DOCUMENT NO.:

Kenya Power

SF6 GAS LEAKAGE CAMERA - SPECIFICATION

A Document of the Kenya Power & Lighting Co. Ltd
DECEMBER 2025

TABLE OF CONTENTS

0.1 CIRCULATION LIST

COPY NO.	COPY HOLDER
1	1st Asst. Engineer, E/plant Nairobi
2	Snr Engineer, E/Plant Nairobi

0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2026-01-14	New issue	Beatrice Gitonga	Zacheus Oluoch

FOREWORD

This specification has been prepared by the E/plant Nairobi of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for SF6 Gas Leakage Camera is intended for use by KPLC engineers to detect SF6 gas leaks safely and efficiently without shutting down high-voltage equipment. An SF_6 camera, or optical gas imaging (OGI) camera, is a specialized infrared thermal imaging device used in the electrical power industry to visualize and pinpoint sulfur hexafluoride gas leaks in real-time. The camera is a portable, non-contact system that visualizes SF_6 gas in real-time, making it ideal for use in KPLC power system.

This specification was prepared to ensure the adaptability of the SF6 Gas Leakage Camera to the existing operating and climatic conditions in Kenya.

There are no other specifications in this series.

This specification stipulates the minimum requirements for SF6 Gas Leakage Camera equipment acceptable for use in the company and it shall be the responsibility of the suppliers and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC, good workmanship and good engineering practice in the manufacture of the Plant/Equipment for KPLC.

Users of Kenya Power specifications are responsible for their correct interpretation and application.

1. SCOPE

1.1. This specification is for SF6 Gas Leakage Camera for use by company's E/plant department.

1.2. The specification covers requirements, design, tests and inspection and schedule of Guaranteed Technical Particulars of the SF6 Gas Leakage Camera

2. NORMATIVE REFERENCES

The following standards contain provision which, through reference in this text, constitute provisions of this specification. For dated editions the cited edition will apply; for undated editions the latest edition of the referenced document shall apply.

IEC 60529 is an international standard that defines the IP (Ingress Protection) Code system. This system classifies and rates the level of protection that electrical equipment enclosures provide against the intrusion of solid foreign objects (including dust) and water.

IEC 60068-2-27 is an international standard that provides procedures for determining the ability of electrical and electronic components and equipment to withstand mechanical shocks.

IEC 60068-2-6 is a foundational international standard within the IEC 60068 series that specifies procedures for testing the ability of electrical and electronic components and equipment to withstand sinusoidal vibrations.

IP54 indicates that an enclosure provides a specific, moderate level of protection against both solid foreign objects and water intrusion

3. DEFINITIONS AND ABBREVIATIONS

For this specification the definitions and abbreviations given in the reference standards shall apply together with the following abbreviations.

3.1. ABBREVIATIONS

KPLC- Kenya Power and Lighting Company Limited

ISO – International Organization for Standardization.

IEC- International electrotechnical commission

Kg –Kilogram

USB- Universal Serial Bus

QWIP-Quantum Well Infrared Photodetector

SF6- Sulfur hexafluoride

IR- Infrared

NETD -Noise Equivalent Temperature Difference

mK- millikelvin

µm- micrometer

HSM - High Sensitivity Mode

FOV- Field of View

Hz- Hertz

Ppm- parts per million

F-number- a crucial concept in optics and photography that describes the relative aperture or opening of a lens

OLED- Organic Light-Emitting Diode

HDMI- High-Definition Multimedia Interface

Wi-fi- is a wireless networking technology that uses radio waves to allow electronic devices to exchange data or connect to the internet without a direct wired connection

JPEG- Joint Photographic Experts Group

MPEG4/H.264- highly prevalent international video compression standard

GPS- Global Positioning System

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

4.1.1. Operating conditions.

The SF6 Gas Leakage Camera shall be suitable for continuous

outdoor operation in tropical areas with the following conditions.

(a) Altitude: Up to 2200 meters above sea level.

(b) Temperature: Average of +30°C with minimum of -1°C and Maximum of +40°C.

4.1.2 Weight- the total weight of the equipment together with its associated accessories shall not exceed 3 Kg

4.2.0 **Imaging and Optical Data**

4.2.1 Detector Type: It shall be of focal plane array, cooled QWIP (Quantum Well Infrared Photodetector) type

4.2.2 The SF6 camera shall be Microcooled

4.2.3 IR Resolution: the IR resolution shall be 320 x 240 pixels (76,800 pixels total).

4.2.4 Spectral Range: It shall be 10.3 µm to 10.7 µm, optimized for SF_6 absorption.

4.2.5 Thermal Sensitivity (NETD): It shall be <15 mK at +30°C (+86°F), allowing visualization of very small gas concentrations.

4.2.6 Digital Image Enhancement. It shall have High Sensitivity Mode (HSM) feature to enhance the visual contrast of the gas plume, making leaks stand out more clearly and a noise reduction filter.

4.2.7 Frame Rate shall be 60 Hz.

4.2.8 Field of View (FOV): It shall have interchangeable lenses of 24° × 18° and 14.5° × 10.8°.

4.2.9 **Focus**: It shall have both Automatic (one-touch) and manual (electric and on the lens).

4.2.10 **Digital Zoom**: It shall be 1x to 8x continuous digital zoom.

4.2.11 **F-number** shall be 1.59

4.2.12 Gas sensitivity shall be SF6: <0.3 ppm x m (ΔT = 10°C, Distance = 1 m)

4.2.13 Detector pitch shall be 30 µm

4.2.14 Laser pointer shall be class 2

4.2.15 Color palettes shall be Arctic, White hot, Black hot, Iron, Lava, Rainbow, Rainbow HC

4.2.16 Image presentation modes shall be IR image, visual image, high sensitivity mode (HSM)

4.2.17 Viewfinder shall be Built-in, tiltable OLED, 800 × 480 pixels

4.3.0 **Measurement and Analysis**

4.3.1 Temperature Range shall be -40°C to +500°C (-40°F to +932°F).

4.3.2 Accuracy shall be ±1°C (±1.8°F) for 0°C to +100°C, or ±2% of reading for temperatures above +100°C.

4.3.3 Measurement Features shall have at least 10 spotmeters, 5 area boxes with max/min/average temperatures, and live lines (horizontal or vertical) for detailed analysis.

4.4.0 **Data Storage and Communication**

4.4.1 Image File Format: Shall be of standard JPEG with 14-bit measurement data included.

4.4.2 Video Recording: Shall be non-radiometric MPEG4/H.264 video recording to memory card.

4.4.3 Connectivity interfaces: Shall have built-in Wi-Fi and Bluetooth for wireless transfer and connection to software/mobile devices, HDMI and USB 2.0.

4.4.4 Shall have GPS where location data is automatically added to every image.

4.4.5 Shall have annotations where voice (via Bluetooth headset) and text annotations are available for detailed reporting. Image sketching shall be available for infrared images.

4.4.6 MuiltiREC recording: Shall have this feature to enable multiple automatic recording of files in a customizable order

4.4.7 It shall have a compass

4.4.8 It shall have cloud services via Wi-fi

4.5.0 Physical and Environmental

4.5.1 **Ergonomics features shall include**: a rotating handle, built-in widescreen 4.3 in. LCD, and tiltable OLED viewfinder for comfortable operation from various angles.

4.5.2 Weight: Shall not be more than 3 kg including lens and battery.

4.5.3 Encapsulation shall be IP54 rated as per IEC 60529

4.5.4 Operating Temperature shall be -20°C to +50°C

4.5.5 Shock shall be 25g as per IEC 60068-2-27

4.5.6 Vibration shall be 2g as per IEC 60068-2-6

4.5.7 Mounting interface shall be UNC ¼"-20

4.6.0 Power supply and battery

4.6.1 The battery type shall be Rechargeable Li-ion battery; 7.4 V, charged in camera or separate 2-bay charger

4.6.2 Battery operating time shall be >2.5 hours at 25°C (68°F) and typical use

4.6.3 Battery charging time shall be 2.5 hours to 95% capacity, charging status shall be indicated by LEDs

4.6.4 Power Supply: Operates on an internal rechargeable battery (Li-ion) for portability, with an option for single phase 230V AC, 50HZ. mains supply operation and charging.

4.7.0 Accessories

4.7.1 Carrying case: A hard case designed to protect the instrument and all accessories during transport.

4.7.2 Battery charger

4.7.3 Two rechargeable Li-ion batteries

4.7.4 Power supply with multi-plugs

4.7.5 hand strap

4.7.6 neck strap

4.7.7 lens cap

4.7.8 lens cap strap

4.7.9 memory card

4.7.10 HDMI-HDMI cable

4.7.11 USB cable

4.7.12 screwdriver TX20

4.7.13 printed manual documentation

APPENDICIES

A: TESTS AND INSPECTION (Normative)

A.1 It shall be the responsibility of the supplier/manufacturer to test or to have all the relevant tests performed.

A.2 On receipt of the surge arrester leakage current analyzer, Kenya Power will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to Kenya Power, any part on the equipment which upon examination, test or use fail to meet any or all of the requirements in the specification.

B: QUALITY MANAGEMENT SYSTEM (Normative)

B.1 The bidder shall indicate the delivery time of the equipment

C: DOCUMENTATION AND DEMONSTRATION (Normative)

C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:

a) Fully filled clause by clause guaranteed technical particulars (GTP) signed by the manufacturer;

b) Copies of the Manufacturer's catalogues, brochures, drawings giving all relevant dimensions, and technical data;

c) Bidder's warranty and guarantee; subject to 12 months from date of delivery to KPLC stores

d) User manual.

C.2 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the diverter switch to KPLC stores.

Issued by: 1ST AE , E/plant Nairobi North	Authorized by: Senior Engineer, E-Plant Nairobi
Signed:	Signed:
Date: 2026-01-14	Date: 2026-01-14

D: GUARANTEED TECHNICAL PARTICULARS (Normative)

To be filled and signed by the Bidder and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, for tender evaluation, all in English Language)

Tender No. .....

Bidder's name and Address.....

Clause number	Requirement	Bidder's offer	
Manufacturer's Name		State	
Country of Manufacture		State	
Name and model Number		State	
1.	Scope	State	
2.	Normative references	Specify	
4.	**Requirements**		
4.1	Service conditions	State	
4.1.1	Operating conditions	specify	
4.1.2	Weight	specify	
4.2	**Imaging and optical data**		
4.2.1	Detector type	State	
4.2.2	Type of cooling	State	
4.2.3	IR resolution	State	
4.2.4	Spectra range	State	
4.2.5	Thermal sensitivity	State	
4.2.6	Digital mode enhancement	State	
4.2.7	Frame rate	State	
4.2.8	Field of view	State	
4.2.9	Focus	State	
4.2.10	Digital zoom	State	
4.2.11	F number	State	
4.2.12	Gas sensitivity	State	
4.2.13	Detector pitch	State	
4.2.14	Laser point	State	
4.2.15	Colour pallette	State	
4.2.16	Image presentation mode	State	
4.2.27	Viewfinder	State	

Clause number	Requirement	Bidder's offer	
4.3	Measurement and analysis		
4.3.1	Temperature range	State	
4.3.2	Accuracy	State	
4.3.3	Measurement features	State	
4.4	Data storage and communication		
4.4.1	Image file format	State	
4.4.2	Video recording	State	
4.4.3	Connectivity interfaces	State	
4.4.4	GPS	State	
4.4.5	Annotations and image sketching	State	
4.4.6	Multirec recording	State	
4.4.7	Compass	State	
4.4.8	Cloud services	State	
4.5	Physical and Environmental		
4.5.1	Ergonomics features	State	
4.5.2	Weight	State	
4.5.3	Encapsulation	State	
4.5.4	Operating temperature	State	
4.5.5	Shock	State	
4.5.6	Vibration	State	
4.5.7	Mounting interface	State	
4.6.0	Power supply and battery		
4.6.1	Battery type	State	
4.6.2	Battery operating time	State	
4.6.3	Battery charging time	State	
4.6.4	Power supply	State	
4.7.0	Accessories	State	
4.7.1	Carrying case	State	
4.7.2	Battery charger	State	
4.7.3	Batteries	State	
4.7.4	Power supply and multi plugs	State	
4.7.5	Hand strap	State	
4.7.6	Neck strap	State	
4.7.7	Lens cap	State	
4.7.8	Lens cap strap	State	
4.7.9	Memory card	State	
4.7.10	HDMI-HDMI cable	State	
4.7.11	USB cable	State	

Issued by: 1ST AE , E/plant Nairobi North	Authorized by: Senior Engineer, E-Plant Nairobi
Signed:	Signed:
Date: 2026-01-14	Date: 2026-01-14

Clause number	Requirement	Bidder's offer	
4.7.12	Screwdriver	State	
4.7.13	Documentation	State	
A	TESTS AND INSPECTION		
A.1	Responsibility to test	State compliance	
A.2	Replacement if it fails to meet any or all of the requirements in the specification.	Specify	
B	Quality Management System		
B.1	Delivery time of the product	state	
C	Documentation and demonstration		
C.1	Documents submitted with tender	State	
C.2	Recommendations for use	State	

.....

Bidder's Name, Signature, Stamp and Date