

	Technical Schedule A and B	Technology
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Title: **Duvha Power Station: Unit 4
UPS Nickel Cadmium
Batteries**

Unique Identifier: **382-PRJ-1-EBBB-D00139-9**

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Stationary vented nickel cadmium batteries

If different battery banks are specified a complete set of technical schedules shall be prepared for each battery bank type.

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered.

Item	Description	Schedule A	Schedule B
3.1	General Requirements		
	Scope	As specified	
	Recombination technology employed	Yes– SANS 62259:2005	
	Cells condition on delivery	As specified	
	Commissioning and testing	As specified	
	Accessories	As specified	
	Discharge tests results	Yes	
	Maintenance equipment	Yes	
	Safety equipment	Yes	
	Battery cabinets	Yes	
	Terminating devices	Yes	
	Inter-row connectors	Yes	
	Transport	Yes	
	Disposal	Yes	
	OEM technical support	Yes	
	OEM distribution formal agreement / contract	Yes	
3.2	Electrical performance requirements		
3.2.2	Rated capacity	As specified	
3.2.3	Discharge curves and tables	As specified	
3.2.4	Suitability for floating operation	Comply	
	Fully charge state – under float:		
	Voltage/cell [V]	1.39V/Cell	
	Recommended boost voltage [V]	1.45V/Cell	
	Recommended equalise voltage [V]	N/A	
	Recommended boost charge frequency	28 days	
	Recommended equalise charge frequency	12 Months	
3.2.5	Endurance	Comply	
	Expected life	17 years	
	End-of-life capacity	80%C5	
	Deterioration rate / capacity loss [%Ah/yr]	1%	
	Number of cycles to 80%C5	3000	
3.2.6	Charge retention	As specified	

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Item	Description	Schedule A	Schedule B
3.2.7	Short-circuit current and internal resistance	Comply	
	Short-circuit current (I_{sc}) [kA] Internal resistance (R_i) [Ω]	5.34kA 0,27m Ω	
3.2.8	Tolerance to AC components of the DC supply	Comply	
	Maximum allowable RMS ripple current and effect on battery life [mA]	17800mA	
	Maximum allowable RMS ripple voltage and effect on battery life [mV]	17800mV	
	Equipment RMS ripple current [mA] Equipment RMS ripple voltage [mV]		
3.2.9	Effect of temperature	Comply	
	Effect of temperature on expected battery life Temperature de-rating – Table / Graph	1% Provide	
3.3	Mechanical requirements		
3.3.1	General	Comply	
	Performance type	Low	
	Resistance to earthquakes	No	
3.3.2	Battery cabinets required	Yes – DSP_34-1959	
3.3.3	Terminal posts	Comply	
	Recommended torque levels [Nm]	30nM	
3.3.4	Terminal seals	As specified	
3.3.5	Single moulded containers	As specified	
3.3.6	Cell lids	Comply	
	Maximum internal cell pressure [kPa]	<0,2 Bar	
3.3.7	Vent plugs	As specified	
3.3.8	Electrolyte reserve	Comply	
	Topping up period [months]	1/10yrs	
	Maximum topping period at specified environmental temperature [months]	1/10yrs	
	Electrolyte reserve per cell [l]	2,16L	
	Electrolyte reserve per cell [%]	24%	
3.3.9	Cell markings and labelling	As specified	
	Barcodes per cell	No	
3.4	Operational requirements		
3.4.1	Environmental conditions		
3.4.1.1	Altitude	2200m	
	Relative humidity	10% - 85% non	
	Lightning	condensing High	

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Item	Description	Schedule A	Schedule B
3.4.1.2	Outdoor air temperatures: Maximum Daily average Yearly average Minimum	40°C 30°C 20°C -10°C	
3.4.1.3	Equipment room air temperatures: Maximum Daily average Yearly average Minimum	50°C 35°C 25°C -5°C	
3.4.1.4	Storage temperatures: Maximum Daily average Yearly average Minimum	35°C 25°C 20°C -5°C	
3.4.2	Application	As specified	
3.4.3	Charging regimes	As specified	
3.4.4	Hydrogen release data	As specified	
3.4.5	Commissioning procedures accepted	Yes	
3.4.6	Maintenance procedures accepted	Yes	
3.4.7	Battery water: Maximum conductivity [$\mu\text{S}/\text{cm}$] Allowable substance traces	<10uS Comply	
3.4.8	Accessories: Bolts, nuts, washers and connectors	Yes – As specified	
3.4.9	Inter-row connectors required	Yes – As specified	
3.4.10	Safety signs required	Yes – As specified	
3.4.11	Equipment performance	Protection/Telecoms	
3.4.12	Type Test certificates & reports, drawings and instruction manuals	Supply – As specified	
3.4.13	Tools	N/A	
3.4.14	Spares	N/A	
3.4.15	Training	N/A	
3.4.16	Warranty requirements	See Contract	
3.4.17	Local support	Yes	
3.4.18	Disposal	As specified	
3.4.19	Equipment limitations	N/A	
3.5	Ancillary equipment	Comply	

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Item	Description	Schedule A	Schedule B
3.5.1	Maintenance equipment required: Jug, Funnel, top-up bottle, Anti-corrosion lubricant Battery logbooks	Yes – As specified Yes – As specified	
3.5.2	Personal protective equipment required: Apron, face shield, gloves	Yes – As specified	
3.5.3	Maintenance equipment rack / cabinet / box	Yes – As specified	
3.5.4	Battery cabinets	Yes – As specified	
3.6	Tests	Comply	
3.6.1	General	Comply	
3.6.2	Electrical and mechanical tests	As specified	
3.6.3	Test certificates	As specified	
3.6.4	Clearance for dispatch	As specified	
3.7	Packaging, labelling, marking and transport	Comply	
3.7.1	Packaging	As specified	
3.7.2	Labelling	As specified	
3.7.3	Transport	As specified	

Annex A – Deviation schedule for Stationary vented nickel cadmium batteries

Any deviations offered to this specification shall be listed below with reasons for deviation. In addition, evidence shall be provided that the proposed deviation will at least be more cost-effective than that specified by Eskom.

Item	Clause	Proposed deviation