



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

74

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18

Page 1 of 19

**TABLE OF CONTENTS**

0.1 Circulation List

0.2 Amendment Record

**FOREWORD**

1. SCOPE
2. REFERENCES
3. TERMS AND DEFINITIONS
4. REQUIREMENTS
5. TESTS AND INSPECTION
6. MARKING AND PACKING
7. DOCUMENTATION

**ANNEX A:** *Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test certificates and type test reports for tender evaluation, all in English Language)*

Issued by:  Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:



Signed:



Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 2 of 19

**0.1 Circulation List**

COPY NO.	COPY HOLDER
1	Research & Development Manager
2	Supply Chain Manager (Procurement)
Electronic copy (pdf) on Kenya Power server ( <a href="http://172.16.1.40/dms/browse.php?fFolderId=23">http://172.16.1.40/dms/browse.php?fFolderId=23</a> )	

**0.2 Amendment Record**

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2014-06-18	New Issue	Michael Apudo 	Eng. Simon Kimitei 

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



TITLE:  
  
**SURVEY AND OPTICAL INSTRUMENTS**  
  
Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18
Page 3 of 19	

**FOREWORD**

This specification has been prepared by the Research and Development Department in collaboration with Distribution Division, both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for Optical Instruments for use on distribution and sub-transmission power lines. It is intended for use by KPLC in purchasing of the instruments.

**1. SCOPE**




- 1.1 This specification is for optical instruments for use outdoors and indoors on distribution and sub-transmission power lines for line inspection (Binoculars); sensing and imaging (Infrared Camera).
- 1.2 The specification covers the following categories of optical instruments:
  - a) Line inspection binoculars
  - b) Infrared Camera Indoor/Outdoor Use
- 1.3 The specification also covers inspection and tests of the instruments as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.
- 1.4 The specification stipulates the minimum requirements for optical instruments acceptable for use in the company and it shall be the responsibility of the Suppliers & Manufacturer to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the instruments for KPLC.

The specification does not purport to include all the necessary provisions of a contract.

**2. REFERENCES**

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply:

IEC 601010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

Issued by:  Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed: 	Signed: 
Date: 2014-06-18	Date: 2014-06-18



TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18

Page 4 of 19

IEC 61326: Electrical equipment for measurement, control and laboratory use - EMC requirements.

ISO 14133-1: Optics and optical instruments -- Specifications for binoculars, monoculars and spotting scopes -- Part 1: General purpose instruments

IEC 60825-1: Safety of laser products — Part 1: Equipment classification and requirements

IEC 60529: Degrees of protection provided by enclosures (IP Code)

UL 60065: Audio, Video and Similar Electronic Apparatus - Safety Requirements

OIML D 11: General Requirements for Measuring Instruments - Environmental Conditions

**3. TERMS AND DEFINITIONS**

For the purpose of this specification the definitions given in the reference standards shall apply.

**4. REQUIREMENTS**


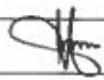

**4.1. SERVICE CONDITIONS**

The optical instruments shall be tropicalized, designed and constructed for continuous outdoor operation in tropical areas and harsh climatic conditions including areas exposed to sea spray (along the coast), humidity of up to 95% and average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C.

**4.2. Safety and Environmental Design Requirements**

4.2.1. Measuring instruments shall be designed and manufactured in accordance with the requirements of OIML D 11 and IEC 601010-1 such that:

- a) Their errors shall not exceed the maximum permissible errors under rated operating conditions.
- b) When they are exposed to disturbances, either
  - Significant faults shall not occur, or
  - Significant faults shall be detected and corrected by means of a checking facility.

Issued by:  Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed: 	Signed: 
Date: 2014-06-18	Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 5 of 19

- 4.2.2. Instruments powered by a battery (stand-alone, rechargeable auxiliary or back-up batteries) shall have the type (-s) and capacity (-ies) of the batteries allowed to be used in the applicable measuring instruments specified by the manufacturer.
- 4.2.3. Instruments powered by the mains power and provided with a back-up battery for data-storage only, shall also comply with the requirements for mains powered instruments.
- 4.2.4. Measuring instruments shall be constructed in such a way that possibilities for unintentional, accidental, or intentional misuse are minimal.
- 4.2.5. Software controlled instruments that are complex in their functionality shall require that the user is guided for the correct use and for achieving correct measurement results.
- 4.2.6. The manufacturer shall specify the limiting conditions; storage and transport conditions for each specified influence quantity - quantity which is not the subject of the measurement and whose change affects the relationship between the indication and the result of the measurement.
- 4.2.7. Measuring equipment shall have a valid calibration status prior to being confirmed, within a specified metrological requirement.
- 4.2.8. The measuring instruments shall be manufactured and tested in conformity with the following safety and environmental design requirements in Table 1;

**Table 1: Safety and Environmental Design Requirements**

No	Particulars	Test Performance	
1	Environmental conditions	Operating temperature	-1 ... +50 °C (+30.2 ... +104 °F)
		Storage temperature	-5 ... +60 °C (23 ... +140 °F)
		Humidity range - Rel. humidity	5 ... 95 %, non-condensing
		Shock (operating)	15 g / 11 ms half sine as per IEC 60068-2-27
		Vibration (operating)	IEC 60068-2-6: Test Fc (Test level 2) Frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 m/s <sup>2</sup> ), 20 cycles per axis
		Dry heat test	IEC 60068-2-2: Type A test (Test level 2) Temperature - 55°C ± 2°C Duration of exposure – 2 h
		Damp heat test	IEC 60068-2-30: Test Db Test level 2 Temperature - 55°C ± 2°C Relative humidity – 93 % Duration of exposure – 4 h
		Salt mist test	IEC 60068-2-11 – Test level 4

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KPI/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 6 of 19

No	Particulars	Test Performance
		Saline solution – 5 % NaCl, pH value- 6.5 – 7.2 %, Temperature – 35°C Duration – 96 h
	Flammability test	IEC 60695-2-11 – Needle flame test
2	EMC tests	Emission standards for residential, commercial and light-industrial environments
		Electrostatic discharge requirements
		Radiated, radio-frequency, electromagnetic field immunity tests
		Fast Transients/Bursts
		Surges on signal, data and control lines
3	Safety	Rated Impulse Voltage for equipment -1.2/50µs
		Overvoltage category
		Pollution category
		Insulation material group
		Minimum clearances for equipment to withstand steady state voltages, temporary over-voltages and to avoid partial discharge
		Partial discharge requirements
		Solid insulation design

\* If the internal emission source(s) is operating at a frequency below 9 kHz then measurements need only to be performed up to 230 MHz

NOTE: The tests results shall be as per the Performance Criteria A specified in IEC 61326-1 for the respective tests.

Issued by: Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed:	Signed:
Date: 2014-06-18	Date: 2014-06-18



TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KPI/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 7 of 19

**4.3. Design and Construction**

**4.3.1. Line Inspection Binoculars**

4.3.1.1. The line inspection binoculars shall be designed manufactured and tested as per the requirements of ISO 14133-1 standards whereas the safety and environmental requirements shall be in accordance with clause 4.2 and Table 1 of this specification.

4.3.1.2. Line inspection binoculars shall be required to monitor LHT and EHT line poles and its' members, positions conductors, power and fibre optic cables and its' accessories fixed to the pole members.

4.3.1.3. The binoculars shall utilize a gimbaled frame with erecting prisms, position and motion sensors, advanced and direct-drive motors and microprocessors, resulting into instant and constant image stability.

4.3.1.4. Each direct drive motor shall respond to its own piezo-motion sensor and gyro-position sensor; one shall be set for horizontal motion and another for vertical motion.

4.3.1.5. As the sensors detect any motion, the CPU shall process the incoming signals and initiate direct motor drive corrections resulting in a smooth and seamless images, higher efficiency, reduced power consumption and higher operating life.

**4.3.1.6. Features**

The binoculars shall be able to provide clear picture / image over a minimum distance of 1000 m and shall meet the following features:

- a) Smaller, lighter, easier to hold.
- b) Wider field view, greater eye relief.
- c) Dual piezo-vibration sensors and gyro-position sensors-computer linked to direct drive motors- help user lock on to the subjects even if both user and the subject are in motion.
- d) Phase-coated roof prisms for sharp, more highly defined images with greater contrast.
- e) 100% water proof (IP 68 as per IEC 60529), fog-proof, dry nitrogen purged.
- f) 100% EBC coatings for the truest colours, brightest images and freedom from glare, flare and ghosting.
- g) Automatic "sensors/response" stabilizing system minimizes power consumption, extends component operating life.

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 8 of 19

- h) Closed-cell foam flotation neck strap which safely keep the binocular afloat.
- i) Solid and sturdy construction.
- j) Deluxe carrying case and neck strap.
- k) Must be rugged in construction, able to be used for long periods in the field

**Table 8: Performance and technical specifications of line inspection binoculars**

Specifications	Requirements
Magnification	More than 12X
Compensation Angle (Stabilization Freedom)	$\pm 3^\circ$
Objective Lens Diameter	32mm
Eye Relief	15mm
Diopter Adjustment	$\pm 3$
Field of View	$5^\circ$
Apparent Field of View	$60^\circ$
Field of View at 1000m	87m
Minimum Focusing Distance	3.5m
Exit Pupil	2.67mm
Relative Brightness	7.1
Inter-pupillary Distance	53 – 74mm
Approximate Dimensions: W x H x D (mm)	177 x 141 x 79
Approximate Weight	1 kg
Operating Temperature Range	$-10^\circ\text{C} \approx 50^\circ\text{C}$

**4.3.1.7. Accessories**

The binoculars shall be supplied complete with the following accessories:

- a) Eyepiece protective cap
- b) Hand Strap
- c) Floatation neck strap
- d) Carrying case with hand/shoulder strap
- e) Cleaning cloth
- f) Instruction manual
- g) AA batteries (4)

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18





TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 9 of 19

**4.3.2. Infrared Camera Indoor/Outdoor Use**

Infrared camera shall be designed, manufactured and tested in accordance with UL 122 standard, with the safety and environmental requirements conforming to clause 4.2 and Table 1 of this specification

**4.3.2.1. Physical and Performance Specifications:**

- 4.3.2.1.1. The camera shall be capable of sensing, imaging, and displaying infrared radiation in the 8 to 14 micron spectral wavelengths and shall have been designed specifically for use within a night environment.
- 4.3.2.1.2. The camera shall be equipped with a Vanadium Oxide infrared imaging sensor in the 320 x 240 resolution format. Each imaging element or pixel on the camera's imaging sensor shall be of 37.5 microns in size.
- 4.3.2.1.3. The camera shall be equipped with a 37.5mm diameter Germanium Window protecting the focal plane array optics. The window shall incorporate anti-reflective and hard carbon coating to minimize damage during operation.
- 4.3.2.1.4. To facilitate high quality image representation, the camera shall refresh at 50 times per second by employing a 50Hz update rate to the sensor itself.
- 4.3.2.1.5. The camera's infrared imaging engine technology shall be specifically designed for use at night and shall be designed, developed, and manufactured by the same company who manufactures the finished camera product.
- 4.3.2.1.6. The camera shall incorporate an "automatic focus system" that adjusts the camera's integration time settings to highlight objects that are targeted by the camera's center crosshairs. The system allows users the means to override the camera's automatically selected sensitivity modes without the use of any buttons or physical switches.
- 4.3.2.1.7. In order to maximize the information provided to users of the camera, the camera shall perform non-uniformity correction (NUC) and mode switching rapidly. The freeze-frame associated with NUC and mode switching shall last no longer than 0.08 seconds.
- 4.3.2.1.8. The camera shall incorporate a video output that uses a standard BNC (Bayonet Neill Concelman) type connector to enable wired transmission to a remote location.

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:




**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18
Page 10 of 19	

Accessories that may be installed into the camera, such as transmitters and digital frame capture capability, shall not prevent users from accessing and using the video output connector concurrent with the use of such accessories.

- 4.3.2.1.9. The internal video signal shall be displayed on backlit 3½ inch LCD with an aspect ratio of 4:3 consistent with the camera's sensor.
- 4.3.2.1.10. To ensure the waterproofing integrity of the camera in all situations, the camera shall be designed to isolate the internal electronic systems from all user accessible areas. The camera shall conform to the IP67 standard, ability to withstand short-term immersion in water to a depth of three feet.
- 4.3.2.1.11. The camera shall withstand multiple drops from a distance of 6 feet on to a concrete surface without sustaining any measurable degradation in performance.
- 4.3.2.1.12. The camera shall have the option of an AA adaptor to allow the use of disposable AA type alkaline batteries and shall provide nominally two hours of operation with the internal display device in the ON position. There shall also be an option of using rechargeable batteries designed specifically for the camera by the manufacture of the camera. The battery shall be NiMH type rechargeable batteries. Other types of batteries including as Lithium Ion, are not acceptable.
- 4.3.2.1.13. To eliminate confusion, the camera shall not incorporate a "sleep" mode that turns-off the camera's internal LCD display while the camera is "on".
- 4.3.2.1.14. The camera shall incorporate an on-screen battery level indicator consisting of 10 battery level increments. The battery level indicator shall also incorporate a low battery warning that, when used with a wireless transmission device, transmits the battery level information and low battery warning information to the receiver located remotely from the camera.
- 4.3.2.1.15. The camera's optional "pistol grip" handle shall be removable. To minimize hazards, the camera shall have no electrical interface and/or electrical connections between the handle and the camera's main housing. The handle shall be easily attached and detached from the camera's main housing without the use of tools to facilitate quick removal and attachment at a fire scene.
- 4.3.2.1.16. The camera shall incorporate an automatic active temperature stabilization system that uses the Peltier Effect. When the camera's electronics heat-up to a predetermined critical temperature, the temperature stabilization system shall

Issued by:  Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed: 	Signed: 
Date: 2014-06-18	Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18

Page 11 of 19

automatically be activated to dissipate heat from the electronics and move the heat into a heat sink.

4.3.2.1.17. The camera shall incorporate through-the-lens direct temperature measurement capability that measures relative surface temperature readings. The direct temperature measurement readings shall be displayed, in numerical form, in the upper right hand corner of the internal display device.

4.3.2.1.18. The camera shall be upgradable to incorporate the capability of recording thermal video and/or digital still images. The video or images shall be downloadable to a personal computer using a USB interface. The recording capacity shall be least 2 hours of video. When coupled to a personal computer using a USB interface, the computer shall recognize the camera as an external memory source similar to an external disk drive.

**Table 7: Performance and Technical Particulars for Infrared Camera**

Particulars	Requirements
Temperature range	-40° C to 500° C (Range 1: -40 to 120° - Range 2: 0 to 500° C)(Select either standard or optional: 200 to 2000° C)
NETD - Noise Equivalent Temperature Difference	0.08° C (@30° C 50Hz)
Accuracy	±2%(Reading) or ±2° C
Spectral Range	8 to 14µm
Infrared Detector	320×240 (76,800 pixels), Uncooled Focal Plane Array - UFPA (MICROBOLOMETER)
Field of View(Standard Lens)	21.7°(H) × 16.4°(V)
I.F.O.V (Standard Lens)	1.2mrad
Focus (Standard Lens)	30cm to infinity
Frame Rate	50 frames/sec
A/D Resolution	14 bit
Measuring Function	Run/Freeze, Auto level/Sense, Level trace, Auto gain control
S/N Improvement	Σ2, 8, 16
Correction	Emissivity / Environment temperature / Back ground
Display Functions	Color/white and black/Positive/Negative ISO thermal: max 4 bands Multilingual menu
Image processing functions	Level/Sense Multi point (10), Multi emissivity (10), Max/Min temperature display, Alarm Image filter (Median, Sharpness, etc.)
Image Output	Composite video (NTSC/PAL) RS232C
Interfaces	IEEE1394a (6pin) or Ethernet (100/10baseT)
Power supply	11 to 13V DC - Rechargeable NiMH Battery
Laser classification	Class 2, 1mW/635nm Red as per IEC 60825-1
Power consumption	8W (TYP) (*1)

Issued by:  Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:



Signed:



Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 12 of 19

Particulars	Requirements
Shock & Vibration	294m/s <sup>2</sup> (S) / 29.4m/s <sup>2</sup> (V)
Environmental protection	IP 67 (IEC60529)
Dimensions	To be specified by manufacturer
Weight	To be specified by manufacturer

**4.3.2.2. System Hardware**

- 4.3.2.2.1. Manufacturer/supplier shall provide customer service, pre-sales applications assistance, after-sales technical assistance, access to online technical support, and online training using Web conferencing.
- 4.3.2.2.2. The manufacturer/supplier shall conduct on-site system administrator and security/surveillance operator training, with the number of sessions and length of sessions as recommended by the video surveillance system manufacturer. Training shall include, but not limited to camera administration, provisioning, configuration, operation, and diagnostics.
- 4.3.2.2.3. The indoor/outdoor camera shall be supplied complete with the following accessories:
  - a) Thermal Imaging Camera Lens
  - b) AC Power supply/battery charger (including mains adaptors)
  - c) SD card reader (USB) for downloading images into computer
  - d) Rugged hard carrying case
  - e) Soft transport bag
  - f) Adjustable hand strap for left-or-right-handed use
  - g) User's manual and to include Calibration Certificate

**4.4. Quality Management System**

- 4.4.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the design, material, workmanship, tests, service capability, maintenance and documentation of the optical instruments fulfil the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfil the requirements of ISO 9001:2008.
- 4.4.2. The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2008 certificate shall be submitted with the tender for evaluation.

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No.

KP1/3CB/TSP/09/059-2

Issue No.

1

Revision No.

0

Date of Issue

2014-06-18

Page 13 of 19

4.4.3. The bidder shall indicate the delivery time of the optical instruments, manufacturer's monthly & annual production capacity and experience in the production of the type and size of items being offered.

**5.0. TESTS AND INSPECTION**

5.1. The optical instruments shall be inspected and tested in accordance with the requirements of ISO 14133-1, UL 60065, OIMLD 11, UL 122, IEC 61010-1 and IEC 61326 standards in clause 4.2 and Table 1 of this specification. It shall be the responsibility of the supplier to perform or to have performed the tests specified and whatever other tests he normally performs at works.

5.2. Copies of previous Type Tests Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. The accreditation certificate to ISO/IEC 17025 for the same third party testing laboratory used shall also be submitted with the tender document (all in English Language)

5.3. The optical instruments shall be subject to acceptance tests at the manufacturer's works before dispatch. Acceptance tests shall be witnessed by two Engineers appointed by The Kenya Power and Lighting Company Limited (KPLC). Routine and Sample Test Reports for the optical instruments to be supplied shall be submitted to KPLC for approval before delivery of the goods.

5.4. On receipt of the product, KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the optical instruments which upon examination, test or use; fail to meet any of the requirements in the specification.

**6.0. MARKING AND PACKING**

**6.1. Marking**

6.1.1. The optical instruments and their accessories shall be marked in a permanent manner with the following information (in English Language):

- a) Standard to which the optical instruments complies,
- b) Name of manufacturer,
- c) Type of the optical instruments (description of type, number and overall size of sections),

Issued by:  Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:



Signed:



Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KPI/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 14 of 19

- d) Year and month of manufacture and serial number,
- e) Maximum permissible measurement limits,
- f) The words "Property of Kenya Power & Lighting Co" shall be engraved, permanently on each optical instrument or its accessories while the other parameters shall be marked on a permanent label.
- g) The overvoltage protection category and duty rating e.g. category IV-field
- h) The optical instruments shall be provided with a separate permanent label displaying advice to the user.
- i) The laser class shall also be marked as per IEC 60825.

**6.2. Packing**

- 6.2.1. The optical instruments and their accessories shall be packed in separate standard rugged heavy duty robust housing with cushion grip handles and rubberized gripping surface for outdoor use (protection category IP X5) in such a manner to avoid damage during transportation.
- 6.2.2. The housing shall be complete with a gasket to seal the lids when closed so as to protect the instrument against water and dirt while the instrument is carried through rainstorms or other hazardous conditions. The lid shall be secured by two latches and a handle for portability. A compartment shall also be provided for storage of test cables and line cord.

**7. DOCUMENTATION**

- 7.1 The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) 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 description of the item on offer as per Annex A (Guaranteed Technical Particulars) and signed by the manufacturer;
  - b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;
  - c) Sales records for the last five years and at least four customer reference letters;
  - d) Details of manufacturing capacity and the manufacturer's experience;
  - e) Copies of required type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
  - f) Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
  - g) Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.

Issued by: Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed:	Signed:
Date: 2014-06-18	Date: 2014-06-18



TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 15 of 19

7.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:

- a) Guaranteed Technical Particulars signed by the manufacturer;
- b) Design Drawings with details of optical instruments to be manufactured for KPLC.
- c) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008
- d) Detailed test program to be used during factory testing;
- e) Marking details and method to be used in marking the optical instruments;
- f) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the optical instruments for The Kenya Power & Lighting Company;
- g) Packaging details (including packaging materials).

7.3 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the optical instruments to KPLC stores

-----PAGE LEFT BLANK-----

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 16 of 19

**ANNEX A:** *Guaranteed Technical Particulars (to be filled and signed by the supplier and submitted together with copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of test certificates for tender evaluation)*

Tender No ..... Bidder's Name & Address .....

	Description	Bidder's Offer
1	Name of the manufacturer and country of origin Type Reference Number or Model Number	
2	Applicable Standards	
3	Terms and Definitions	
4	Requirements	
4.1	Service conditions	
4.2	Design and Construction	
	4.2.1. – 4.2.8	
	<b>Safety and Environmental Design Requirements</b>	
	Climatic condition	Normal (N)
	Operating temperature	-25°C--- +55°C
	Storage temperature	-5 ... +60 °C (23 ... +140 °F)
	Humidity range - Rel. humidity	20% -- 96%, non-condensing
	Shock (operating)	15 g / 11 ms half sine as per IEC 60068-2-27
	Vibration (operating)	IEC 60068-2-6: Test Fc (Test level 2) Frequency range from 10 Hz to 150 Hz, continuous acceleration 2 g (20 m/s <sup>2</sup> ), 20 cycles per axis
	Dry heat test	IEC 60068-2-2: Type A test (Test level 2) Temperature - 55°C ± 2°C Duration of exposure – 2 h
	Damp heat test	IEC 60068-2-30: Test Db Test level 2 Temperature - 55°C ± 2°C Relative humidity – 93 % Duration of exposure – 4 h
	Salt mist test	IEC 60068-2-11 – Test level 4 Saline solution – 5 % NaCl, pH value- 6.5 – 7.2 %, Temperature – 35°C Duration – 96 h
	Flammability test	IEC 60695-2-11 – Needle flame test
	Emission standards for residential, commercial and light-industrial environments	IEC 61000-6-3 - Class A

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18





Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18

Page 17 of 19

	Electrostatic discharge requirements	IEC 61000-4-2 – Test level 3 Air discharge - 8kV, Contact discharge - 6kV	
	Radiated, radio-frequency, electromagnetic field immunity tests	IEC 61000-4-3 – Test level 3 10 V/m (80 MHz bis 1 GHz)	
	Fast Transients/Bursts	IEC 61000-4-4: Test level 2 Min Values ±1 kV (5/50 ns, 5kHz)	
	Surges on signal, data and control lines	IEC 61000-4-5- Test level 3 Line to ground voltage – 2.0 kV Line to Line voltage – 1.0 kV	
	Rated Impulse Voltage for equipment -1.2/50µs	6000 V as per IEC 60664-1, table 1	
	Overvoltage category	Class IV 600 V as per IEC 61010-1	
	Pollution category	Degree 2 as per IEC 60664-1 clause 2.5.1	
	Insulation material group	Group II - 400≤CTI<600 (PLC=1) as per IEC 60112 and IEC 60664-1 clause 2.7.1	
	Minimum clearances for equipment to withstand steady state voltages, temporary over-voltages and to avoid partial discharge	5.5mm as per IEC 60664-1 section 3 clause 3.1 and Table 1	
	Partial discharge requirements	As per IEC 60664-1 Annex C	
	Solid insulation design	Shall withstand short term and long term stresses as per IEC 60664-1 clause 3.3	
4.3	Design and construction		
4.3.1	Line Inspection Binoculars		
	4.3.1.1 Construction		
	4.3.1.1.1 – 4.3.1.1.5		
	4.3.1.2 Features		
	(a-k)		
	Performance and technical specifications of line inspection binoculars		
	Specifications	Requirements	
	Magnification	More than 12X	
	Compensation Angle (Stabilization Freedom)	±3°	
	Objective Lens Diameter	32mm	
	Eye Relief	15mm	
	Diopter Adjustment	±3	
	Field of View	5°	
	Apparent Field of View	60°	
	Field of View at 1000m	87m	
	Minimum Focusing Distance	3.5m	
	Exit Pupil	2.67mm	

Issued by: *[Signature]* Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

*[Signature]*

Signed:

*[Signature]*

Date: 2014-06-18

Date: 2014-06-18



Kenya Power

TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**

Part 2: Optical Instruments

Doc. No. KP1/3CB/TSP/09/059-2

Issue No. 1

Revision No. 0

Date of Issue 2014-06-18

Page 18 of 19

	Relative Brightness	7.1	
	Inter-pupillary Distance	53 – 74mm	
	Approximate Dimensions: W x H x D (mm)	To be specified by manufacturer	
	Approximate Weight	To be specified by manufacturer	
	Operating Temperature Range	-10°C ≈ 50°C	
	4.3.4.3. Accessories		
4.3.2	Infrared Camera – Indoor/Outdoor		
	4.3.2.1 – Physical & performance specifications		
	4.3.2.1. – 4.3.2.18		
	Technical and performance particulars of infrared camera		
	Particulars	KPLC Requirements	
	Temperature range	-40° C to 500° C (Range 1: -40 to 120°- Range 2: 0 to 500° C)(Select either standard or optional: 200 to 2000° C)	
	NETD - Noise Equivalent Temperature Difference	0.08° C (@30° C 50Hz)	
	Accuracy	±2%(Reading) or ±2° C	
	Spectral Range	8 to 14µm	
	Infrared Detector	320×240 (76,800 pixels), Uncooled Focal Plane Array - UFPA (MICROBOLOMETER)	
	Field of View(Standard Lens)	21.7°(H) × 16.4°(V)	
	I.F.O.V (Standard Lens)	1.2mrad	
	Focus (Standard Lens)	30cm to infinity	
	Frame Rate	50 frames/sec	
	A/D Resolution	14 bit	
	Measuring Function	Run/Freeze, Auto level/Sense, Level trace, Auto gain control	
	S/N Improvement	Σ2, 8, 16	
	Correction	Emissivity / Environment temperature / Back ground	
	Display Functions	Color/white and black/Positive/Negative ISO thermal: max 4 bands Multilingual menu	
	Image processing functions	Level/Sense Multi point (10), Multi emissivity (10), Max/Min temperature display, Alarm Image filter (Median, Sharpness, etc.)	
	Image Output	Composite video (NTSC/PAL) RS232C	
	Interfaces	IEEE1394a (6pin) or Ethernet (100/10baseT)	
	Power supply	11 to 13V DC - Rechargeable NiMH Battery	
	Laser classification	Class 2, 1mW/635nm Red as per IEC 60825-1	
	Power consumption	8W (TYP) (*1)	
	Shock & Vibration	294m/s <sup>2</sup> (S) / 29.4m/s <sup>2</sup> (V)	

Issued by: Head of Section Tech Stds & Specs

Authorized by: Head of Department, R & D

Signed:

Signed:

Date: 2014-06-18

Date: 2014-06-18



TITLE:

**SURVEY AND OPTICAL INSTRUMENTS**




Part 2: Optical Instruments

Doc. No.	KP1/3CB/TSP/09/059-2
Issue No.	1
Revision No.	0
Date of Issue	2014-06-18

Page 19 of 19

	Environmental protection	IP 67 (IEC60529)	
	Dimensions	To be specified by manufacturer	
	Weight	To be specified by manufacturer	
	4.3.2.2 System hardware		
	4.3.2.2.1 - 4.3.2.2.3		
4.4	Quality Management System		
	4.4.1 – 4.4.3		
5.0	Tests and Inspection		
	5.1 – 5.6		
6.0	Marking and packing		
	6.1 Packing		
	6.1.1 – 6.1.3		
	6.2 Marking		
7.0	Documentation		
	7.1– 7.3		
8.0	Manufacturer's Guarantee and Warranty		
9.0	List catalogues, brochures, technical data and drawings submitted to support the offer.		
10.0	List customer sales records and customer reference letters submitted to support the offer.		
11.0	List test & calibration reports to be submitted to KPLC for approval before shipment		
12.0	List Test Reports and Test Certificates submitted with tender		
13.0	List test reports of the instruments to be submitted to KPLC for approval before shipment		
14.0	Statement of compliance to specification (indicate deviations if any & supporting documents)		
15.0	List Acceptance Tests to be witnessed by KPLC Engineers at the factory		

.....  
**Manufacturer's Name, Signature, Stamp and Date**

Issued by:  Head of Section Tech Stds & Specs	Authorized by: Head of Department, R & D
Signed: 	Signed: 
Date: 2014-06-18	Date: 2014-06-18



[Faint, illegible text spanning the width of the page, possibly bleed-through from the reverse side.]