C	0 to 50	
1.4.6	Pressure rated	Bar	25	
1.4.7	Minimum flow rate	ℓ/s	600	
1.4.8	Maximum flow rate	ℓ/s	1000	
1.4.9	Accuracy	%	+/-2 at flow velocities >1m/s	
1.4.10	Reproducibility	%	+/-2	
1.4.11	Conductivity	μS/cm	≥20	
1.4.12	Interference immunity		CE EN 50081-1-2 & EN 50081-1-2	
1.4.13	Protection type	IP/NEMA	66/4X	
1.5	MATERIALS			
1.5.1	Sensor	Stainless Steel	PVDF, Viton O-ring, Electrodes 316 SS	
1.5.2	Housing		Die-cast Aluminium	
1.5.3	Weld stub	Stainless Steel	316	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.5.4	Adaptor piece	Stainless Steel	316	
1.5.5	Plastic union nut		PVC	
1.6	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.6.1	Number of Amendments (0 if None)		State	
1.6.2				
1.6.3				
1.6.4				
1.6.5				

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Y.2.5 Electro-Magnetic Flow Meters

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	TYPE		Electro-Magnetic flow meter	
1.5	FLOW SENSOR			
1.5.1	Type of Fluid	Medium	Water (raw)	
1.5.2	Solid content	Percentage of Flow Medium	Less than 5%	
1.5.3	Flanges	Type of Steel	Stainless Steel	
1.5.4	Grounding Rings	Type of Steel	Stainless Steel	
1.5.5	Degree of protection (Ingress Protection)	IP	68	
1.5.6	Approval Ratings		Non-Ex	
1.5.7	Type of fitted electrodes		Stainless steel	
1.5.8	Type of liner		Hard Rubber	
1.5.9	Min straight lengths required for installation			
	– <i>Upstream</i>	<i>m</i>	<i>5 x DN</i>	
	– <i>Downstream</i>	<i>m</i>	<i>3 x DN</i>	
1.6	SIGNAL/FLOW CONVERTOR			
1.6.1	Model Type		Field Housing – remote version	
1.6.2	Measuring Accuracy		0.5% of Measured Value	
1.6.3	Conductivity		20 µS/cm	
1.6.4	Maximum Solids	Percentage of Flow Medium	Less than 5%	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.5	Display and User interface		LCD High Contrast Display – backlit white, size:128x64 pixels	
1.6.5.1	– Display Functions		2 measured value pages, 1 status page, 1 graphic page	
1.6.5.2	– Languages		English, German, Portuguese	
1.6.5.3	– Operator input elements		4 optical keys for operator control of the signal convertor without opening the housing	
1.6.5.4	– Units		Metric, British and US units selectable	
1.6.6	Communication			
1.6.6.1	– Current Output	VDC mA Ω	Current output active – 24VDC, $I \leq 22\text{mA}$, $R_L \leq 1\text{k}\Omega$	
1.6.6.2	– Pulse Output	VDC mA Ω Hz	Pulse/frequency output active – 24VDC $I \leq 20\text{mA}$ $R_L \leq 47\text{k}\Omega$, $f \leq 100\text{Hz}$ $R_L \leq 10\text{k}\Omega$, $f \leq 1\text{kHz}$ $R_L \leq 1\text{k}\Omega$, $f \leq 10\text{kHz}$	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.6.3	– Status Output	VDC mA Ω	Status output/limit switch active – 24VDC $I \leq 20\text{mA}$, $R_L \leq 47\text{k}\Omega$	
1.6.6.4	– Verification		Diagnostics: instrument, process, measurement, empty pipe detection	
1.6.7	Measuring Accuracy			
1.6.7.1	– Maximum measuring error		+/- 0.15% of the measured value +/- 1mm/s	
1.6.7.2	– Repeatability		+/- 0.06% to OIML R117	
1.6.8	Operating conditions			
1.6.8.1	– Process temperature		0 to 50°C	
1.6.8.2	– Ambient temperature		-40 to 65°C	
1.6.8.3	– Storage temperature		-50 to 70°C	
1.6.9	Electrical Conductivity			
1.6.9.1	– All media except water	μS/cm	1	
1.6.9.2	– Water	μS/cm	20	
1.6.9.3	– Solids content	%	30	
1.6.10	Materials			
	– Remote mount type		Die-cast aluminium polyurethane coated	
1.6.11	Electrical connection			
1.6.11.1	– Voltage	V	230	
1.6.11.2	– Power consumption	VA	22	
1.6.11.3	– Signal cable	Max length in meters	600m	
1.6.11.4	– Cable entries		M20 x 1.5	
1.6.12	Protection category			
1.6.12.1	– According to IEC529/EN60529	Ingress Protection	IP67-field mount	
1.6.13	Minimum and Maximum Flow			

VOL 2 RETURNABLE DOCUMENTS

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.13.1	– <i>Minimum Flow Rate</i>	ℓ/s	15	
1.6.13.2	– <i>Maximum Flow Rate</i>	ℓ/s	1040	
1.7	GENERAL			
1.7.1	Nominal bore (DN)	mm		
1.7.2	Flange to flange dimension	mm	State	
1.7.3	Flange drilling table		BS EN 1092-2 (R/F)	
1.7.4	Pressure rating	PN		
1.7.5	Design Pressure (PN)	kPa	1.5 x WP _{max}	
1.8	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.8.1	Number of Amendments (0 if None)		State	
1.8.2				
1.8.3				
1.8.4				
1.8.5				

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Y.2.6 Battery Operated Magnetic Flow Meters

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	TYPE	VDC	Battery Powered – Lithium type	
1.5	FLOW SENSOR			
1.5.1	Type of Fluid	Medium	Water (raw)	
1.5.2	Solid content	Percentage of Flow Medium	Less than 5%	
1.5.3	Flanges	Stainless Steel	316-SS	
1.5.4	Degree of protection (Ingress Protection)	IP	68	
1.5.5	Nominal Diameter of pipe	DN	25	
1.5.6	Versions	Remote or Compact	Separate + Signal Convertor	
1.5.7	Type of fitted electrodes	Stainless Steel	316-SS	
1.5.8	Type of liner		Rilsan / Hard Rubber	
1.5.9	Min straight length flow up and down stream of flow meter			
	– <i>Upstream</i>	<i>m</i>	<i>5 x DN</i>	
	– <i>Downstream</i>	<i>m</i>	<i>3 x DN</i>	
1.6	SIGNAL CONVERTOR			
1.6.1	Model Type		Compact	
1.6.2	Maximum measuring error	%	0.5% of Measured Value	
1.6.3	Repeatability	%	+/- 0.2	
1.6.4	Electrical Conductivity	µS/cm	≥ 20	
1.6.5	Maximum Solids	Percentage of Flow Medium	Less than 5%	
1.6.6	Display		LCD High Contrast Display	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.7	Inputs/Outputs			
1.6.7.1	– Pulse Outputs	VDC mA mW Hz	<i>Pulse output passive for remote totalising : 5 - 24VDC I\leq10mA f\leq500Hz P\leq100mW</i>	
1.6.7.2	– Status Outputs	VDC mA mW	<i>Status output passive: 5 - 24VDC I\leq10mA P\leq100mW</i>	
1.6.7.3	– Communication		<i>External data logger utilising wireless communication protocol like IEC 61107 or better (No GSM coverage in area)</i>	
1.6.8	Power Supply			
1.6.8.1	– Battery	VDC	<i>2 x Lithium cell – 3.6V</i>	
1.6.8.2	– Typical lifetime	yrs	<i>+/-10</i>	
1.6.8.3	– Alarm	yrs	<i>1 year before battery depletion and final alarm</i>	
1.6.8.4	– Battery replacement		<i>Must not affect totaliser data</i>	
1.6.8.5	– Approval Ratings		<i>Non-Ex</i>	
1.6.8.6	– Protection Category		<i>IP 67</i>	
1.6.8.7	– Temperature Ratings	°C	<i>-5 to 50</i>	
1.6.8.8	– Process Connection		<i>M20 x 1.5</i>	
1.6.8.9	– Housing material		<i>Die-cast aluminium, polyurethane coated</i>	
1.6.9	Minimum and Maximum Flow			
1.6.9.1	– Minimum Flow Rate	l/s	<i>0.5</i>	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.9.2	– <i>Maximum Flow Rate</i>	ℓ/s	2	
1.7	GENERAL			
1.7.1	Nominal bore (DN)	mm	25	
1.7.2	Flange to flange dimension	mm	State	
1.7.3	Flange drilling table		BS EN 1092-2 (R/F)	
1.7.4	Pressure rating	PN	25	
1.7.5	Design Pressure (PN)	kPa	1.5 x WP _{max}	
1.8	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.8.1	Number of Amendments (0 if None)		State	
1.8.2				
1.8.3				
1.8.4				
1.8.5				

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Y.2.7 3-Beam-In-Line Ultrasonic Flowmeter

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	TYPE		Time-of-flight 3-beam ultrasonic in-line	
1.5	FLOW SENSOR			
1.5.1	Type of Fluid	Medium	Water (raw)	
1.5.2	Solid content	Percentage of Flow Medium	Less than 5%	
1.5.3	Materials			
1.5.3.1	– Flanges	Type of Material	Carbon Steel	
1.5.3.2	– Measuring Tube	Type of Material	Carbon Steel	
1.5.3.3	– Housing	Type of Material	Stainless Steel	
1.5.3.4	– Connection box	Type of Material	Stainless Steel	
1.5.3.5	– Transducer Window	Type of Material	Stainless steel	
1.5.4	Sensor Cable			
1.5.4.1	– Connection		M20 x 1.5	
1.5.4.2	– Cable length	m	15	
1.5.5	Min straight length flow up and down stream of flow meter			
1.5.5.1	– Upstream	m	10 x DN	
1.5.5.2	– Downstream	m	5 x DN	
1.6	SIGNAL CONVERTOR			
1.6.1	Model Type		Field Mounted	
1.6.2	Measuring Accuracy		0.5% of Measured Value	
1.6.3	Materials			
1.6.3.1	– Housing		Die-cast aluminium	
1.6.3.2	– Protection Category	IP	67	
1.6.4	Functionality			
1.6.4.1	– Flow rate	Yes/No	Yes	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6.4.2	– Flow direction	Yes/No	Yes	
1.6.4.3	– Velocity of sound	Yes/No	Yes	
1.6.4.4	– Signal strength	Yes/No	Yes	
1.6.4.5	– Self-diagnostics	Yes/No	Yes	
1.6.5	Local Display			
1.6.5.1	– Display		3-Field LCD backlit High Contrast Display	
1.6.5.2	– Languages		English, German	
1.6.6	Galvanic Isolation			
1.6.6.1	– Inputs/Outputs		All inputs and outputs galvanically isolated from power supply and each other	
1.6.7	Power Supply			
	– Mains supply	V	230V	
	– Cable Connection		M20 x 1.5	
1.6.8	Communication			
1.6.8.1	– Current Output	VDC mA Ω	Current output active – 24VDC, $I \leq 35\text{mA}$, $R_L \leq 680\Omega$	
1.6.8.2	– Pulse Output	VDC mA	Pulse/frequency output active – 24VDC $I \leq 50\text{mA}$	
1.6.8.3	– Status Output	VDC mA	Status output/limit switch active – 24VDC $I \leq 50\text{mA}$	
1.6.9	Minimum and Maximum Flow			
1.6.9.1	– Minimum Flow Rate	l/s	30	
1.6.9.2	– Maximum Flow Rate	l/s	650	
1.7	GENERAL			
1.7.1	Nominal bore (DN)	mm	700	
1.7.2	Flange to flange dimension	mm	State	
1.7.3	Flange drilling table		BS EN 1092-2 (R/F)	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.7.4	Pressure rating	PN	40	
1.7.5	Design Pressure (PN)	kPa	1.5 x WP _{max}	
1.8	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.8.1	Number of Amendments (0 if None)		State	
1.8.2				
1.8.3				
1.8.4				
1.8.5				

VOL 2 RETURNABLE DOCUMENTS

Y.2.8 Analytical – Multi-Parameter – Digital Sensors

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	MEASURED VARIABLES		Refer to Sensor information	
1.5	MEASURING RANGES		Refer to Sensor information	
1.6	INPUT TYPES	Digital/Analogue	Digital Sensor types	
1.7	CABLE SPECIFICATION (MAXIMUM LENGTH)	meters	100	
1.8	CABLE SPECIFICATION (CABLE TYPE)		Data cable	
1.9	OUTPUT COMMUNICATION SIGNAL	mA	2 x (4 – 20mA)	
1.10	MAXIMUM LOAD	Ohm	500	
1.11	OVERVOLTAGE PROTECTION	Yes/No	Yes	
1.12	INGRESS PROTECTION	IP	67	
1.13	WEATHER PROTECTION COVER	Yes/No	Yes	
1.14	RELATIVE HUMIDITY	%	10 to 95	
1.15	POWER SUPPLY	VDC	24	
1.16	ELECTROMAGNETIC COMPATIBILITY		EN 61326-1:2006	
1.17	AMBIENT TEMPERATURE RANGE	°C	-10 TO 50	
1.18	HUMAN MACHINE INTERFACE (HMI)	Yes/No	Yes	
1.19	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.19.1	Number of Amendments (0 if None)		State	
1.19.2				
1.19.3				
1.19.4				
1.19.5				

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Y.2.9 Analytical Transmitter – Single Parameter – Analogue Sensors

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	MEASURED VARIABLES		Refer to Sensor information	
1.5	MEASURING RANGES		Refer to Sensor information	
1.6	INPUT TYPES	mA	4 – 20mA	
1.7	CABLE SPECIFICATION (MAXIMUM LENGTH)	meters	100	
1.8	CABLE SPECIFICATION (CABLE TYPE)		Instrumentation cable	
1.9	OUTPUT COMMUNICATION SIGNAL	mA	4 – 20mA	
1.10	MAXIMUM LOAD	Ohm	500	
1.11	OVERVOLTAGE PROTECTION	Yes/No	Yes	
1.12	INGRESS PROTECTION	IP	67	
1.13	WEATHER PROTECTION COVER	Yes/No	Yes	
1.14	RELATIVE HUMIDITY	%	10 to 95	
1.15	POWER SUPPLY	VDC	24	
1.16	ELECTROMAGNETIC COMPATIBILITY		EN 61326-1:2006	
1.17	AMBIENT TEMPERATURE RANGE	°C	-10 TO 50	
1.18	HUMAN MACHINE INTERFACE (HMI)	Yes/No	Yes	
1.19	DEVIATION FROM SPECIFICATION?	Yes/No	State	
	Number of Amendments (0 if None)		State	

Y.2.10 Analytical Transmitter – PH Sensor

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	MEASURED VARIABLE	pH °Celsius	pH & Temperature	
1.5	PROCESS CONNECTION		G1/NPT 1	
1.6	CONDUCTIVITY SENSOR TYPE		Digital	
1.7	MEASURING RANGES	pH °C	1 to 12 0 to 50	
1.8	MEASURED ERROR	%	1.0	
1.9	CELL CONSTANT K	K	1.0 cm ⁻¹	
1.10	TEMP SENSOR INTEGRATED	Yes/No	Yes	
1.11	INGRESS PROTECTION	IP/NEMA	68/6P	
1.12	PROCESS PRESSURE	Bar	25	
1.13	MATERIAL - SENSOR		Graphite	
1.14	MATERIAL – SENSOR SHAFT		PES	
1.15	MATERIAL – THERMAL SENSOR		Titanium	
1.16	PROCESS TEMPERATURE	°C	0 to +50°C	
1.17	ELECTRODES	Material type	Graphite	
1.18	DURABILITY	Pressure Proof	Up to 40 Bar	
1.19	MEASURED CABLE LENGTH	meters	15	
1.20	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.20.1	Number of Amendments (0 if None)		State	
1.20.2				
1.20.3				
1.20.4				
1.20.5				

Y.2.11 Analytical Instrument – Conductivity Sensor

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	MEASURED VARIABLE	$\mu\text{S}/\text{cm}/^\circ\text{C}$	Conductivity & Temperature	
1.5	PROCESS CONNECTION		G1/NPT 1	
1.6	CONDUCTIVITY SENSOR TYPE		Digital	
1.7	MEASURING RANGES	$\mu\text{S}/\text{cm}/^\circ\text{C}$	10 to 20 $\mu\text{S}/\text{cm}$ -20 to 100 $^\circ\text{C}$	
1.8	MEASURED ERROR	%	1.0	
1.9	CELL CONSTANT K	K	1.0 cm^{-1}	
1.10	TEMP SENSOR INTEGRATED	Yes/No	Yes	
1.11	INGRESS PROTECTION	IP/NEMA	68/6P	
1.12	PROCESS PRESSURE	Bar	25	
1.13	MATERIAL - SENSOR		Graphite	
1.14	MATERIAL – SENSOR SHAFT		PES	
1.15	MATERIAL – THERMAL SENSOR		Titanium	
1.16	PROCESS TEMPERATURE	$^\circ\text{C}$	0 to +50 $^\circ\text{C}$	
1.17	ELECTRODES	Material type	Graphite	
1.18	DURABILITY	Pressure Proof	Up to 40 Bar	
1.19	MEASURED CABLE LENGTH	meters	15	
1.20	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.20.1	Number of Amendments (0 if None)		State	
1.20.2				
1.20.3				
1.20.4				
1.20.5				

Y.2.12 Analytical Instrument – Turbidity Sensor

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	MODEL		State	
1.4	MEASURED VARIABLE	FNU/PP M/g/1/%	Turbidity	
1.5	PROCESS CONNECTION		G1/NPT ^{3/4}	
1.6	TURBIDITY SENSOR TYPE		Digital	
1.7	MEASURING RANGES	FNU PPM g/1 %	0.0 to 9999 0.0 to 3000 0.0 to 3.0g/1 0.0 to 200	
1.8	MAXIMUM MEASURED ERROR	%	<5% (0.02FNU)	
1.9	INGRESS PROTECTION	IP/NEMA	68/6P	
1.10	PROCESS PRESSURE	Bar	25	
1.11	MATERIAL - SENSOR		PVC/PPS	
1.12	MATERIAL – OPTICAL WINDOW		Sapphire	
1.13	MATERIAL – WIPER		Rubber	
1.14	PROCESS TEMPERATURE	°C	0 to +50°C	
1.15	MEASURED CABLE LENGTH	meters	15	
1.16	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.16.1	Number of Amendments (0 if None)		State	
1.16.2				
1.16.3				
1.16.4				
1.16.5				

TAGS FOR ANALYTICAL INSTRUMENTS

1B-AT-001

1B-AT-002

1B-AT-003

1B-AT-004

1B-AT-005

1B-AT-006

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Y.2.13 Temperature Transmitters

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	INPUT TYPE			
1.5.1	Measured Variable	Ω, V	Voltage and Resistance	
1.5.2	Measuring Range	$^{\circ}C$	15 - 95	
1.5.3	Type of input		RTD	
1.6	OUTPUT TYPE			
1.6.1	Output signal	mA	4 – 20 with HART functionality	
1.6.2	Alarm signals		Under ranging - <3.8mA, Over ranging - >20.5mA, Sensor break, short circuit <3.8mA or >20.5mA	
1.6.3	Load			
1.6.4	Linearization		On temperature, resistance and voltage	
1.6.5	Filter	S	0 to 100s/Digital	
1.6.6	Galvanic isolation	kV AC	2 for both input and output	
1.6.7	Minimum current consumption	mA	≤ 3.5	
1.6.8	Current limit	mA	≤ 23	
1.6.9	Switch on delay	S	4	
1.7	POWER SUPPLY			
1.7.1	Supply voltage	V	11.5 to 35 with polarity protection	
1.7.2	Under voltage detection	Yes/No	Yes	
1.7.3	Residual ripple	V, kHz	$U_{ss} \leq 3V$ at U_b $\geq 13V$, $f_{max} = 1kHz$	
1.8	PERFORMANCE CHARACTERISTICS			

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.8.1	Response time	S	2	
1.8.2	Measurement accuracy	%	0.08	
1.9	ENVIRONMENTAL CONDITIONS			
1.9.1	Ambient temperature	°C	-10 to 50	
1.9.2	Degree of protection	IP	66	
1.9.3	Electromagnetic compatibility		IEC 61326	
1.10	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.10.1	Number of Amendments (0 if None)		State	
1.10.2				
1.10.3				
1.10.4				
1.10.5				

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Y.2.14 PLC – CPU Module

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	CLOCK FREQUENCY	Hz	24MHz at least	
1.6	MEMORY	RAM	8MB at least	
1.7	INTERNAL BATTERY BACKUP	Type	Lithium/3.6V	
1.8	PROTECTIVE RATING	IP	IP20 according to EN60529, IEC 529	
1.9	COMMUNICATION PORT REQUIREMENTS			
1.9.1		Com 1	Ethernet/10Mbs/100Mbs	
1.9.2	Optional - Only if a design requirement	Com 2	Ethernet/10Mbs/100Mbs	
1.9.3	Optional - Only if a design requirement	Com 3	PROFIBUS-DP	
1.9.4	Optional - Only if a design requirement	Com 4	PROFINET	
1.10	MAXIMUM SUPPLY CURRENT	Modulebus	1 Amp	
1.11	FUSE RATING	Modulebus	2 Amp fast	
1.12	REDUNDANT POWER SUPPLY			
1.12.1		Max Input Voltage	30VDC	
1.12.2		Min Input Voltage for high level	15VDC	
1.12.3		Min Input Voltage for low level	8VDC	
1.13	SUPPLY REQUIREMENTS			
1.13.1		Supply Voltage	24VDC	
1.13.2		Allowed Variation	19.2 – 30VDC	
1.14	TYPICAL CURRENT CONSUMPTION	24V	180mA	
1.15	TYPICAL POWER LOSS	24V	5W	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.16	MAXIMUM POWER LOSS	24V	13W	
1.17	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.17.1	Number of Amendments (0 if None)		State	

Y.2.15 PLC – Communication Module

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	

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Y.2.16 PLC – Power Supply Module

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	RATED OUTPUT CURRENT	Amp	2.5 - 5	
1.6	RATED OUTPUT POWER	Watt	60 - 120	
1.7	RATED OUTPUT VOLTAGE	Volt	24V	
1.8	RATED INPUT POWER (FULL LOAD)	Watt	70 - 140	
1.9	EFFICIENCY FACTOR	%	85% - 95%	
1.10	MAINS/INPUT VOLTAGE	Volt	115/230VAC	
1.11	MAINS VOLTAGE VARIATION	%	85% - 110%	
1.12	PRIMARY PEAK CURRENT (AT POWER ON)	Amp	15A – 25A	
1.13	HEAT DISSIPATION	Watt	8W – 15W	
1.14	SECONDARY VOLTAGE HOLDUP TIME AT MAINS BLACKOUT	Time	>20ms	
1.15	PROTECTIVE RATING	IP	IP20 according to EN60529, IEC 529	
1.16	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.16.1	Number of Amendments (0 if None)		State	
1.16.2				
1.16.3				
1.16.4				
1.16.5				

Y.2.17 SCADA Server (Front-End & Back-End Server, Historian)

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	PROCESSOR CORE		16/18/20/22/24	
1.6	PROCESSOR TYPE	Hz	Intel Xeon 8100 Series/Intel Xeon 6100 Series/Intel Xeon 5100 Series	
1.7	MEMORY TYPE	RAM	DDR4	
1.8	PROCESSOR SPEED		3.6GHz	
1.9	MEMORY SLOTS	Number	48 DIMM Slots	
1.10	MEMORY LIMIT	TB	3	
1.11	SYSTEM FAN		Hot Standby redundant	
1.12	EXPANSION SLOTS	Number	8	
1.13	PROCESSOR CACHE	MB	30.25MB L3 /33.00MB L3 / 35.75MB L3	
1.14	MOUNTING TYPE		Rack Mount	
1.15	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.15.1	Number of Amendments (0 if None)		State	
1.15.2				
1.15.3				
1.15.4				
1.15.5				

Y.2.18 SCADA Client (Engineering & Operator Workstations)

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	PROCESSOR TYPE	Type	Intel C622 Chipset	
1.6	CPU BUS SPEED	Hz	10.4GT per second	
1.7	MEMORY TYPE	GB RAM	DDR4-DIMM 16/32/64	
1.8	MEMORY EXPANSION		24 Slots	
1.9	MEMORY SPEED	MT	2133MT/s, 2400MT/s, 2666MT/s & 2933MT/s	
1.10	I/O CONTROLLER		Nuvoton SIO15	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

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Y.2.19 PLC – Digital Input Modules

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	TYPICAL NUMBER OF CHANNELS	2 Groups with 8 each	16 current sinking	
1.6	TYPICAL RATED VOLTAGE		24VDC	
1.7	TYPICAL INPUT VOLTAGE RANGE	For a "1"	15 to 30V	
1.8	TYPICAL INPUT VOLTAGE RANGE	For a "0"	-30 to +5V	
1.9	NOMINAL INPUT CHANNEL CURRENT	@ 24VDC	6 mA	
1.10	TYPICAL INPUT CURRENT	For a "1"	>3.0mA	
1.11	TYPICAL INPUT CURRENT	For a "0"	<1.0mA	
1.12	TYPICAL INPUT IMPEDANCE		3.5 k Ohm	
1.13	MAXIMUM FIELD CABLE LENGTH	Distance	600 meters	
1.14	FILTER TIMES (DIGITAL, SELECTABLE)	Between	2,4,8,16ms	
1.15	PROCESS VOLTAGE SUPERVISION	1 per group	2 Channels	
1.16	TYPICAL CURRENT CONSUMPTION @	+5VDC	50mA	
1.17	TYPICAL POWER DISSIPATION		1.8W	
1.18	MAXIMUM AMBIENT TEMPERATURE		55/40 Deg C	
1.19	ISOLATION		Groupwise isolated from ground	
1.20	EQUIPMENT CLASS		Class 1 according to IEC 61140	
1.21	G3 COMPLIANT VERSION		According to ISA-S71.04	
1.22	TYPICAL RATED INSULATION VOLTAGE		50V	
1.23	TYPICAL DIELECTRIC TEST VOLTAGE		500VAC	
1.24	DEVIATION FROM SPECIFICATION?	Yes/No	State	
	Number of Amendments (0 if None)		State	

VOL 2 RETURNABLE DOCUMENTS

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED

VOL 2 RETURNABLE DOCUMENTS

Y.2.20 PLC – Digital Output Modules

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	TYPICAL NUMBER OF CHANNELS	2 Groups with 8 each	16	
1.6	TYPICAL TYPE OF OUTPUT		Transistor current sourcing, current limited	
1.7	TYPICAL INPUT VOLTAGE RANGE		12 – 32VDC	
1.8	TYPICAL MAXIMUM LOAD CURRENT		0.5A	
1.9	TYPICAL MAXIMUM SHORT-CIRCUIT CURRENT		2.4A	
1.10	TYPICAL MAXIMUM LEAKAGE CURRENT		<10 μ A	
1.11	TYPICAL OUTPUT IMPEDANCE		<0.4 Ohm	
1.12	MAXIMUM FIELD CABLE LENGTH		600 meters	
1.13	TYPICAL CURRENT CONSUMPTION @	+5V	80mA	
1.14	TYPICAL POWER DISSIPATION		2.1W	
1.15	MAXIMUM AMBIENT TEMPERATURE		55/40 Deg C	
1.16	PROCESS VOLTAGE SUPERVISION		2 Channels (1 per group)	
1.17	ISOLATION		Groupwise isolated from ground	
1.18	EQUIPMENT CLASS		Class 1 according to IEC 61140	
1.19	PROTECTION RATING		IP20 according to IEC 60529	
1.20	TYPICAL RATED INSULATION VOLTAGE		50V	
1.21	TYPICAL DIELECTRIC TEST VOLTAGE		500VAC	
1.22	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.22.1	Number of Amendments (0 if None)		State	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.22.2				
1.22.3				
1.22.4				
1.22.5				

VOL 2 RETURNABLE DOCUMENTS

Y.2.21 PLC – Analogue Input Modules

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	NUMBER OF CHANNELS	1 Group of 8	8	
1.6	TYPE OF INPUT		Unipolar single ended	
1.7	MEASUREMENT RANGE		4...20mA	
1.8	UNDER/OVER RANGE		-5% /+15%	
1.9	TYPICAL INPUT IMPEDANCE	At Voltage Input	290K Ohm	
1.10	TYPICAL INPUT IMPEDANCE	At Current Input	>= 230 Ohm	
1.11	MAXIMUM FIELD CABLE LENGTH		600 meters	
1.12	MAXIMUM VOLTAGE INPUT	Non-Destructive	30VDC	
1.13	TYPICAL ERROR		Max 0.1%	
1.14	TYPICAL RESOLUTION		12 bit	
1.15	TYPICAL AND MAXIMUM ALLOWABLE TEMPERATURE DRIFT CURRENT		50 ppm/Deg C – max 80 ppm/Deg C	
1.16	TYPICAL AND MAXIMUM ALLOWABLE TEMPERATURE DRIFT VOLTAGE		Typ 70 ppm/Deg C – max 100 ppm/Deg C	
1.17	TYPICAL UPDATE CYCLE TIME		8ms	
1.18	TYPICAL CURRENT CONSUMPTION	24V	40mA	
1.19	TYPICAL CURRENT CONSUMPTION	5V	70mA	
1.20	TYPICAL POWER DISSIPATION		1.5W	
1.21	MAXIMUM AMBIENT TEMPERATURE		55/40 Deg C	
1.22	VOLTAGE SUPERVISION		Internal power supply	
1.23	MAXIMUM SENSOR POWER DISTRIBUTION		Max 1A per connection	
1.24	INPUT FILTER	Time	140ms	

VOL 2 RETURNABLE DOCUMENTS

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.25	ISOLATION		Groupwise isolated from ground	
1.26	EQUIPMENT CLASS		Class 1 according to IEC 61140	
1.27	PROTECTION RATING		IP20 according to IEC 60529	
1.28	TYPICAL RATED INSULATION VOLTAGE		50V	
1.29	TYPICAL DIELECTRIC TEST VOLTAGE		500VAC	
1.30	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.30.1	Number of Amendments (0 if None)		State	
1.30.2				
1.30.3				
1.30.4				
1.30.5				

VOL 2 RETURNABLE DOCUMENTS

Y.2.22 PLC – Analogue Output Modules

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	NUMBER OF CHANNELS	1 Group of 8	8	
1.6	OUTPUT RANGE		4...20mA	
1.7	TYPICAL OVER RANGE		15%	
1.8	TYPICAL OUTPUT LOAD		500 Ohms	
1.9	MAXIMUM FIELD CABLE LENGTH		600 meters	
1.10	RISE TIME		0-90% 0.35ms RL=500 Ohms	
1.11	TYPICAL CYCLE TIME		< 2ms	
1.12	TYPICAL ERROR		Max 0.1% at 0- 500 Ohms	
1.13	TYPICAL RESOLUTION		14 bit	
1.14	TEMPERATURE DRIFT		Typ 30 ppm/Deg C Max 60ppm/Deg C	
1.15	MAXIMUM CURRENT CONSUMPTION @	24V	200mA	
1.16	TYPICAL REQUIRED SUPERVISION		Module: Output power low Channel: Open- circuit	
1.17	MAXIMUM CURRENT CONSUMPTION @	5V	70mA	
1.18	TYPICAL POWER DISSIPATION		3W	
1.19	MAXIMUM AMBIENT TEMPERATURE		55/40 Deg C	
1.20	ISOLATION		Groupwise isolated from ground	
1.21	EQUIPMENT CLASS		Class 1 according to IEC 61140	
1.22	PROTECTION RATING		IP20 according to IEC 60529	
1.23	TYPICAL RATED INSULATION VOLTAGE		50V	

VOL 2 RETURNABLE DOCUMENTS

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.24	TYPICAL DIELECTRIC TEST VOLTAGE		500VAC	
1.25	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.25.1	Number of Amendments (0 if None)		State	
1.25.2				
1.25.3				
1.25.4				
1.25.5				

Y.2.23 Microwave Broadband Radio

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Country of origin		State	
1.1.2	Manufacturer		Cambium Networks	
1.1.3	Supplier		State	
1.1.4	Model		PTP 820C	
1.1.5	Operational modes		Full Duplex	
1.1.6	Modulation		Digital	
1.1.7	RF data rate & Bandwidth		340MBps@28M Hz Channel Bandwidth	
1.1.8	Frequency Band		6 - 38 GHz	
1.2	TECHNICAL SPECIFICATION			
1.2.1	Temperature Range	°C	-33° to 55°	
1.2.2	Power Input	VDC	-48VDC	
1.2.3	Max Power Consumption	W	6GHz: 65W, 7GHz: 75W, 11GHz: 65W, 13-15GHz: 55W, 18-24GHz: 48W, 26-38GHz: 55W	
1.2.4	Power over Ethernet Interface		Yes	
1.2.5	Security		AES 256-bit Encryption	
1.2.6	Protocols		HTTPS, SNMPV3, SSH, SFTP	
1.2.7	Ethernet Standards Supported		10/100/1000Base-T/X (IEEE802.3), Ethernet VLANs (IEEE802.1ac), Class of service (IEEE802.1p), Link Aggregation (IEEE802.3ad)	

VOL 2 RETURNABLE DOCUMENTS

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.8	Ethernet Interfaces		Traffic Interface - 10/100/1000Base-T (RJ45) and 1000Base-X (SFP), Management Interface – 10/100Base-T (RJ-45), Optical SFP Types – Optical 1000Base-LX (1310nm) or SX (850nm)	
1.2.9	Ethernet Features		MTU – 9600 Bytes, QoS: VLAN ID, IPv4, DSCP, IPv6, 8 priority queues, buffering up to 64Mbit per queue, 4K VLANs, VLAN add/remove/translate, Frame Cut Through, Adaptive Bandwidth Notification, Network Resiliency – G.8032 and MSTP. Ethernet QAM	
1.3	COMPLIANCE STANDARDS			
1.3.1	EMC		EN 301 489-1, EN 301 489-4, Class B (Europe), FCC 47 CFR, Part 15, Class B (US), ICES-003, Class B (Canada)	
1.3.2	Surge		EN61000-4-5, Class 4 (for PWR and ETH1/PoE ports	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.3.3	Safety		EN60950-1, IEC60950-1, UL60950-1, CSA-C22.2 No.60950-1, EN60950-22, UL60950-22, CSAC2.2.60950 -22	
1.3.4	Ingress Protection		IP66 Compliant	
1.3.5	Storage		ETSI EN 300 019-1-1 Class 1.2	
1.3.6	Transportation		ETSI EN 300 019-1-2 Class 2.3	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

VOL 2 RETURNABLE DOCUMENTS

Y.2.24 Managed Ethernet Switch

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	ETHERNET PORTS			
1.5.1	Fibre Ports	1000BaseX	4/6/8	
1.5.2	Copper Ports	10/100BaseTX	8/16/24	
1.5.3	Connector Types		LC, SC, SFP Pluggable Optics	
1.6	CYBER SECURITY FEATURES			
1.6.1	Password Protection		Multi-level	
1.6.2	Encryption		SSH/SSL	
1.6.3	Port Security		MAC Based	
1.6.4	Access Security		SNMPv3 encrypted authentication	
1.7	INTERNATIONAL STANDARDS			
1.7.1	Electric utility Substation		IEEE 1613	
1.7.2			IEC 61850-3	
1.7.3	Variable Speed drive Systems		IEEE 61800-3	
1.7.4	Generic Industrial		IEC 61000-6-2	
1.7.5	Traffic Control Equipment		NEMA TS-2	
1.7.6	Hazardous Location Certification		Class 1 Division 2	
1.7.7	Operating Temperature		-40 Deg to +85 Deg C	
1.8	POWER REQUIREMENTS			
1.8.1	Power Consumption		10W Max	
1.8.2	Power Supply	Hi-Voltage	230 VAC	
1.9	GENERAL			
1.9.1	Ingress Protection	IP	40	
1.9.2	Enclosure	Galvanized Steel	20 AWG	
1.9.3	Mounting		DIN Rail	
1.9.4	Warranty	Year	5	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.10	SWITCH PROPERTIES			
1.10.1	Switching Method		Store and forward	
1.10.2	Switching Latency		7 μ Sec	
1.10.3	Switching Bandwidth		5.6 Gbps	
1.10.4	MAC Addresses		4096	
1.10.5	MAC Address table size		32 kbytes	
1.10.6	Priority Queues		4	
1.10.7	Frame Buffer Memory		2 Mbit	
1.10.8	VLANS		4096	
1.10.9	IGMP Multicast Groups		256	
1.10.10	Port Rate Limiting		128kbps, 256, 512, 4, 8 Mbps	
1.11	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.11.1	Number of Amendments (0 if None)		State	
1.11.2				
1.11.3				
1.11.4				
1.11.5				

VOL 2 RETURNABLE DOCUMENTS

Y.2.25 Instrument Power Supply

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN		State	
1.2	MANUFACTURER		State	
1.3	SUPPLIER		State	
1.4	MODEL		State	
1.5	RATED OUTPUT CURRENT	Amp	5	
1.6	RATED OUTPUT POWER	Watt	120	
1.7	RATED OUTPUT VOLTAGE	Volt	24...28V	
1.8	RATED INPUT POWER (FULL LOAD)	Watt	140	
1.9	SURGE PROTECTION	Yes/No	Yes	
1.10	MAINS/INPUT VOLTAGE	Volt	115/230VAC	
1.11	OVERLOAD PROTECTION		105% - 130%	
1.12	PARALLEL CONNECTION OPTION	Yes/No	Yes	
1.13	DEGREE OF EFFICIENCY AT MAX LOAD	%	>=84	
1.14	SECONDARY VOLTAGE HOLDUP TIME AT MAINS BLACKOUT	Time	>20ms	
1.15	PROTECTIVE RATING	IP	IP20 according to EN60529, IEC 529	
1.16	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.16.1	Number of Amendments (0 if None)		State	
1.16.2				
1.16.3				
1.16.4				
1.16.5				

VOL 2 RETURNABLE DOCUMENTS

Y2.26 24 - Core Fibre Optic Single-Mode Cable

ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	COUNTRY OF ORIGIN			
1.2	MANUFACTURER			
1.3	SUPPLIER			
1.4	FIBRE SPECIFICATIONS	nm	1550nm	
1.4.1	Typical Core Diameter	µm	8.3	
1.4.2	Cladding Diameter	µm	125	
1.4.3	Core to Cladding Offset	µm	<=0.8	
1.4.4	Cladding Non-Circularity	%	<=1	
1.4.5	Coating Diameter	µm	245	
1.4.6	Coloured Fibre Diameter	µm	250	
1.4.7	Cut-off Wavelength	nm	<1260	
1.4.8	Mode-Field Diameter	nm	10.5 @ 1550nm	
1.4.9	Cable Fibre Attenuation	dB/Km	0.25 Max & 0.24 Average@ 1550nm	
1.4.10	Attenuation Uniformity	dB	<0.1 for both 1310nm & 1550nm	
1.4.11	Maximum Total Dispersion	Nm*Km (1550nm)	<=18.0PS	
1.4.12	Zero Dispersion Wavelength	nm	1301.5<=ZDW<=1321.5	
1.4.13	Zero Dispersion Slope	Nm ² * Km	<=0.092ps	
1.4.14	Polarization Mode Dispersion	ps/Km	<=0.5	
1.5	PHYSICAL CRITERIA			
1.5.1	Core		Doped Silica	
1.5.2	Cladding		Concentric Silica	
1.5.3	Coating		Dual Layered, UV-cured acrylate	
1.5.4	Water Blocking Tape	Yes/No	Yes	
1.5.5	RipCORDS	Yes/No	Yes	
1.5.6	Armouring (corrugated steel tape/steel wire)	Yes/No	Yes	
1.5.7	Cable Sheath		HDPE	
1.5.8	Cladding design		Matched	

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ITEM	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.6	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.6.1	Number of Amendments (0 if None)		State	
1.6.2				
1.6.3				
1.6.4				
1.6.5				

SCHEDULE Z – CATHODIC PROTECTION AND AC MITIGATION

Z. CATHODIC PROTECTION AND AC MITIGATION

Z.1 PREAMBLE - CATHODIC PROTECTION AND AC MITIGATION

Z.1.1 INTRODUCTION

- a) All Schedules shall be fully completed in block letters using a black pen or typing. Failure to complete all relevant sections may result in the Tender being rejected and/or disqualified.
- b) Tenderers shall ensure that they are fully acquainted with the contents of Section 34 – “AC Mitigation and Cathodic Protection” and Section 39 – “Electrical Plant and Installation” of the Specification. The Contractor shall indicate, at tender stage, all variations from the Specification.
- c) Preference shall be given to locally manufactured Materials, Plant and Equipment. Should items not be locally manufactured or procured, Tenderers shall clearly identify these in their Tender.
- d) Only Materials and Plant based on proven quality and technology and of high reliability shall be considered for use.
- e) The Tenderer shall complete the Schedules giving details of Contractors and / or suppliers of Materials, Plant and Equipment and show that these Materials, Plant and Equipment have been successfully used and installed on other pipelines in South Africa operating under similar site conditions as required on this Contract. The suppliers’ or Contractors’ references shall stipulate the pipeline name, the length of time that the specific unit, Plant and / or piece of Equipment has been operational as well as the name of a representative of the owner of the pipeline together with a contact telephone number(preferably landline).
- f) All Schedules concerning Materials and Plant incorporating proprietary brand products or units, shall be fully supplemented by the inclusion of applicable brochures, pamphlets, additional explanatory specifications, descriptions or notes in that order of availability and shall be submitted with the Tender in a covering letter and bound separately.
- g) Where Tenderers wish to bring special characteristics of Materials, Plant and Equipment offered to the attention of the Engineer, Tenderers shall supply descriptive literature and brochures to supplement information in the Schedules.
- h) Where the Specification calls for specific makes and types of Plant, the Tendered prices shall be based on such Plant.

VOL 2 RETURNABLE DOCUMENTS

Z.2 CATHODIC PROTECTION SCHEDULES**Z.2.1 Mixed Metal Oxide (MMO) / Precious Metal Oxide (PMO) Anodes - Tubular**

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER DETAILS AND STANDARDS			
1.1.1	Type		MMO / PMO	
1.1.2	Manufacturer / Supplier		State	
1.1.3	Product name		State	
1.1.4	Reference standard		ASTM B338	
1.2	DIMENSIONS, DETAILS AND CAPACITY			
1.2.1	Length	mm	1,000 (min.) & 1,500 (max.)	
1.2.2	Length	mm	1,000 (max.)	
1.2.3	Diameter	mm	19 (min.)	
1.2.4	Wall thickness	mm	0.9	
1.2.5	Anode capacity	A.yrs	120 (minimum)	
1.2.6	Max anode loading / length	A/mm	3.0 A/ 500mm	
1.2.7	Test method used for determining loading / length		State	
1.3	TESTS			
1.3.1	Test Method / Laboratory accreditation		UKAS / Bureau Veritas	
1.3.2	Cable to anode resistance	Ω	0.001 (max.)	
1.3.3	Capacity test on complete anode	years	20 (minimum)	
1.4	DEVIATION FROM SPECIFICATION?			
1.4.1	Number of Amendments (0 if None)	Yes/No	State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

Z.2.2 Mixed Metal Oxide (MMO) / Precious Metal Oxide (PMO) Anodes – Mesh (Diamond)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER DETAILS AND STANDARDS			
1.1.1	Type		MMO / PMO	
1.1.2	Manufacturer / Supplier		State	
1.1.3	Product name		State	
1.1.4	Reference standard		ASTM B265	
1.2	DIMENSIONS, DETAILS AND CAPACITY			
1.2.1	Length	mm	1,000 (min.)	
1.2.2	Length	mm	1,200 (max.)	
1.2.3	Mesh	mm	6 x 4 x 40 wide (minimum)	
1.2.4	Mesh thickness	mm	1.0	
1.2.5	Capacity	A.yrs	60 (minimum)	
1.2.6	Max anode loading / anode length	A/mm	3.0 A/ 1200 mm long anode	
1.2.7	Test method used for determining loading / length		State	
1.3	TESTS			
1.3.1	Test Method / Laboratory accreditation		UKAS	
1.3.2	Cable to anode resistance	Ω	0.001 (max.)	
1.3.3	Capacity test on complete anode	years	20 (minimum)	
1.4	DEVIATION FROM SPECIFICATION?			
1.4.1	Number of Amendments (0 if None)	Yes/No	State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

VOL 2 RETURNABLE DOCUMENTS

Z.2.3 Silicon Iron Centrifugally Cast Tubular Anodes

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER, DETAILS AND STANDARDS			
1.1.1	Manufacturer / Supplier		State	
1.1.2	Type / Product Name		State	
1.1.3	Reference Standard		State	
1.1.4	Casting defects standard		ASTM E186 Vol II Level 1/2	
1.2	DIMENSIONS			
1.2.1	Length	mm	1,070 (minimum)	
1.2.2	Internal diameter (minimum)	mm	55 (minimum)	
1.2.3	External diameter (minimum)	mm	70 (minimum)	
1.2.4	Cable to Anode resistance	Ω	0.001 (max.)	
1.2.5	Density	g/ml	7.0 (minimum)	
1.2.6	Weight	kg	14.0 (minimum)	
1.3	ELEMENT COMPOSITION			
1.3.1	Silicon (Si)	%	14.20 to 14.75	
1.3.2	Carbon (C)	%	0.70 to 1.10	
1.3.3	Manganese (Mn)	%	1.5 (maximum)	
1.3.4	Molybdenum (Mo)	%	0.2 (maximum)	
1.3.5	Copper (Cu)	%	0.5 (maximum)	
1.3.6	Chromium (Cr)	%	3.35 to 5	
1.3.7	Iron (Fe)	%	Balance	
1.4	DEVIATION FROM SPECIFICATION?		Yes/No	State
1.4.1	Number of Amendments (0 if None)			State
1.4.2				
1.4.3				
1.4.4				
1.4.5				

VOL 2 RETURNABLE DOCUMENTS

Z.2.4 Fully Automatic Temporary CP DV Controller (CP-CC PSU)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	MANUFACTURER, DETAILS			
1.1.1	Manufacturer		State	
1.1.2	Type / Product Name		State	
1.2	DETAILS			
1.2.1	Primary enclosure type		IP 65 Polycarbonate	
1.2.2	Secondary enclosure type		Durasafe or equivalent	
1.2.3	Cooling		Natural convection – not forced cooling	
1.2.4	Input		Battery pack – 4 of 180 A/hr capacity batteries.	
1.2.5	Continuous DC Output	V / A	24 V 15 A	
1.2.6	Output Ripple Voltage (ANSI C43.2) across entire range	%	0,5% (maximum)	
1.3	CONTROL MODES			
1.3.1	Mode 1			
	– Full Logic Control		<i>Constant pipe to soil potential (Fully independent of 4.3.2)</i>	
	– Reference Potential Input		<i>4-20 mA (± 65 V peak rating) fully isolated half- cell signal > 10 MΩ input Impedance with 100 dB @ 50 Hz AC rejection; Self- Calibration</i>	
	– Control Accuracy		<i>±50 mV from preset potential within a 100 mS</i>	

VOL 2 RETURNABLE DOCUMENTS

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
			<i>(maximum) response time.</i>	
1.3.2	Mode 2			
	– <i>Full logic control</i>		<i>Constant DC output current (Fully independent of 4.3.1)</i>	
	– <i>Control accuracy</i>		<i>±1% from preset value within a 100 mS (max.) response time (over entire range).</i>	
1.3.3	Current measurement		Hall effect probe.	
1.4	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

VOL 2 RETURNABLE DOCUMENTS

Z.2.5 Carbonaceous Backfill Material

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Supplier		State	
1.1.2	Type / Product name		State	
1.2	CHEMICAL ANALYSIS AND/OR DESCRIPTION			
1.2.1	Fixed carbon	%	99.5% (minimum) (ASTM D5373)	
1.2.2	Sulphur	%	0.25% (ASTM D4239)	
1.2.3	Ash & Volatile's and HM	%	0.50% (ASTM D4422 & BS 1016- 104.3)	
1.2.4	Moisture	%	0.15% (ASTM D3173)	
1.2.5	Resistivity @ 1,000 kPa	$\mu\Omega$	550 (maximum) (Alusuisse C109)	
1.3	MAXIMUM AND MINIMUM PARTICLE SIZE DISTRIBUTION (PSD)			
1.3.1	MMO anode in soil / brackish water ≤ 15 m	%	100% < 1.00 mm 5% < 0.5 mm	
1.3.2	MMO anode in soil / brackish water > 15 m but < 50 m	%	100% < 1.50 mm 5% < 0.5 mm	
1.3.3	MMO anode in soil / brackish water ≥ 50 m	%	100% < 1.00 mm 5% < 0.5 mm	
1.3.4	Centrifugally cast tubular silicon iron anodes in soil brackish water – all depths	%	100% < 3.00 mm 5% < 0.5 mm	
1.4	DEVIATION FROM SPECIFICATION?		State	
1.4.1	Number of Amendments (0 if None)		State	
1.4.2				
1.4.3				
1.4.4				
1.4.5				

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Z.2.6 Remote Monitoring Units (RMU) for the Transformer Rectifier Units (TRU's)

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Supplier		State	
1.1.2	Type / Product name		State	
1.2	REQUIREMENTS			
1.2.1	Humidity	%	85% maximum non condensing	
1.2.2	Programming interface	Type	USB	
1.2.3	Synchronisation of GPS clock and date	hr	hourly (1 hour) minimum	
1.2.4	Battery back-up	hr	72 (minimum)	
1.2.5	Non-volatile memory	G	1 Gig	
1.2.6	Frequency of samples stored in non-volatile memory	/ s	from 1 /s	
1.2.7	Frequency of samples transmitted	/ min	at least 1 / min	
1.2.8	RMU input impedance	MΩ	10 MΩ minimum	
1.2.9	Opto-isolation between PRE potential, coupon current, DC output voltage and DC output current	kV	1 kV minimum	
1.2.10	TRU voltage resolution	V	100 V ± 10 mV maximum	
1.2.11	TRU voltage resolution	V	50 V ± 2 mV maximum	
1.2.12	250 mA coupon current resolution	Bit	16 Bit in 10 µA steps	
1.2.13	50 A coupon current resolution	Bit	16 Bit in 10 mA steps	
1.2.14	Alarm reporting	type	sms and e- mail	
1.2.15	Number of mobile systems and e-mails included in alarm reporting	No	State	
1.2.16	Number of e-mails included in alarm reporting	No	State	
1.2.17	Output report	Type	Data, alarms, efficiency and down time	
1.2.18	Output report format	Type	PDF and CSV/ MS Excel	

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ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.2.19	Output report frequency	No /day	once per day fully programmable	
1.2.20	Online access	Type	State	
1.2.21	Password protection	Type	View, access, change parameters, alarms	
1.2.22	Maximum operating temperature	°C		
1.2.23	Minimum operating temperature	°C		
1.2.24	Clock drift			
1.2.25	Constant current (A) set points - maximum, minimum threshold and alarms			
1.2.26	Constant voltage (V) set points - maximum, minimum threshold and alarms			
1.2.27	Constant potential (CSE) set points - maximum, minimum threshold and alarms			
1.2.28	Software licencing - requirement		State	
1.3	DEVIATION FROM SPECIFICATION?	Yes/No	State	
1.3.1	Number of Amendments (0 if None)		State	
1.3.2				
1.3.3				
1.3.4				
1.3.5				

Z.2.7 Solid State DC Decoupling (SS DCD) Device

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Supplier		State	
1.1.2	Type / Product name		State	
1.2	REQUIREMENTS			
1.2.1	Type of lightning protection	Type	gas discharge / spark gap (no air) / MOV	
1.2.2	Lightning protection peak surge	kA	100 kA (8/20 μS)	
1.2.3	Damage at 10 kA fault current 30 cycles at 50 HZ (600 mS)		no damage	
1.2.4	Blocking voltage	V	+1 / -8 V	
1.2.5	Steady state DC	A	60 A for 3 hours with T _{Heat Sink} ≤ 60 °C	
1.2.6	Bypass capacitor network	A	60 A at 50 Hz	
1.2.7	AC impedance	Ω	≤ 0.5 Ω maximum	
1.3	DEVIATION FROM SPECIFICATION?		State	
1.3.1	Number of Amendments (0 if None)		State	
1.3.2				
1.3.3				
1.3.4				
1.3.5				
1.3.6				

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Z.2.8 Data Loggers

ITEM NO	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1.1	GENERAL			
1.1.1	Supplier		State	
1.1.2	Type / Product name		State	
1.2	REQUIREMENTS			
1.2.1	Input impedance	MΩ	10.5 MΩ minimum	
1.2.2	Voltage range	V DC	55 V DC in 1 mV steps	
1.2.3	Accuracy over voltage range	%	0.2% minimum	
1.2.4	AC frequency rejection filter range	Hz	1 to 120 Hz	
1.2.5	Sampling rate	mS	200 mS with user adjustable to any value with over sampling of up to 10 times	
1.2.6	Synchronisation	mS/ week	Fully synchronised to within 600 mS maximum of each data logger per week	
1.3	DEVIATION FROM SPECIFICATION?		Yes/No	State
1.3.1	Number of Amendments (0 if None)			State
1.3.2				
1.3.3				
1.3.4				
1.3.5				