



Clause	Requirement	Comment to specification	Questions	ZETDC RESPONSES
Symmetrical and Asymmetrical Interruption capacity	31kA	Our solution confirms that our U series reclosers are rated to break a maximum fault current of 12.5kA and our E series reclosers are rated to break a maximum fault current of 16kA	<p>Please confirm if a rated interruption current of 31.5kA is truly required. We note that this fault level is extremely high and beyond the capabilities of all pole mounted reclosers to our knowledge.</p> <p>We note by comparison that the required interruption rating required by Eskom on what we assume to be a similar electrical system is in fact only 8kA. As such ZESA requirement is almost 4 times that required by Eskom</p> <p>In our estimation even if the recloser was installed directly at the LV termination of the step-down transformer the transformer capacity would need to be at least 75mV at 11kV and at least 225 MVA at 33kV to generate this fault level.</p> <p>We further note that fault level actually on the overhead line network will be much lower and consequently would require much higher capacity to generate 31kA on the overhead network.</p> <p>Please see the attached file detailing calculations for expected fault level based on expected transformer percentage impedance with the values selected guided by the attached network.</p>	<p>The Symmetrical and Asymmetrical Interruption capacity required have been revised as follows:</p> <p>11kV Pole Mounted Symmetrical (rms) kA 8 kA Asymmetrical (peak) kA 20kA</p> <p>11kV Ground Mounted Symmetrical (rms) kA 12.5kA Asymmetrical (peak) kA 31.25.kA</p> <p>33kV Pole Mounted Symmetrical (rms) kA 12.5 kA Asymmetrical (peak) kA 31.25kA</p> <p>33kV Ground Mounted Symmetrical (rms) kA 16kA Asymmetrical (peak) kA 40kA</p> <p>Whilst fault levels in our network are around 31.5kA in places near power sources, fault levels in areas where the autoreclosers will be deployed are generally low, hence the revision to lower figures.</p> <p>Refer to Addendum issued and revised BOQ</p>

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ACTIONED BY: _____

DUE DATE: _____

		<p>document detailing typical ABB transformer internal impedance</p> <p> Fault level calculations.xlsx</p> <p> power-transformer-a-bb-energy-efficiency.pdf</p> <p>We note from the attached ABB document regarding power transformer impedance that typically the impedance of large power transformers is approximately 10%. The transmission system impedance must also be considered and typically this will be around 2% or 2.5%.</p> <p>If we assume a total transformer and source impedance of 12.5%, and if the reclosers are to be connected directly at the substation bus bars then would need to be at least 75mV at 11kV and at least 225 MVA at 33kV to generate this fault level.</p> <p>Our suggested values for interruption duty are 12.5kA at 11kV and 16kA at 33kV. This would necessitate transformer connected capacities of 30MVA at 11kV and 114MVA at 33kV if the fault was to occur directly on the transformer LV tails.</p>
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			In real terms the reclosers will be installed on the MV networks then the impedance of the MV circuit must be considered also and this in practice means that the actual maximum connected transformer capacity on the circuit can in fact exceed 30MVA at 11kV and 114MVA at 33kV	
Maximum number of reclosures per cycle	4	The recloser can be programmed to trip up to 4 times before locking out on a fault as such it can reclose up to 3 times	Please confirm if the requirement should be 4 trips to lockout with 3 reclose attempts. We note from the next clause that the required operating sequence is O-1 st r-CO-2 nd r-CO-3 rd r-CO which is in fact 4 trips and 3 recloses as is normal	The design should be such that it recloses three times but trips 4 times. There should be three(3) auto recloses but the Auto reclosers will be used for smart meter applications where the Autorecloser will be selected to trip and lock out after first trip.
Breaking operations between inspection of arcing contacts at rated current	O-1 st r-CO-2 nd r-CO-3 rd r-CO	We are unsure of the intent of this clause but confirm that the vacuum interrupters are rated for 50 open and 50 close operations at full short circuit current. The quantity of fault operations increases exponentially as the actual fault level is reduced and we note that recloser is capable of 5000 fault operations at 1kA		To comply with IEC standards
Voltage range of closing solenoid	DC0.019-0.029kV	The power supply system consists of 2 x 12V 7.2Ah starved electrolyte sealed lead acid batteries connected in series to provide a system voltage of 24V DC. The batteries are temperature compensated	We suggest that this clause be reformatted to note the functional requirements rather than providing a prescriptive design methodology which may compromise the ability of vendors to issue to mist	Noted, we will require bidders to offer their solutions which the specified requirements/functionality. Various

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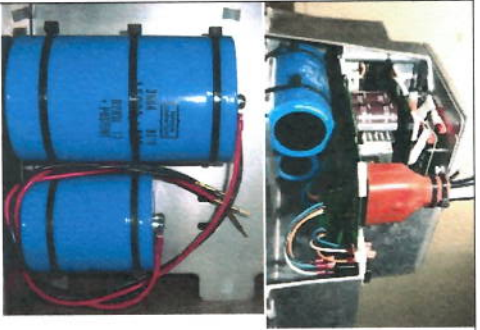
Burden of closing solenoid: current	7A	float charged from the onboard battery charger. The battery charger is a constant voltage type used to trickle charge 2 X 12V batteries in series. The maximum charging current is 600mA. The float voltage is 27.4V @ 20°C (temperature compensated). The recommended Control Voltage is 13.6V to 13.8V per 12V cell @ 20°C.	cost effective and functional solution to meet the desired requirements e.g. The control unit must have an on board power supply. The capacity of the power supply must be rated to power all the electronic modules, operate the switchgear (tripping/opening and closing) and power the data communication equipment. Steps must be taken to minimise the device's power consumption. Adequately rated miniature circuit-breakers must be provided for individually isolating the control from the following: <ul style="list-style-type: none"> • Auxiliary Supply • Battery Supply The auxiliary supply must be derived from an external power source. The required supply must be one of the following: <ul style="list-style-type: none"> • 115 V (±10%) AC at a frequency of 50/60 Hz; • 230 V (±10%) AC at a frequency of 50/60Hz; 	designs will be accepted provided they meet the requirements specified.
At voltage	0.024KV	Battery terminals are provided with insulated crimps to prevent inadvertent short circuiting of the terminals.		
For durations	200ms	Operation of the recloser is via low voltage magnetic actuator activated by discharging stored energy capacitors housed in the control cubicle which in turn are charged by the on-board power supply. A fully charged set of our 7Ah batteries will provide up to 26 Hours hold up time or in excess of 200 recloser operations from loss of auxiliary charging supply. The system is managed to ensure that no operation is attempted unless the trip capacitor is fully charged. Trip operations are not prevented if the close capacitor is discharged		

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The device must provide a visual indication, on the control panel and in the event log, of the status of the auxiliary supply.

An auxiliary supply fail function must be provided; it must operate an alarm output.

Loss or restoration of the auxiliary supply voltage, and under-voltage conditions in the auxiliary supply must not result in damage or spurious operation of the equipment

The power supply must include the necessary over-current protection to protect the supply from current excursions.

The use of fuses for over-current protection on the auxiliary input circuit(s) is not acceptable.

The power supply must include the necessary surge arresters and/or voltage limiting devices to inhibit damage due to voltage surges

A battery backup supply consisting of batteries and a constant voltage battery charger, with current limiting, must be provided with the control unit.

The Battery standby time must be a minimum of 12h, allowing for the following:

- ten switchgear operations;
- 2 Ah for the communications device or other accessories

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			<p>Electrical Operation of the switchgear must be independent of the status of the HV supply and must be via low voltage solenoid or by low voltage magnetic actuator</p> <p>Provision must be made to locally electrically trip and electrically close the switchgear.</p> <p>The switchgear must be prevented from operating if the system does not have enough stored energy to complete the operation. Close operations must also be prevented if the system does not have enough stored and complete the close operation an immediate trip operation</p>	<p>Noted, Auxiliary Circuits Basic impulse level to be tested in accordance with IEC62271-111</p>
<p>Auxiliary Circuits: Basic impulse level</p>		<p>We note that this test is not required under international standards for reclosers. The recloser standard is a harmonised document under IEC and IEEE standards IEC62271-111 and IEEE C37.60 being the same document.</p> <p>The standard notes</p> <p>7.5.3.2 Test of the Auxiliary and control equipment</p> <p>Sub clause 7.5.3.2 of IEC62271-1:is not applicable</p> <p>The continuous current or temperature rise test requirement for other auxiliary control equipment is addressed by the</p>	<p>We note that this test is not required under international standards for reclosers. The recloser standard is a harmonised document under IEC and IEEE standards IEC62271-111 and IEEE C37.60 being the same document.</p> <p>The standard notes</p> <p>7.5.3.2 Test of the Auxiliary and control equipment</p> <p>Sub clause 7.5.3.2 of IEC62271-1:is not applicable</p> <p>The continuous current or temperature rise test requirement for other auxiliary control equipment</p>	

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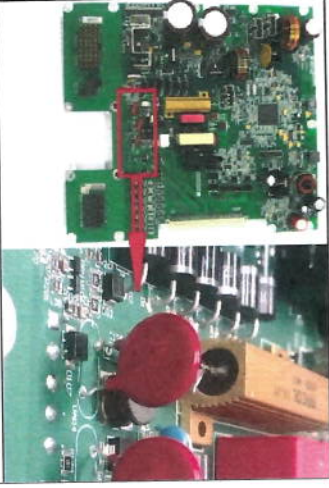
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	<p>successful completion of the interrupting duty, mechanical endurance test and temperature rise of the main circuit.</p> <p>Since the auxiliary and control equipment is included in the definition of an automatic circuit recloser, it is required that this auxiliary and control equipment be included in the operation of the recloser during the interrupting duty and mechanical endurance tests</p>	<p>is addressed by the successful completion of the interrupting duty, mechanical endurance test and temperature rise of the main circuit.</p> <p>Since the auxiliary and control equipment is included in the definition of an automatic circuit recloser, it is required that this auxiliary and control equipment be included in the operation of the recloser during the interrupting duty and mechanical endurance tests</p> <p>We suggest that this clause be augmented with the comment or be tested in accordance with IEC62271-111</p>	
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<p>Is changeover switch provided for closing solenoid? (Y/n)</p>	<p>YES</p> <p>Circuit breaker should have its own opening and closing switches mean while controller has local and remote control buttons There should be provision for inputs for tripping and closing commands from an external source</p>		<p>See the attached exemption application</p> <p>Yes</p> <p>Operation of the recloser is via low voltage magnetic actuator activated by discharging stored energy capacitors housed in the control cubicle using microprocessor controlled IGBTs (Insulated Gate Bipolar Transistors). Operation is therefore fully independent of the availability of MV supplies. The operator can select either the X side bushings to be the source and I side to be the load or vice versa.</p> <p>External signals can be supplied by telemetry protocol such as DNP3, IEC-60870-101/104 or Modbus or can be</p>	<p>We suggest that this clause be augmented with the comment OR Electrical Operation of the switchgear must be independent of the status of the HV supply and must be via low voltage solenoid or by low voltage magnetic actuator</p> <p>A facility must be provided which allows the operator to select which side of the reclosers is the source side and which side of the recloser is the load side. This selection capability should be available locally via the HMI and by the relay configuration software and remotely by telemetry protocol</p>	<p>Clause amended to add electrical operation:</p> <p>Circuit breaker should have its own opening and closing switches mean while controller has local and remote control buttons There should be provision for inputs for tripping and closing commands from an external source such as an energy meter</p> <p>OR</p> <p>Electrical Operation of the switchgear must be independent of the status of the HV supply and must be via low voltage solenoid or by low voltage magnetic actuator</p>
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**STANDARD BIDDING DOCUMENT FOR SUPPLY AND DELIVERY OF LOW VOLTAGE(LV) AND HIGH VOLTAGE (HV) CIRCUIT BREAKERS TO
ENABLE REMOTE DISCONNECTION AND RECONNECTION OF SMART METERED POINTS**

PROCUREMENT REFERENCE NUMBER: ZETDC/INTER01/2022

such as an energy meter	received via GOOSE messages using IEC61850. If a physical hard wired control signals are required <i>then our optional extra priced IOEX or Fast trip Input Modules are required.</i>	There should be provision to select source locally and remotely
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Sr No	Clause No	Description	Queries/Clarification	ZETDC response
1	PART 1 BIDDING PROCEDURES 1.0 Preparation of Bids	Proof of Registration with Procurement Regulatory Authority of Zimbabwe in the relevant category	We request you to clarify that whether an International bidder has to be registered with the Procurement Regulatory Authority of Zimbabwe to participate in the bid.	The Bidders must be registered with Procurement Regulatory Authority of Zimbabwe. Bidders not registered will be automatically disqualified
2	Clause no 5. PART 1 BIDDING PROCEDURES 1.0 Preparation of	A copy of Certificate of Incorporation ,CR14 and CR6 or equivalent documents for foreign companies.	We understand that the foreign company has to submit the company registration certificate along with the bid.	The Bidders should submit equivalent registration company documents from their country

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	Bids Clause no 8.			
3	PART 1 BIDDING PROCEDURES 1.0 Preparation of Bids Clause no 9.	Proof of registration with ZIMRA	We request you to clarify that whether an International bidder has to be registered with the ZIMRA to participate in the bid.	The company should not be registered with ZIMRA. They should provide an equivalent registration documents with the Revenue Authority of their country
4	PART 1 BIDDING PROCEDURES 1.0 Preparation of Bids Clause no 11.	Subtotal VAT and Total Tender Price must be shown separately in the Price Schedule;	We request that Foreign Companies /International Bidders must be allowed to submit their bid on CIF price basis. In that case of CIF basis then there will be no VAT to be paid. Please clarify.	The Prices must be CIF for all Bidders
5	PART 1 BIDDING PROCEDURES 1.0 Preparation of Bids Clause no 12.	Prices must be Duty Delivery Paid (DDP) ZETDC Central Stores, Adbenne, Harare and must be clearly stated.	We request that Foreign Companies /International Bidders must be allowed to submit their bid on CIF price basis. Please clarify.	The Prices must be CIF for all Bidders
6	PART 1 BIDDING PROCEDURES 1.0 Preparation of Bids Clause no 13.	Payment terms are within 30 days after delivery and must be clearly stated. Payment to local companies will be in Zimbabwean dollars at prevailing Reserve Bank of Zimbabwe mid exchange on the date of payment. Foreign Companies will be paid in United States Dollars.	We request payment terms to be modified to CIF LC payment in USD at Sight basis for foreign bidders.	The requirement will remain as it is. Payment terms are within 30 days after delivery and must be clearly stated. Payment to local companies will be in Zimbabwean dollars at prevailing Reserve Bank of Zimbabwe mid exchange on the date of payment. Foreign Companies will be paid in United States Dollars.
7	Part 1 BIDDING PROCEDURES 1.6 Eligibility and qualification	Bidder have fulfilled their obligations to pay taxes and social security contributions in Zimbabwe	We request you to clarify the obligations of taxes and social security contributions for the foreign bidders.	Bidder have fulfilled their obligations to pay taxes and social security contributions in the country of registration

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	requirements Clause No3			
8	Part 1 BIDDING PROCEDURES 1.6 Eligibility and qualification requirements Clause No 7	Bidder have been registered with the Authority as a Supplier and have paid the applicable Supplier Registration Fee set out in Part III of the Fifth Schedule to the Regulations	We request you to clarify that whether an International bidder has to be registered with the Procurement Regulatory Authority of Zimbabwe to participate in the bid.	The Bidders must be registered with Procurement Regulatory Authority of Zimbabwe. Bidders not registered will be automatically disqualified
9	Part2 Statement of Requirements 2.3 Technical Specifications Table 8 Technical Schedule for 11kV Autorecloser	Minimum Interruption Capacity: Symmetrical (rms) KA 31.5kA Asymmetrical (rms) KA 31.5kA	We request you to clarify the minimum interruption capacities , as it seems to be very highly specified for the equipment.	Minimum interruption capacities have been reviewed downwards as follows: 11kV Pole Mounted Symmetrical (rms) KA 8 KA Asymmetrical peak) KA 20KA 11kV Ground Mounted Symmetrical (rms) KA 12.5KA Asymmetrical (peak) KA 31.25KA 33kV Pole Mounted Symmetrical (rms) KA 12.5 KA Asymmetrical (peak) KA 31.25KA 33kV Ground Mounted Symmetrical (rms) KA 16KA Asymmetrical (peak) KA 40KA Refer to Addendum 1 issued

10	Part2 Statement of Requirements 2.3 Technical Specifications Table 8 Technical Schedule for 33kV Autorecloser	Minimum Interruption Capacity: Symmetrical (rms) KA 31.5KA Asymmetrical (rms) KA 31.5KA	We request you to clarify the minimum interruption capacities, as it seems to be very highly specified for the equipment.	Minimum interruption capacities have been reviewed downwards as follows: 33kV Pole Mounted (Lot 4) Symmetrical (rms) KA 12.5 KA Asymmetrical (peak) KA 31.25 KA 33kV Ground Mounted (Lot65) Symmetrical (rms) KA 16 KA Asymmetrical (peak) KA 40 KA Refer to Addendum issued
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