38-SDMS-06

Rev.0

SPECIFICATIONS FOR SMART EARTH FAULT INDICATORS FOR UNDERGROUND DISTRIBUTION NETWORKS

38-SDMS-06

Rev.0

SPECIFICATIONS FOR SMART EARTH FAULT INDICATORS FOR UNDERGROUND DISTRIBUTION NETWORKS

Revision History

#	Date	Revision No.	Revised By	Major Revision Description
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Table of Contents

1 Scope

This SEC Distribution Materials Specification specifies the minimum technical requirement for design, engineering, manufacturing, inspection, testing and performance of Smart Earth Fault Indicators (EFI) used in conjunction with MV underground network system of Saudi Electricity Company (SEC), Saudi Arabia.

2 Cross References

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 SDMS.

This SDMS shall also be read in conjunction with SEC Purchase Order or Contract Schedules and the Scope of Work and Technical Specifications for project, as applicable.

3 Applicable Codes and Standards

The latest revision of the following Codes and Standards shall be applicable for the equipment/material covered in this SDMS. In case of conflict, the vendor/manufacturer may propose equipment/material conforming to one group of Codes and Standards quoted hereunder without jeopardizing the requirements of this SDMS.

Standard	Description
IEEE 495	IEEE Guide for Testing Faulted Circuit Indicators
IEC 61000-4	Electromagnetic compatibility Measurements and Testing
IEC 60502-1	Cables for Rated Voltages of 1 kV
IEC 62689	Current and Voltage Sensors or Detectors to be Used for Fault Passage
IEC 61869-1	Instruments Transformers –Part 1: General Requirements
IEC 61869-2	Instruments Transformers - Current Transformers
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC-60870-5	Telecontrol equipment and systems - Part 5: Transmission protocols
IEC 61850	Communication networks and systems for power utility automation

4 Service and System Conditions

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

5 Material, Design and Construction Requirements

5.1 General

5.1.1 The smart Earth Fault Indicators (EFI) shall meet or exceed the requirements of this Specification in all respects.

5.1.2 Manufacturer's drawings, as required by 01-SDMS-01, shall show the outline of the smart EFI, together with all pertinent dimensions. Any variations in these dimensions due to manufacturing tolerances shall be indicated.

5.2 Design Criteria

5.2.1 Unless otherwise specified, the smart EFI shall be manufactured and tested in accordance with the relevant international standards as defined in section 3.

5.2.2 The smart EFI and all relevant components shall be designed to meet the operating conditions specified in 01-SDMS-01 and shall be capable to withstand temperature from -10°C up to 75°C.

5.2.3 The smart EFI components at the secondary substation, except current sensor, shall be installed in robust, metallic enclosures to protect the device against accidental or intentional damage. Degree of protection IP65 or better shall be provided to all the components. The enclosure shall be weather proof, UV resistant and suitable for outdoor installation and capable to house all relevant components of the smart EFI. The maximum dimensions of the enclosure shall be not more than 300x200x150mm. The status indication of the smart fault indicator shall be visible from outside. The reset button shall be provided and be preferably accessible without opening of the enclosure. The enclosure shall have the necessary means to be installed on the LVDP by using L-type bracket ready for welding on the LVDP and wall mounted bracket with necessary installation accessories.

5.2.4 The smart UG fault indicators shall be equipped with ultra-bright blinking LEDs for local indications. Any additional indicating method may be proposed and shall be evaluated by SEC. Local indications shall have a clear visibility from a distance of 20m at daylight.

5.2.5 The smart EFI shall be able to detect all line-to-ground fault conditions in both directions 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-reclosing operation.

5.2.6 The smart EFI shall be automatically resettable with voltage only within the range of 10 to 30 seconds of restoration of supply.

5.2.7 The EFI shall be supplied complete with one split type core summation current transformer with diameter as needed for the installed cables (SEC MV cables reference: 11-SDMS-03).

5.2.8 The EFI shall be supplied with a flexible insulated cable to connect the current transformer to the indication unit not less than 15 meters length.

5.2.9 The EFI shall be powered by 110-240 volts AC, 60 Hz and shall not require any additional source of supply. Backup supply solution for driving the LED for minimum 10 hours continuously and support the communication features after power off shall be foreseen. The operating life of the backup solution shall have minimum 10 years operating life.

5.2.10 The trip current fixed values shall be 25/50 amps selectable and response time shall be less than 100 ms with an accuracy of ±10%, and shall be capable to restrict the indication for In Rush Currents for minimum 300 milliseconds.

5.2.11 The terminal block of the smart EFI shall have the provision of contacts for CT, power source, external indication and connection with the communication device.

5.2.12 The smart EFI shall have the provision of manual resetting and testing button.

5.3 Communication Requirements

5.3.1 The smart EFI shall be supplied with a modem, ready for communication via the mobile phone network. The modem shall be provided with a SIM card slot to accommodate a standard size SIM card for use in Saudi Arabia GSM network for the purpose to exchange information with the distribution control center (remote servers) and/or to an SMS client / mobile device. It shall be capable to operate with the telecommunication standards in the mobile phone network GSM (GPRS, 3G, 4G, NB IoT, 5G, etc.).

5.3.2 The delivery shall include all equipment required up to the interface port at the control center servers of ADMS. This includes, but not limited to communication devices, remote terminal units, data collectors, etc. Communication solutions

with additional interim servers and software for connection of devices to the control center servers shall not be accepted.

6 Marking

Each EFI shall have a clear name plate engraved or printed with indelible Ink/paint with the following information:

- SEC item number
- Rated tripping current
- Rated voltage
- Rated frequency
- Manufacturer name and reference number
- Serial number
- Year of manufacture
- Country of origin
- SEC purchase order number
- Reference to SEC specification
- SEC Monogram.

7 Tests

7.1 General

7.1.1 All equipment shall be type tested at SEC-approved independent testing laboratory in accordance with the latest standards and as specified herein. Test reports shall be submitted for SEC review and approval.

7.1.2 The equipment offered shall meet the type test requirements of the latest version of IEEE 495 or equivalent.

7.2 Type Tests

7.2.1 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 and shall consider the environmental conditions applicable.

7.2.2 SEC reserves the right to attend and witness the tests.

7.2.3 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 UG cable EFI have frequent faults and failures.

7.2.4 As a special test conditions, **75˚C** operating temperature range test according to IEEE 495 shall be performed on the complete EFI device including the backup supply.

7.3 Routine Tests

7.3.1 Routine (Production) tests in conformance with the applicable clauses of IEEE 495 or equivalent shall be performed on all smart UG cable EFI. 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.

7.3.2 In addition to the IEEE 495 production tests, a communication tests shall be performed on samples.

7.4 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:

- Dimensional verification
- Markings
- User Manual
- Packaging
- Functionality
- SIM Card Slot.

8 Packing and Shipping

8.1 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.

8.2 Each smart fault indicator shall be packed in a box as a complete unit and shall be delivered ready for use. Components shall be easily connectable with standard plugs and connection terminals with a minimum installation efforts at site.

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

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

8.5 Each box shall be printed with the following information:

a) Purchase Order Number/ Tender Number

b) Smart UG Fault Indicator Rating

c) Manufacturer 's Name and Model/Type

d) Year of Manufacture & gross weight

e) SEC Item Code

f) Position of slinging points and other relevant handling instructions.

8.6 Packing notes in Arabic and English shall be included in each case giving a description of the goods packed.

9 Guarantee

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

9.2 The supplier/manufacturer shall guarantee that the backup supply provided in each smart fault indicator have a minimum operating life of 10 years.

9.3 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-01.

10.1.3 Manufacturer's Catalogue in English language.

10.1.4 User Manual in both English and Arabic language.

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 Detailed drawings and mounting accessories description.

10.1.9 Detailed description about what information or signals the fault indicator can provide and the analysis capabilities of the indicators processing unit.

10.1.10USB Flash Drive containing e-copy of all the documents mentioned above.

10.2 Vendor shall submit the following after the contract award:

10.2.1 Samples in compliance with Clause 7 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

Smart Earth Fault Indicators for Underground Networks

SEC Inquiry No: *Item No:*

	Description	SEC specified values	Vendor proposed value
1.	Reference Manufacturing Standard	Required	
2.	Temperature operating range	-10 to 75 o C	
3.	Maximum housing dimensions	300x200x150mm	
4.	Degree of protection of enclosure	IP65	
5.	Indicating mechanism	LED	
	Indication visibility distance	Up to 20 m	
6.	Automatic and manual voltage resetting	Required	
	Reset time	10 to 30 seconds	
7.	Type of CT	Split core	
	Minimum CT diameter	120 mm	
8.	Minimum CT cable length	15 m	
9.	Rated Operating Voltage	110-240 V AC	
10.	Tripping Current 25/50 Amps	Selectable	
	Response Time	100 ms	
	Inrush current restraint time	300 ms min	
11.	Number of output contacts	2	
12.	Reset/test button	Required	
13.	Submittals as per this spec. enclosed	Required	
14.	Communication Requirements	-	
	SIM Card Slot Available	Yes	
	SIM Card Size	Standard	
	Mobile Phone Communication (GSM, GPRS, 3G, 4G)	Yes	
	IEC 60870-5-101	Yes	
	IEC 60870-5-104	Yes	

Smart Earth Fault Indicators for Underground Networks

SEC Inquiry No: *Item No:*

A Additional technical information or features specified by SEC

B Additional supplementary data or features proposed by Bidder/Vendor/Supplier

C Other particulars to be filled up by Bidder/Vendor/Supplier

D 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		