



Technical Specification		 TENAGA NASIONAL	
SCADA-Ready 33kV 3-Pole Outdoor Automatic Circuit Recloser for Medium Voltage Overhead Line Systems			
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Appendix A

No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
1	Company / Model Name & No. / Manufacturer	Company	
		Model Name & No.	
		Manufacturer	
2	Country of Manufacturer		
3	Rated System Voltage	36 kV	
4	Rated Frequency	50 Hz	
5	Number of Phases	3	
6	Rated Continuous/Normal Current	Not Less Than 400A	
		Up to 630A	
7	Rated Short Circuit Making Current	$\geq 31.5 \text{ kA}_{\text{peak}}$	
8	Rated Interrupting / Breaking Current	$\geq 12.5 \text{ kA}_{\text{rms}}$	
9	Rated Short-Time Withstand Current	$\geq 12.5 \text{ kA}_{\text{rms}} / 3 \text{ sec}$	
10	Lightning Impulse Withstand Voltage (peak)	170 kV	
11	Power Frequency Withstand Voltage (rms) Dry @ 1 minute Wet @ 10 seconds	70 kV	
		60kV	
12	Average Ambient Temperature (Maximum)	28°C (45°C)	
13	Humidity Range	0 – 95% RH	
14	Preferred Altitude Requirement	Up to 1,800 meters	
15	Preferred Mechanical Operations Requirement	$\geq 10,000$ operations	
16	Bushing Insulators	Silicone Rubber	
17	Total Creepage Distance	Min.	576 mm
		Max.	900 mm

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No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
18	Insulation of Automatic Circuit Recloser	Gas / Solid Insulated	
19	Designed with Permanent Hermetically Sealed Tank	Yes	
20	Designed with Self-Contained Operating Mechanism	Yes	
21	Self-Supporting Control Unit in Stainless Steel Control Cubicle Provided	Yes	
22	Multi-Ratio 33-22-11 / 0.240 kV Single Phase 2-Pole Potential Transformer Provided	Yes	
23	Independent Surge Protection Device with Auto-Resetting ELCB for Low Voltage Supply Provided	Yes	
24	SCADA Features & Functionalities of Microprocessor-Based Control Unit for Protection, Metering, Fault & Event Recording Provided for Remote Monitoring and Control	Yes	
25	Non-Volatile Memory Storage for Fault & Event Recording Facility Available	Yes	
26	Operation Counter Available	Yes	
27	Designed with Permanent Lifting Means	Yes	
28	Surge Arrestor Mounting Brackets on Both LOAD & SOURCE Sides Provided	Yes	
29	LOAD & SOURCE Sides Indelibly Marked	Yes	
30	Designed with Vacuum Arc Interrupter	Yes	
31	OPEN & CLOSE Position Visible from Ground, Color Coded and Sufficiently Labelled	Yes	

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No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
32	Capable of Performing Duty Cycle as per Clause 5.2.7	Yes	
33	Tagging and/or Padlocking at OPEN Position for Safety Provided	Yes	
34	Designed with LV Solenoid or Magnetic Actuator Mechanisms for Simultaneous 3-Phase Opening and Closing	Yes	
35	Manual Closing & Opening for Maintenance Purpose Provided	Yes	
36	Facilities to Prevent Unauthorized Operations Provided	Yes	
37	Control & Protection Modules Power Supply	Main from 240 Vac Back-Up by 12 Vdc Battery	
38	Control Panel Cubicle Coding	IP54	
39	Length of Control Cable Provided	15 meters	
40	Firmware & Software Provided Sufficiently Tested & Proven	Yes	
41	Standard Features for Control Panel as per Clause 5.3.4.6	Yes	
42	Front Panel Capabilities as per Clause 5.3.4.7	Yes	
43	Control Panel LCD Display as per Clause 5.3.4.8 and 5.3.4.9	Yes	
44	Protection Functions Provided as per Clause 5.3.5	Yes	
45	Protection Settings and Configurations as per Clause 5.3.6	Yes	

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No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
46	Event / Disturbance Recorder and Measurement Requirement as per Clause 5.3.7	Yes	
47	Interrogation Tools Provided with Features as per Clause 5.3.8	Yes	
48	SCADA Indication Points Provided as per Clause 5.3.9	Yes	
49	Voltage Supply Requirements as per Clause 5.3.10	Yes	
50	SCADA Communication Requirements as per Clause 5.3.11	Yes	
51	Control Panel Design for SCADA Communication Requirements as per Clause 5.3.12	Yes	
52	Grounding Terminal Provided with “Earth” Symbol	Yes	
53	Preferred Minimum Size of Terminal Stud	M12	
54	Bushing Type	Silicone Rubber	
55	Preferred Terminal Connector	Universal 4-Bolt Clamp Type	
56	Terminal Connector Suitable for Stranded Copper & Aluminum Conductor	Yes	
57	Bushings & Connectors Provided with Covers	Yes	
58	Material & Testing of Bushing & Connector Covers Compliance	TNB Technical Specification KEJ08237:2013 (Rev. 01)	
59	Bushing-Type Current Transformer (CT) Ratio	1000:1	

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No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
60	Bushing-Type CT Provided at Bushing Nos 1, 3 & 5	Yes	
61	Multi-Ratio Single Phase 2-Pole Potential Transformer (PT) as per IEC 60044-2 Provided	Yes	
62	PT Suitable to be Energized at 11, 22 & 33kV	Yes	
63	PT Designed with Selectable Secondary Winding Providing 240Vac Supply	Yes	
64	PT Rated Burden	500 VA	
65	PT Burden Irrespective of Primary Voltage	Yes	
66	PT Rated Voltage Factor / Rated Time	1.9 / 8 Hours	
67	PT Accuracy Class	6P	
68	PT Rated Power Frequency Withstand Voltage (rms)	70kV	
69	PT Rated Lightning Impulse Voltage Withstand Voltage (peak)	170kV	
70	PT Rating Plate Requirement as per Clause 5.6.7	Yes	
71	PT Type Tested as per IEC 60044-2 & Type Test Documentation Submitted	Yes	
72	Independent DIN-Rail Type AC Surge Protection Device (SPD) for Control Unit LV Power Supply Provided	Yes	
73	SPD Designed with Auto-Resetting ELCB	Yes	

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No.	MANDATORY REQUIREMENT	TNB Requirement	Supplier Offer
74	Provision for Dry Contacts for SPD Remote Monitoring via SCADA	Yes	
75	MOV-Type SPD Designed with Built-In Fuse Circuit for Thermal Runaway Prevention	Yes	
76	Preferred Electrical Rating of SPD as per Clause 5.7.7	Yes	
77	Auto-Resetting ELCB Requirements as per Clauses 5.7.9 – 5.7.13	Yes	
78	Preferred Electrical Rating of Auto-Resetting ELCB as per Clause 5.7.1.14	Yes	
79	Auto-Resetting ELCB Provided with 12Vdc Motor Rotating Shaft for Reset Operations	Yes	
80	Reset Frequency for Auto-Resetting ELCB	3 Times	
81	Preferred Auto-Resetting ELCB Reset Frequency Requirements as per Clause 5.7.16	Yes	
82	SPD System Type Tested to IEC 61643-11 & Type Test Documentation Submitted	Yes	
83	Preferred Automatic Circuit Recloser Tank IP Coding	IP67	
84	Automatic Circuit Recloser Type Tested as per IEEE C37.60 / IEC 62271-111 Submitted	Yes	
85	Type Tests Done at ISO/IEC 17025 Certified Laboratory	Yes	
86	Technical Documentation on Information of Design, Drawings & Data Submitted for All Product Components & Accessories	Yes	
87	Six (6) Surge Arrestors Provided	Yes	

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88	Surge Arrestors Comply with the Latest TNB Technical Specification KEJ05285:2020	Yes	
89	Each Surge Arrestor Provided with: One (1) PVC-covered aluminum jumper with a cross-sectional area of 150 mm ² or copper equivalent CSA with a length of 500 mm or sufficiently required length	Yes	
90	Each Surge Arrestor Provided with: One (1) flexible copper braid with an equivalent cross-sectional area of 35 mm ² with a length of 500 mm or sufficiently required length	Yes	