



BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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Type of Document	Technical Specification		Sign	[Signature]		
Title	ELECTRICAL TEST LABORATORY EQUIPMENT - FULLY AUTOMATIC INFRARED THERMOVISION SCANNING SYSTEM		Date	16.09.19	16.9.19.	322011 16/9/19
			Group	TBEM		
			W.O. No	83011		
CUSTOMER	NTPC LTD.					
CONSULTANT	-					
PROJECT	North Karanpura Super TPP (3x660MW) 1. 400/220kV Switchyard at NKSTPP 2. 220kV Sub-station at Chatti Bariatu & Kerandari-A Mine					
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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS	
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SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This specification covers design, manufacture, testing, supply, delivery to site of Electrical Test Laboratory equipment.

1.1 The equipment are required for the following project:

Name of Owner : NTPC LTD.

Name of Project : 400/220kV Switchyard for North Karanpura Super Thermal Power Project (3x660MW)

Refer Section - 3 for Project Details and General Specifications.

1.2 TECHNICAL PARTICULARS

Refer Section-2 for specific technical requirement.

1.3 QUANTITIES

Sl.No.	DESCRIPTION	QUANTITY (Nos.)
1.	Fully automatic infrared thermovision scanning system suitable for thermal scanning of switchyard equipment, panels etc. and having facility of data storage on separate card with necessary software for analysis. MAKE: FLIR, FLUKE or equivalent.	1

Note:-

1. The Catalogue of the offered make/ Model shall be available on OEM website as on Technical Bid opening date. The catalogue submitted should match with the one available on website.
2. Make/Model offered is subject to NTPC approval. NTPC approval shall be considered as final.
3. Supplier shall provide valid calibration certificate, test certificate & warranty certificate for the quoted test equipment in the event of order.
4. Supplier is required to give an undertaking "to address issue of warranty / after sales services either itself or from the respective manufacturer/OEM of the equipment" along with technical offer on its/OEM letterhead.
5. Supplier is required to give undertaking (in the technical offer) from respective manufacturer/OEM of the equipment on OEM letterhead stating that the offered make/model is suitable for use in 765/400kV AC charged station & there will be no change in technical performance of the equipment during the equipment life in the site conditions.
6. The test and maintenance equipment shall be of top quality & NTPC may call for demonstration of the offered test equipment in 765/400 kV charged switchyard, to ensure satisfactory performance before accepting the equipment. The same shall be without any price implication.
7. Bidder should submit the performance certificate (in the technical offer) issued from customer (Power utilities, Powerplant, Govt approved Lab, etc) available with them for all the offered make/model. The performance certificate should be verifiable from the customer.

8. In case the performance certificate is not available, bidder should submit the Purchase order copy (unpriced) along with technical offer for all the offered make/model not more than 5 year old from Technical bid opening. Also the successful demonstration certificate shall be furnished for the offered make/model.
9. Bidder must comply at least any one of the above point 7/8 to check the proveness of the offered make/model, or the technical offer for the respective item will not be considered for technical evaluation.
10. The bidder may need to perform the demonstration (if required by NTPC/BHEL) of the offered make/model in the charged 765/400 kV AC conditions & only after successful demonstration, the make/model will be technically accepted. The same shall be without any price implication. Bidder need to furnish the compliance for this point.
11. The instrument is intended for use in high-voltage substation (up to 765kV) and industrial environment. The testing equipment are generally meant for carrying out testing at site and movement from one place to another is unavoidable. Therefore, equipment shall be robust in design so that it gives desired performance even in adverse site conditions. Necessary transport packing arrangement shall be provided along with the equipment.

1.4 BIDDER SHALL SUBMIT THE FOLLOWING DOCUMENTS ALONGWITH OFFER

- a) Leaflet/ catalogue of offered items.
- b) Technical Details/ Data sheet of the offered model
- c) Instruction Manual
- d) List of accessories offered
- e) Test Certificates/ reports
- f) Calibration certificate
- g) Clause Wise Compliance of Technical Specification

1.5 CERTIFICATES/ REPORTS

Bidder shall submit valid test reports/ certificates as per relevant standard for review and approval by NTPC/ BHEL.

PROJECT: 400/220kV Switchyard for North Karanpura Super TPP (3x660MW)	
CUSTOMER: NTPC LTD.	
Technical Specification of Thermovision Camera	TB-369-316-004B
Section-2: Equipment Specification	REV.00

SECTION-2

EQUIPMENT SPECIFICATION

Sr. No.	Specifications	Details
1)	Function & Scope	The infrared thermal imaging and temperature measurement camera should be fully automated and shall be useful for thermo-vision scanning, having capability to identify hot spots and loose connections in sub-stations and transmission lines up to 400/ 765 kV. Min. Distance of use is 15 mtr for standard and 60 mtr for Telephoto lens. The camera shall have the laser pointing facility and shall have built in high resolution colour touch screen (LCD min 3.5" size). The instrument shall be portable and battery operated. The infrared thermal Imaging and measurement system should be based on un-cooled focal plane array (UFPA) technology. It shall also have a built in digital colour visual camera of minimum 3 Mega pixels, thus creating a colour visual image of corresponding thermal image. It should be possible to store the thermal and visual image together (thermal fusion-merging visual & thermal images).
2)	Thermal imaging performance.	The thermal detector of the Thermo-vision camera should be based on the Focal Plane Array, un-cooled micro-bolometer technology with minimum 320 x 240 pixels (Infrared pixels to be captured by the camera and not enhance after image capturing). It should have Thermal sensitivity of the order of 0.05° at 30° Centigrade or better. Image frequency should be such that the buffering effect/ delay shall not come on display. The Spectral Range should be of the order of 8 to 13 μm or better. The Thermo-vision camera shall be supplied with the standard lens and an additional telephoto lens. The minimum focus distance of the camera for the standard lens & telephoto lens shall be such that it does not affect measurement in switchyard & transmission lines. The Thermo-vision camera shall have Automatic as well as manual focus. It should also have electronic/ digital zoom for IR function of 4x or better.
	a. Spatial resolution (IFOV)	Standard lens: 1.7 mrad or less. Tele-photo lens: 0.4 mrad or less
	b. Lens (Horizontal FOV)	Standard lens: 23° or more Tele-photo lens: 7° or less
3)	Temperature measurement range & accuracy	0° to 350°C (minimum), with accuracy of $\pm 2\%$ of reading or $\pm 2^\circ\text{C}$.
4)	Emissivity Correction	The camera shall have automatic temperature correction facility for emissivity (emissivity range 0.1 to 1)
5)	LCD and indicators	The system shall have a tilt-able (min.90°) LCD display or tiltable lens. Display shall be properly visible in sunlight. Camera shall also have status indications to view the status of battery/ power mode indication etc.30cm or better for standard lens

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6)	Physical characteristics	The system should be lightweight, hand-held with on-board rechargeable, field replaceable battery. The thermo vision camera shall also operate on 230 V AC supply $\pm 10\%$ and camera battery shall also get charged with this while the camera is in operation. Separate battery charger and spare battery shall also be provided. The equipment shall be well balanced for one hand operation. Hand/ Neck straps should be provided for safety of Camera while using in field. The total weight of the thermo vision camera including battery, memory card, LCD display, laser pointer, and Standard as well as Tele- lens shall not exceed 2.0 kg.
7)	Battery operation time.	Camera battery (preferably Li-Ion) shall have sufficient for minimum 3 hours of continuous operation with LCD display ON.
8)	Output	The camera shall have video output: CCIR/PAL composite video/ S-video/ USB.
9)	Voice Recording/ Text annotation	The system shall have the voice annotation (voice recording) facility for not less than 30 seconds per image and voice recording shall be tagged to particular image or the system shall have provision to attach pre-defined text on each image file during measurement. Infrared image along with corresponding visual image and voice recording or text annotation shall be linked together.
10)	Image storage capacity	System shall be supplied with minimum of 4GB flash memory (internal/ external)
11)	Image storage facility	The camera should store (in selectable built in flash memory or flash memory card in selectable directory) the image in full radiometric format as well as standard image format e.g. bmp, jpeg, tif, png, gif etc. readable without use of special software indicating marked temperature with date and time stampings along with all technical parameters corresponding to image, in addition to visual image, voice/ text annotation. If required, operator shall have the facility to recall, analyze, save, and delete the images in the field including the replay and edit of its voice/ text annotation. It shall be possible for operator to view the live images / recalled image details. Camera shall have the facility to freeze/ hold the image and store a single image or multiple of images either continuously or periodically. While saving the image, the camera shall automatically prompt for saving of voice or text annotation and visual image. It shall also be possible to store only IR images with or without voice/text annotation or IR image.
12)	Measurement function	The thermo vision camera shall measure absolute temperature of hotspots and have auto spot function (auto placement of cursor at min or max temperature). It shall be possible to create movable cross-hairs/ spots (with temperature) in the live/ freeze image. It shall be possible to create different areas with continuously adjustable dimensions and position in an image with their selectable max., min., and average temperature display. All the area shall be movable and shall give maximum and minimum temperature value and its position within the area. It shall be possible to manually adjust emissivity (preferably with an online help table), reflected temperature, distance for individual spot as well as for individual area.

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		The laser locator shall be active in IR mode with push button. The camera should have all the required standard palettes/ colour schemes (minimum 4 pallets).
13)	Software	The analysing software (to be provided alongwith the Camera) shall be windows based, simple to operate, compatible to IR and visual camera Images and capable of providing comprehensive report generation facility in addition to image analysis and post processing. It should also be possible to insert a visual image (photo) as well as text object in the report. The software should include tools for extensive image analysis & reporting.
14)	Accessories	All the required accessories like PC/ video interface cables, Power supply cables, Battery, Battery Charger (In addition to the AC adopter), Standby battery set, Operating manual, Original CD and software, Application CD, Hard carrying case etc. should be provided. In addition to internal memory card, additional SD card of min. 4GB.
15)	Operating conditions (with all accessories)	Shall operate at Temperature 0 to 50 deg. C, Relative Humidity: 10 to 90% not condensing.
16)	Safety Standards	Thermo vision camera shall have protection grade of IP-54. The unit shall meet all EMC emission, immunity standard as per IEC/ EN 61000-4-4, IEC/ EN 61000-4-8 respectively or equivalent latest standards, with CE marking to work in EHV areas without any interference. Copy of relevant certificates shall be furnished along with the bid.
17)	Guaranty	Camera shall be guaranteed for minimum 5 years from the date of successful & complete commissioning at Substation. All the materials including accessories, cables etc. are to be covered in guaranty period. If the kit needs to be shifted to supplier's works for repairs within guaranty period, suppliers will have to bear the cost of spares, software, transportation, transit insurance (To & Fro) etc. of kit for repair at test lab/ works. Kit after repair needs to be re turned within thirty (30) days from the date of despatch from customer/ end user site.
18)	Training	Supplier shall have to ensure the camera is made user friendly for the end user engineers in addition to the detailed demonstrations at site. Apart from this, the supplier shall also provide all the "technical know-how" to the end user engineers as and when required, during the tenure of guarantee as well as AMC period.
19)	Commissioning, Handing Over of the Instrument	Successful Bidder will have to commission the instrument to the satisfaction of end user/ customer. The instrument failed during the demo/commissioning shall be rejected and no repairs are allowed. .
20)	Services after Sale	Bidder will have to submit the documentary evidences of having established mechanism for prompt after sales services in India.

PROJECT: 400/220kV Switchyard for North Karanpura Super TPP (3x660MW)
CUSTOMER: NTPC LTD.

Technical Specification

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Section-3: Project Details and General Specification

SECTION- 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

3.0 GENERAL

This section stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.

The provisions under this section are intended to supplement general requirements for the materials, equipment and services covered under other sections of tender documents and are not exclusive. However in case of conflict between the requirements specified in this section and requirements specified under other sections, the requirements specified under respective sections shall prevail.

3.1 PROJECT DETAILS

	Particular	Details
a)	Customer	NTPC Ltd.
b)	Engineer/Consultant/ Inspector	NTPC Ltd.
c)	Project Title	North Karanpura Super Thermal Power Project (3x660 MW) : 400/220kV Switchyard at NKSTPP end & 220kV Sub-station at Mine end
d)	Project Location	Place: Near Tandwa town District: Hazaribagh & Chatra State: Jharkhand
e)	Latitude & Longitude	400/220kV S/s at NKSTPP: North: 23°50' to 23°52' and East: 84°59' to 85°2' 220kV S/s at Chatti Bariatu & Kerandari-A mine: North: 23°52'35" and East: 85°05'25"
f)	Nearest Railway Station	Khalari Railway Station Ranchi-Garhwa section of Eastern Railways
g)	Distance of project location from the Railway station	40 Km (approx.)
h)	Nearest Major Town	Hazaribagh city
i)	Distance of the town from the project site	50 Km.
j)	Nearest commercial airport	Ranchi
k)	Distance of airport from the project site	150 Km
<u>SITE CONDITIONS</u> (for design purposes)		
a)	Design ambient temperature	50°C
b)	Maximum Relative humidity	95 %
c)	Height above mean sea level	Less than 1000 meters
d)	Pollution Severity	Heavily polluted (With Coal dust & Fly ash) and Highly Corrosive environment.