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THERMOGRAPHY AUDIT

SCOPE OF WORKS

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1. INTRODUCTION

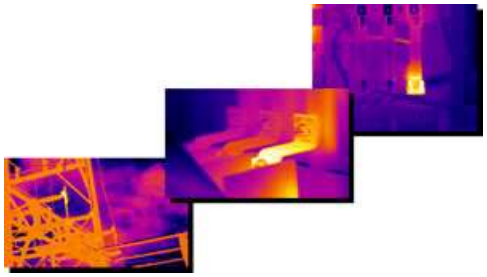
All objects emit thermal energy (heat) in the form of electromagnetic radiation in the IR spectrum. The hotter the object is, the more intense the infrared radiation emitted. This radiation is, however, outside of the human eye range. IR thermography is used to detect, image, and measure this radiation. By detecting areas of abnormal temperature, IR thermography can diagnose problem areas and their severity.

DIGITIAL IMAGE - LOOKS NORMAL

THERMAL IMAGE - HIGH TEMPERATURE FOUND IN RED PHASE

- It's a proactive trouble shooting and predictive maintenance tool
- It is the collection & analysis of radiated electromagnetic energy in the infrared portion of the electromagnetic spectrum (2 – 14 micron range) using a thermal imaging camera
- Infrared testing is essentially a non-invasive, non-destructive inspection process that uses thermography cameras
- Infrared thermography is the process of acquisition and analysis of thermal information from non-contact thermal imaging devices

2. WHY INFRARED THERMOGRAPHY AUDITS FOR ELECTRICAL INSTALLATIONS?



- Insurance industry loss statistics indicate that more than 30 percent of all fire losses are electrical in origin
- Electrical failures are the single most likely cause for industrial insurance claims
- NFPA says "Routine infrared inspections of electrical systems should be performed annually"

- This can find problems and allow plant management to schedule repairs when it is convenient, eliminating production upsets and unscheduled downtime, as well as extending equipment life and reducing energy consumption.
- In Electrical equipment and systems - to detect abnormal overheating due to loose connections, corrosion, load imbalances, and so forth, in high- and low-voltage equipment, thermography is inevitable

3. DATA REQUIREMENT FOR IR AUDITS

The following Electrical installation data of the premises required for the IR Audits:

- Total Load of the Installation (in KVA / KW)
- Details of Major Panels / DBs
- Details of Major Motors / Pumps
- Any specific concern / problem area description – helps in providing extra attention in the audit in problem areas

4. HOW THERMOGRAPHY IS PERFORMED?

- An Infra-Red survey is a non-destructive test that does not interrupt normal business operations.

  Measurements are made:

- While the plant is operating
- Without contacting the target object
- With the equipment under full load.
- From a safe distance from energized electrical equipment, rotating equipment, or equipment in hostile environments.
- Instruments used would be :

  Infrared Thermal Camera
  Infrared Thermometer
  Clamp meter (for Current measurements)

5. THERMOGRAPHY REPROT

A comprehensive Infra-Red thermography report would include the following:

2. Executive Summary

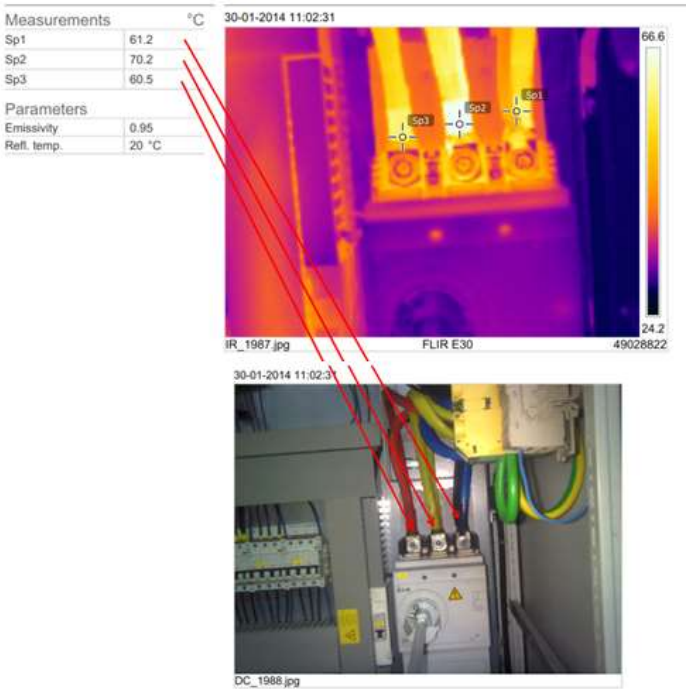
The below given table provides the snapshot of Infrared Thermography carried out in various Panel/DBs

Sr. No.	Location	Identification	Operating Condition	Remark
1	LDBs	Incoming & Outgoing feeders	Satisfactory	**Temperature indicator not seen in the Tech room, needs to be installed**
2	AC DB (PDB)	Incoming & Outgoing feeders	Satisfactory	
3	UPS DB	Incomer & Outgoing MCBs	Satisfactory	
4	Main LT Panel	Incoming & Outgoing Chambers	Satisfactory	
5	**AMF Panel**	**EB & DG side contactors and Bus bar chambers**	**Satisfactory**	**Needs Ventilation**
6	**Bescom Metering chamber**	**Bus bar chambers and End terminatons**	**Unsatisfactory**	**Needs refurbishment**
7	UPS Battery	Battery terminations	Satisfactory	

- Equipment identification and location
- Specific item or component that exhibits the thermal anomaly
- Temperature rise and severity of the problem
- Colour thermogram and a corresponding visible light photograph
- Probable cause and recommended action for each finding to assist in scheduling and implementing repairs

Note: Sample summary of the IR audit given below:

The below image is a Digital & IR image of a switch gear in Garment factory:



The below image is a Digital & IR image of a switch gear in aluminium extrusion plant:

Location	Washing machine panel
Identification	350Amps main switch incomer side
Comment	High temp observed on all 3 phase terminals, needs futher investigation and retermination to reduce temperature raise.

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6. BENEFITS OF IR AUDIT

- ✓ Helps to detect the hotspots or show any loose connections
- ✓ Helps diagnose potential breakdown
- ✓ Preventive service and maintenance
- ✓ A thermal imager makes anomalies visible
- ✓ Checks materials and components completely without any damage and exposes problems before malfunction can occur