

I. Thermography: Definitions and Applications

Infrared Thermography

Infrared thermography (IR) is a well established technique for remotely measuring the temperature of a surface where it is impractical or impossible to do so by a contact means. The term thermography denotes an imaging capability, but the concepts are the same for non-imaging sensors. IR thermography exploits the correlation between the temperature of a surface and the Infrared energy emitted by the surface.

Modern Thermographic scanner or infrared scanner is sophisticated electronic devices with detectors that are sensitive to invisible radiant heat energy given off by all surfaces. This radiation is a form of electromagnetic energy similar to light except we cannot see it with our eyes. The detector in the camera responds to the radiation with change of voltage and resistance; that response is processed electronically into a thermal image with a numerical value.

Applications of Thermography

Thermography is now a very important tool in an effective preventive maintenance program, as it shows the present thermal condition of the equipment or facility, so that repair and/or replacement can be made before breakdown can occur. It has long history, until its use has increased dramatically with the commercial and industrial applications for the past 50 years. Some applications are: Government and airport personnel used thermography to detect suspected swine flu case during the 2009. Fire fighters use thermography to see through smoke, to find persons, and to localize the base of fire. Maintenance technician use thermography to locate overheating joints and sections of the power lines, pinpoint overheating terminals, terminations and connections due to loose or damaged terminations and determine the overheating contacts of a circuit breaker or bus bars which are signs of impending failure. Building construction technician can see thermal signatures that Indicates heat leaks in faulty thermal insulation and can cause the results to improve the efficiency of heating and air-conditioning units. Many other applications such as: research, medical imaging, night vision, security surveillance, environment, volcanology, law enforcement, buried artefacts, etc.

II. Inspection Instruments Used:

1. Thermal Imaging Camera, IR Fusion Technology

Model: Ti400, Serial Number: Ti400-15100058, Brand: Fluke, Made in U.S.A.

Model: Ti401 PRO, Serial Number: Ti401P-20060583, Brand: Fluke, Made in U.S.A.

2. Digital Clamp multi-meters

3. Portable Thermometer

III. Category and Classifications of Anomalies

TEMPERATURE RISE CATERGORY
CLASSIFICATION/RECOMMENDED ACTION
(Temperature Difference
Between Equipment and
Ambient Temperature)

1°C - 10°C	1 st STAGE	ADVISORY -Possible deficiency or Overheating; Warrants an Investigation	ADVISORY
11°C -20°C	2 nd STAGE	INTERMEDIATE -Indicates probable Deficiency or Overheating; Repair as time permits	INTERMEDIATE
21°C -40°C	SERIOUS	SERIOUS -Developed Overheating; Monitor until corrective action is Accomplished as soon as possible	SERIOUS
41°C >	CRITICAL	IMMEDIATE -Major Discrepancy or Overheating; Repair Immediately	IMMEDIATE

IV. Tests Procedures:

1. All equipment and facility scheduled for infrared scanning shall be handled by a well trained certified IR thermographer Level 1.
2. SMART-TECH Personnel/thermographer shall be assisted by the owner/owner’s authorized representative throughout the inspections, specifically during switching of circuit breakers, opening and closing of panel boards and switchgears.
3. All anomalies detected and categorized as Level 3 and 4 (Critical and Serious respectively) shall be brought immediately to the attention of the owner/representative for corresponding actions.
4. Ammeter readings shall be taken for all feeders/circuits under probe as reference during interpretation of anomalies.
5. SMART-TECH shall submit complete infrared thermographic report 1 to 3 weeks after the inspections to include interpretation, observation and recommendations signed by a certified Infrared Thermographer Level 1 and a Professional Electrical Engineer.