الشركة السعودية للكهرباء
Saudi Electricity Company
نعمل بإتقان من أجلكم

38-SDMS-05

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SPECIFICATION FOR SMART OVERHEAD LINE (OHL) FAULT INDICATORS FOR OVERHEAD DISTRIBUTION NETWORK

Saudi Electricity Company

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1. SCOPE

This specification defines the minimum technical requirements for design, engineering, manufacturing, testing, inspection and performance of smart OHL fault indicators intended to be used in medium-voltage overhead line distribution network of Saudi Electricity Company (SEC) in Saudi Arabia.

2. CROSS REFERENCES TO OTHER SEC STANDARDS

This specification shall always be read in conjunction with SEC General Specification No. 01-SDMS-01 (latest revision) titled "General Requirements for all Equipment/Materials," which shall be considered as an integral part of this specification. It shall also be read in conjunction with SEC purchase order and/or contract schedules, and scope of work/technical specifications for projects, as applicable.

The latest revision of SEC specification 10-SDMS-01 shall be applicable with reference to 13.8kV and 33kV ACSR/AW overhead line conductors.

3. APPLICABLE CODES AND STANDARDS

The latest revision of the following codes and standards shall be applicable for the equipment/materials covered in this specification. In case of any deviation, the vendor/manufacturer may propose equipment/materials conforming to alternate codes or standards. However, the provisions of SEC standards shall supersede the provisions of these alternate standards in case of any difference.

Table 1: List of applicable standards

Standard #	Title
IEEE 495	Guide for Testing Faulted Circuit Indicators
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
IEC 60068-2-11	Basic Environmental Testing Procedures – Part 2: Test – Test Ka: Salt Mist
IEC 61000-4-2	Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test
IEC 61000-6-2	Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
IEC 62689-1	Current and Voltage Sensors or Detectors to be Used for Fault Passage Indication Purposes – Part 1: General Principles and Requirements

4. SERVICE AND SYSTEM CONDITIONS

The smart OHL fault indicators shall be suitable for operation under the service conditions specified in the latest revision of SEC specification 01-SDMS-01.

All fittings and attachments of the smart OHL fault indicators shall be capable of withstanding the effects of direct solar radiation at their installed locations. The temperature of surfaces exposed to direct solar radiation shall be regarded as 75°C plus the effect of any internal heating.

5. MATERIAL, DESIGN AND CONSTRUCTION REQUIREMENTS

5.1. GENERAL

5.1.1 The smart OHL fault indicators shall meet or exceed the requirements of this specification in all respects and it shall be manufactured and tested in conformance with relevant international standards.

5.1.2 Manufacturer's drawing shall show the outline of the smart OHL fault indicators together with all pertinent dimensions and clamping range to applicable overhead line conductors. Any variations in these dimensions due to manufacturing tolerances shall be indicated.

5.2. DESIGN CRITERIA

5.2.1 The smart OHL fault indicators shall be designed to operate at ambient temperature from -10°C to +75°C and suitable for mounting on overhead line conductors up to 25mm overall diameter with rated operating voltage of up to 36kV.

5.2.2 The housing of the smart OHL fault indicators shall be made of weatherproof, robust, non-metallic, fire-retardant, UV stabilized material. The dimensions shall not exceed 210mm in height and 150mm in width/overall diameter.

5.2.3 The smart OHL fault indicators shall be suitable for outdoor installation with IP65 degree of protection or better. It shall be suitable for installation and removal on live overhead lines with the use of insulated hot-stick and/or by using hot-stick adapters provided by the manufacturer. Hot-stick mounting adapter shall be supplied for every 50 units of the smart OHL fault indicators.

5.2.4 Clamping tightness of the smart OHL fault indicators shall be able to withstand wind pressure without slipping or falling out of the conductor.

5.2.5 The smart OHL fault indicators shall be equipped with local indications plus remote signalization. Local indication by ultra-bright blinking LEDs. Any additional local indicating method may be proposed and shall be evaluated by SEC.

Local indications shall have a clear 360° visibility from a distance of 100m at daylight and 500m at night-time.

Provision for live line testing the indications should be available.

5.2.6 The smart OHL fault indicators shall be maintenance-free, fully self-contained without external transformer or connections, and do not require additional source of supply.

5.2.7 The battery for driving the local indications shall be military-grade, easily replaceable with or without using common hand tools and shall have a minimum operating life of 10 years and total continuous indicating time of 1500 hours or more.

Soldered battery terminal connections are not acceptable.

5.2.8 The smart OHL fault indicators shall be bi-directional and able to detect all line-to-line and line-to-ground fault conditions with built-in restraints to prevent false operation due to sudden variations in load-current, proximity to other circuits, inrush currents due to feeder switching or auto-recloser operation.

5.2.9 The smart OHL fault indicators shall be equipped with the following selectable and adjustable local reset options:

- Local Automatic Reset: 10 to 30 seconds after recovering the line voltage (re-energized line) and return of minimum primary current of 3A.
- Local Timed Reset: selectable to 2, 4, and 8 hours.

Local manual reset shall also be provided such as by using magnet mountable on standard insulated hot-sticks, or proximity local remote-control, or any other method accessible from the ground level.

Magnet and its adapter to hot-sticks, and/or proximity local remote-control shall be supplied for every 50 units of smart OHL fault indicators.

5.2.10 The smart OHL fault indicators shall be provided with manual pre-adjusted trip current value of the load currents in steps of up to 500 amperes or better, and load dependent self-adjusted value of trip current.

5.2.11 The smart OHL fault indicators shall have a response time not lower than 80ms to prevent false indication due to disturbances with tolerance of ±10ms.

5.3. COMMUNICATION REQUIREMENTS

The smart OHL fault indicators shall be capable of receiving information from adjacent smart fault indicators and forwarding the information on remote servers or SMS client.

5.3.1 The (Master) smart OHL fault indicator with integrated RTU shall be provided with a SIM card slot to accommodate a standard size SIM card for use in Saudi Arabia GSM network connections to forward information to remote servers or SMS client. It shall also be equipped with short distance radio frequency communication to be able to connect up to 8 (Slave) smart OHL fault indicators. It should be able to periodically transmit an SMS “heartbeat” to remote servers or SMS client to verify its status.

5.3.2 The (Slave) smart OHL fault indicator shall be equipped with short-distance radio frequency communication of up to 70 meters that would enable it to forward information to adjacent (Master) smart OHL fault indicators that is capable of forwarding the information on remote servers or SMS clients.

5.3.3 The Data Terminal Unit (DTU) or gateway shall be designed to operate continuously and unattended. It should be able to receive, collect, and process information from remote (Master) smart OHL fault indicators. It shall be provided with a maintenance-free UPS to be able to survive short power outages. It should allow (Master) smart OHL fault indicators to be integrated in SCADA systems with OPC (OLE for Process Control) or IEC 60870-5-104 communication protocols. It shall be provided with a SIM card slot to accommodate a standard size SIM card for use in Saudi Arabia GSM network connections. It shall be able to be configured or access by authorized personnel either locally or remotely.

6. MARKING

Each smart OHL fault indicator shall have a clear and durable nameplate that will remain visible throughout the lifetime of the device, and shall bear the following information:

a. Manufacturer and Model/Type
b. Smart OHL Fault Indicator Ratings
c. Conformance Standard, i.e. IEEE 495 or equivalent
d. Serial Number
e. Year of Manufacture
f. Origin
g. SEC Issued PO Number
h. Vendor Name
i. Reference SEC Specification
j. SEC Monogram

7. TESTING AND INSPECTION

The smart OHL fault indicators shall be tested in conformance with the applicable requirements of the latest version of IEEE 495 or equivalent.

7.1. ROUTINE TESTS

Routine tests in conformance with the applicable clauses of IEEE 495 or equivalent shall be performed on all smart OHL fault indicators. Electronic copies of the test reports shall be submitted to SEC in USB thumb drive for each batch to be delivered prior to issuance of the releases.

7.2. TYPE TESTS

Type test shall be performed in complete conformance with the applicable clauses of IEEE 495 or equivalent. It shall be performed at SEC approved laboratories. Type testing from other accredited laboratories may be proposed but subject for SEC approval.

SEC reserves the right to attend and witness the tests.

SEC reserves the right to request the supplier/manufacturer to repeat the type test every five (5) years, or as needed should the supplied smart OHL fault indicators have frequent faults and failures.

7.3. SAMPLE INSPECTION

Samples together with actual CAD drawings, user manual and routine test reports shall be submitted for inspection/evaluation prior to issuance of approval for mass production. The following attributes shall be checked:

a. Dimensional verification
b. Markings
c. User Manual
d. Hot-stick adapter
e. Accessories for Manual Reset: magnet + hot-stick attachment or proximity local remote-control
f. Packaging
g. Functionality
h. SIM Card Slot

8. PACKING AND SHIPPING

Packing and shipping requirement shall generally be as per latest revision of SEC General Requirements for Equipment/Materials, 01-SDMS-01 or as per purchase order requirements.

Each smart OHL fault indicator shall be packed in a box as a complete unit and shall be delivered ready for use. Accessories like hot-stick mounting adapters, manual reset (magnet + hot-stick adapter and/or proximity local remote-control) should be supplied in a separate box with printed marking relating to the box of the OHL fault indicator. A minimum of one (1) of each accessory should be provided for every 50 units of smart OHL fault indicator supplied.

Packing shall protect the OHL fault indicators against damage during shipment and site handling.

Suppliers should coordinate with SEC Warehousing Department for additional packing, handling, and or shipping instructions, as applicable.

Each box shall be printed with the following information:

a. Purchase Order Number / Tender Number

b. Smart OHL Fault Indicator Rating
c. Manufacturer's Name and Model/Type
d. Year of Manufacture
e. SEC Item Code

9. GUARANTEE

The supplier/manufacturer shall guarantee the products against all defects arising out of faulty design or manufacturing defects or defective materials for a period of five (5) years from the date of delivery.

The supplier/manufacturer shall guarantee that the batteries provided in each smart OHL fault indicators have a minimum operating life of 10 years.

The supplier shall guarantee the uniformity of the products delivered with the approved samples.

10. SUBMITTALS

10.1. SUBMITTALS REQUIRED WITH TENDER/INQUIRY

10.1.1. Summary in table form with the following information: list of items offered, manufacturer, origin, catalogue number, and quantity

10.1.2. Clause-by-clause compliance with the latest revision of SEC specification 38-SDMS-05.

10.1.3. Manufacturer's Catalogue and User Manual

10.1.4. Certificate stating that the raw material has been sampled, tested and inspected in accordance with relevant standard specifications.

10.1.5. Product type test reports and certificates carried out from SEC approved laboratories

10.1.6. Filled-up technical data schedule on each of the items offered

10.1.7. Manufacturer CAD drawings for each of the items offered

10.1.8. USB Flash Drive containing e-copy of all the documents mentioned above

10.2. SUBMITTALS REQUIRED FOLLOWING AWARD OF CONTRACT

10.2.1. Samples in compliance with Clause 7.3 of this specification

10.2.2. Quality assurance tests

10.2.3. Manufacturing and routine test schedules

10.2.4. Special tests, if applicable

11. TECHNICAL DATA SCHEDULE

Table 2: Technical Data Schedule

SEC Inquiry No: Item No:

No	Description	SEC Specified Values (*)	Vendor Proposed Values (**)
1	**General**	-	
	Reference Manufacturing Standard	**	
2	**Design Requirements**	-	
2.1	Maximum Housing Dimensions (l x w or Ø)	210mm x 150mm	
2.2	Ambient Operating Temperature Range	-10°C to +75°C	
2.3	Degree of Protection (Minimum)	IP65	
2.4	Maximum Conductor Diameter	Ø25mm	
2.5	Local Indicating Devices	Ultra-Bright Blinking LED	
	Visibility at Daylight (Distance)	100m	
	Visibility at Night (Distance)	500m	
2.6	Local Resetting Options	-	
	Automatic (seconds)	10 to 30	
	- Minimum Primary Current Reset	3A	
	Timed (hours)	2, 4, 8	
	Manual	Magnet or Remote-Control	
	Provision for Live Line Testing Provided	Yes	
2.7	Rated Operating Voltage (Line-to-Line)	Up to 36kV	
2.8	Rated Operating Frequency	60Hz	
2.9	Minimum Battery Life	10 Years	
2.10	Minimum Battery Continuous Operational Life	1500 indicating hours	
2.11	Tripping Current	Up to 500A, in steps	

2.12	Response Time, milliseconds	>80	
2.13	Inrush Current Restraint	Required	
2.14	Symmetrical Fault Current	25kA / 160ms	
2.15	Accessories	-	
	Hot-stick Mounting Adapter Provided	Yes / Not Applicable	
	Magnet + Hot-stick Adapter Provided	Yes / Not Applicable	
	Proximity Local Remote-Control Provided	Yes / Not Applicable	
2.16	Communication Requirements	-	
	SIM Card Slot Available	Yes	
	SIM Card Size	Standard	
	Short-Distance Radio Frequency Communication	Yes	
	Maximum Distance from the Master	70m	
3	**Others**	-	
	Product is Type Tested	Yes	
	SEC Approved Laboratory	**	
	Date Tested	**	
	Manufacturer	**	
	Model/Type	**	
	Country of Origin	**	
	Submittals Required with Tender/Inquiry Included or Not?	**	

Smart OHL Fault Indicators

SEC Inquiry No: Item No:

- Additional Technical Information or Features Specified by SEC

- Additional Supplementary Data or Features Proposed by Bidder/Vendor/Supplier.

- Other Particulars to be filled-up by the Bidder/Vendor/Supplier.

- List of Deviations and Clauses to which exception is taken by the Bidder/Vendor/Supplier. (Use separate sheet, if necessary).

Description	Manufacturer of Material/Equipment	Vendor/Supplier
Name of Company		
Location and Office Address		
Name and Signature of Authorized Representative with Date		
Official Seal / Stamp		