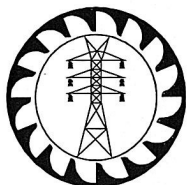


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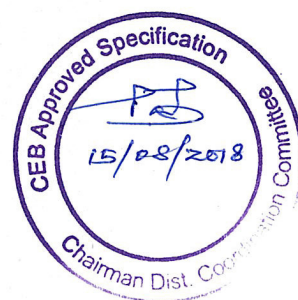
# CEB SPECIFICATION

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## THERMAL IMAGING AND MEASURING DEVICES



**CEYLON ELECTRICITY BOARD  
SRI LANKA**



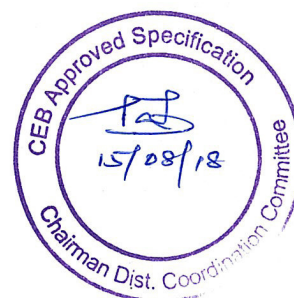
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## SPECIFICATION FOR THERMAL IMAGING AND MEASURING DEVICES

### 1.0 SCOPE

This specification covers the general requirements of the design, manufacture and testing of Thermal Imaging and Measuring Devices with following categories:

1. Thermal Image Camera for locating over heating components of an electrical network with/without leakage detection of SF<sub>6</sub> gas.
2. Infrared(IR) Thermometer

The exact configuration required will be selected and specified in the price schedule.

### 2.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Minimum ambient temperature	06 °C
(c)	Maximum ambient temperature	40 °C
(d)	Maximum relative humidity	90%
(e)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(f)	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(g)	Isokeraunic (Thunder days) level	100 days
(h)	Maximum design temperature of conductors	75 °C

### 3.0 APPLICABLE STANDARDS

The equipment and components supplied shall be in accordance with the latest editions of the standard specified below and amendments thereof.

(a)	IEC 60068-2-6: 2007	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)
(b)	IEC 60068-2-27: 2008	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
(c)	IEC 60529: 1989	Degrees of protection provided by enclosures (IP Code)

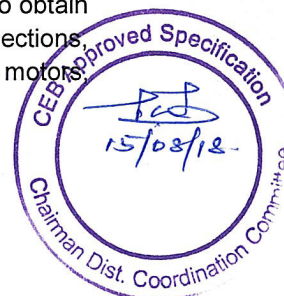
However in the event of discrepancy, details given in this CEB specification supersede above standards.

### 4.0 BASIC FEATURES

#### 4.1 Thermal Image Camera

For the Thermal Image Camera, the bidder shall furnish complete catalogues of information and operating instruction along with the bid. The quoted instrument shall be intrinsically safe and suitable for rough outdoor use.

The Thermal Image Camera shall be of compact light weight instrument so design to obtain the thermal imaging of three phase power distribution, fuse boxes, cable and connections, relays, switches, insulators, capacitors, circuit breakers, controllers, transformers, motors,



battery banks, generator windings/bearings etc. Shall be able to capture visible spectrum images along with IR images to pin point the hot/leak spots.

In case if gas detection facility required, the instrument shall be able to detect SF<sub>6</sub> leakage from breakers, panels and outdoor switchgears etc. from a distance suitable for overhead applications.

The instrument shall have easy-to-use user interface and shall be able to focus an object without much effort. It should be able to capture both visual and IR images for the purpose of analysis. It shall have facility to transfer inspection results to PC and should have suitable analysis and reporting software.

#### 4.2 Infrared (IR) Thermometer

IR Thermometer shall be handheld lightweight device with a laser pointer to precisely point out the target.

### 5.0 DESIGN PARAMETERS RANGE AND ACCURACY

#### 5.1 For Thermal Image Camera

##### 5.1.1 Temperature

- (a) Temperature measurement range 0°C to +600°C
- (b) Temperature measurement accuracy Minimum  $\pm 2^\circ\text{C}$  or  $\pm 2\%$  whichever is higher at 25°C represented in a differentiable data format.

##### 5.1.2 Imaging Performance

- (a) Display Built-in min 3.5" Colour LCD or LED
- (b) Auto and Manual focusing shall be available
- (c) Image resolution min 640 x 480 (for IR images)
- (d) Thermal sensitivity  $\leq 0.05^\circ\text{C}$  at 30°C
- (e) Infrared spectral band 7.5 $\mu\text{m}$  to 14 $\mu\text{m}$
- (f) The display content shall be easily readable to human eye
- (g) Resolution of visual camera not less than 5MP, flash/flood lighting for night time use
- (h) Data Communication Interface – USB and remote connection such as WiFi
- (i) Overlay thermal images on to visual image for extra location documentation
- (j) Shall be able to record voice/text memos along with the images
- (k) Image resolution min 320 x 240 (for SF<sub>6</sub>) - Optional

Thermal Imager shall optionally include infrared lens types (telephoto and wide-angle) with the standard infrared lens with  $\approx 30\text{cm}$  minimum focus distance.

Thermal Imager shall come up with user selectable different color palettes for better image representation for problematic areas. Temperature level and span should be able to set within the imager-temperature range either automatically or manually. Toggling between these two modes is required.

Instrument shall include on-screen adjustment features such as Date/time, temperature units, scale, LCD intensity and on-screen indicators such as battery status, emissivity, background temperature and real-time clock.

##### 5.1.3 Other Requirements

- (a) Storage medium shall be removable SD card minimum 4GB capacity and transfer via USB cable





- (b) Thermal imager shall be capable of visual and radiometric infrared video recording, paused or saved images. It shall be transferred to personal computer
- (c) Captured radiometric thermal image/video shall be able to save additionally in a standard JPEG/BMP/PNG/AVI etc. formats also
- (d) User selectable temperature scale ( $^{\circ}\text{C}/^{\circ}\text{F}$ )
- (e) Time/Date set
- (f) Emissivity selection
- (g) Reflected background temperature compensation
- (h) Transmission correction
- (i) Selectable hot spot, cold spot, and center point on the image
- (j) Picture in Picture facility
- (k) High temperature alarm
- (l) Laser beam to point out the targets
- (m) The equipment shall meet minimum IP 54 requirement
- (n) Shall Provide minimum three years of comprehensive warranty for the product

## 5.2 For IR Thermometer

### 5.2.1 Temperature

- (a) Temperature measurement range  $-20^{\circ}\text{C}$  to  $+600^{\circ}\text{C}$
- (b) Temperature measurement accuracy  $\pm 1^{\circ}\text{C}$  or  $\pm 1\%$  of the reading whichever is higher at  $25^{\circ}\text{C}$ .

### 5.2.2 Other Requirements

- (a) Response time shall be less than 500ms
- (b) Emissivity range shall be 0.10 to 1.00
- (c) Optical resolution 20:1
- (d) Display resolution  $0.1^{\circ}\text{C}$
- (e) Repeatability  $\pm 0.5^{\circ}\text{C}$  or  $\pm 0.5\%$  of the reading
- (f) Battery life shall be minimum 15 hours with laser and backlight on

## 6.0 ACCESSORIES / DOCUMENTS TO BE SUPPLIED

### 6.1 For Thermal Image Camera

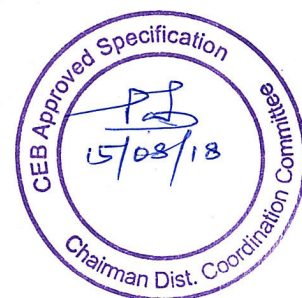
- (a) Post Processing software with backups for analysis and reporting (compatible with Windows 7 or higher operating systems)
- (b) Hard carrying case for the transportation of instrument
- (c) Soft carrying case
- (d) Neck strap
- (e) Operator manual
- (f) User guide for computer software
- (g) Power adapter / Battery charger
- (h) 12V Travel Charger
- (i) Li-Ion rechargeable batteries (5 hours or more) and extra carry on battery
- (j) SD card 4GB or Higher
- (k) USB cable
- (l) All cables and accessories required for the operation

### 6.2 For IR Thermometer

- (a) Operator manual
- (b) Soft carrying case
- (c) Power adapter/battery charger
- (d) Cables to connect to a PC (as applicable)

## 7.0 CALIBRATION

The bidder shall provide the following details with respect to calibration/firmware upgrade of



instruments.

- (a) Calibration interval
- (b) Address of places available for calibration of Thermal Image camera/ IR Thermometer
- (c) Calibration shall be done free of charge during warranty period and manufacturer's/supplier's commitment for calibration after the warranty period also shall be available and shall be mentioned in the offer
- (d) Time required for calibration

## 8.0 REQUIREMENTS FOR SELECTION

### 8.1 Quality Assurance

The manufacturer shall possess ISO 9001:2008 or latest Quality Assurance Certification valid throughout the delivery period of this bid, for the manufacture of similar equipment for the plant where manufacturing is being done. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

### 8.2 Manufacturing Experience

The manufacturer shall have minimum of five (5) years experience in manufacturing similar measuring equipment. In addition, minimum of three (3) years experience shall be in manufacturing for orders from outside the country of the manufacturer. The product offered has to be in same voltage range of offered item and shall have been used in service utilities over past 2 years.

Manufacturer shall furnish a list of purchasers with year and quantity of the product offered with the offer to prove his manufacturing experience.

Makes with proven after sales service; excellence track records and well known in Sri Lanka will be exempted from above requirements.

## 9.0 INFORMATION TO BE FURNISHED WITH THE OFFER

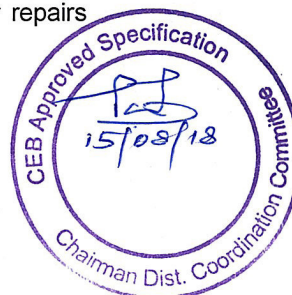
The following shall be furnished with the offer.

- (a) Construction features and relevant technical literature (materials used for components, mechanical strength, weight, electrical characteristics etc.)
- (b) Duly filled and signed 'Annex - A: Schedule of Technical Requirements and Guaranteed Technical Particulars'.
- (c) Documents to prove manufacturer's experience in accordance with Clause 8.2.
- (d) ISO 9001:2008 or latest Quality Assurance Certificate in accordance with clause 8.1.

## 10.0 POST DELIVERY REQUIREMENTS

### 10.1 Maintenance & Repair after Delivery

- 10.1.1 Supplier shall carry out necessary maintenance or repairs of the equipment as prescribed by the manufacturer within the warranty period. CEB will transport the Equipment for such maintenance to a place specified by the Supplier and transport cost will be borne by CEB. Any other costs associated with these maintenance or repairs including cost of labor shall be borne by the supplier.



- 10.1.2 The bidder shall furnish an undertaking to the effect that it will take responsibility of after-sales service of the Equipment and to provide spare parts for up-keeping the Equipment for a minimum period of 6 years from the date of delivery.

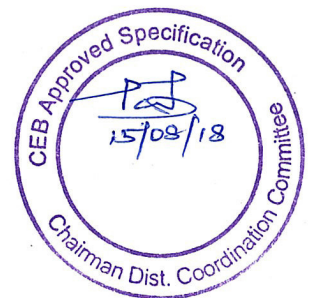
## 10.2 Warranty

- 10.2.1 The Supplier warrants that all the Equipment are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials.
- 10.2.2 The Supplier further warrants that the equipment shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the area of final destination.
- 10.2.3 The warranty shall remain valid for two (02) years after the Equipment have been delivered to and accepted at the final destination indicated in the Bid Data.
- 10.2.4 CEB shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. CEB shall afford all reasonable opportunity for the Supplier to inspect such defects.
- 10.2.5 Upon receipt of such notice, the Supplier shall, within 42 days OR within the period specified in the Contract Agreement, expeditiously repair or replace the defective Equipment or parts thereof, at no cost to the CEB.
- 10.2.6 If having been notified, the Supplier fails to remedy the defect within the period specified, CEB may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the CEB may have against the Supplier under the Contract.

## 11.0 ANNEXES

Annex – A : Schedule of Technical Requirements and Guaranteed Technical Particulars

Annex – B : Non-Compliance Schedule



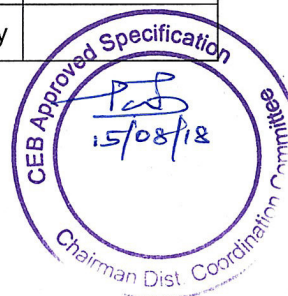


## Annex - A

### SCHEDULE OF TECHNICAL REQUIREMENTS AND GURANTEED TECHNICAL PARTICULARS (For Thermal Image Camera)

(CEB Requirements shall be filled by the procurement entity and information of the offer shall be filled by the manufacturer)

		CEB Requirement	Offered
1.	Name of the Manufacturer		
2.	Country of Origin		
3.	Model No.		
4.	Applicable Standard		
5.	Spectral Response (for IR) <span style="float: right;">μm</span>	Please specify	
6.	Image Resolution (IR only) <span style="float: right;">Pixel</span>	Min 640 x 480	
7.	Field of View <span style="float: right;">(H) x (V) in Deg</span>		
8.	Distance to spot ratio or instantaneous field of view	Min 750:1 or Min 1.3 mrad	
9.	Temperature measurement Range	0°C to +600°C	
10.	Temperature measurement accuracy	Min ±2 °C or ±2% whichever is higher at 25 °C	
11.	Thermal sensitivity	≤ 0.05°C at 30°C	
12.	Visual camera resolution	Min 5MP	
13.	Type and size of the built in screen	Min 3.5" LED/LCD	
14.	Minimum focus length	Please specify	
15.	Focus Type	Auto & Manual	
16.	Battery type and average operating life hours per full change <span style="float: right;">hrs</span>	5 (min)	
17.	Storage medium	SD /Micro SD	
18.	Available communication/Connection Types	Please specify	
19.	IP class	IP 54 or above	
20.	Whether thermal image camera complies with requirements specified in clause 5.1.3? <span style="float: right;">Yes/No</span>	Yes	
21.	Warranty <span style="float: right;">Years</span>	2	
22.	Whether all accessories / documents stated in clause 6.1 offered with the product. <span style="float: right;">Yes/No</span>	Yes	
23.	Ability to detect SF <sub>6</sub> leakage and estimate the gas leakage rate (Optional for gases) <span style="float: right;">Yes/No</span>	Yes	
24.	SF <sub>6</sub> detection Accuracy(Optional for gases)	Please specify	





25.	Minimum detectable SF <sub>6</sub> leakage rate (Sensitivity) (Optional for gases)	Please specify	
26.	Detection Unit (Optional for gases) gram / year OR ppm		
27.	Whether a certified copy of ISO 9001:2008 or latest furnished with the offer?	As per clause 8.1	
28.	Whether information provided as per clause 9.0?	As per clause 9.0	

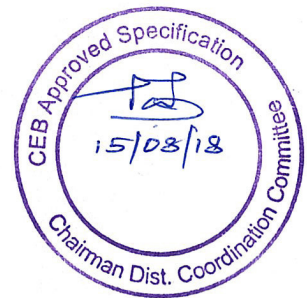
.....  
Signature of the Manufacturer and seal

.....  
Date

I/We certify that the above data are true and correct

.....  
Signature of the Bidder and seal

.....  
Date



**Annex – B****Non-Compliance Schedule**

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....  
**Signature of the Manufacturer and seal**

.....  
**Date**

**I/We certify that the above data are true and correct**

.....  
**Signature of the Bidder and seal**

.....  
**Date**

