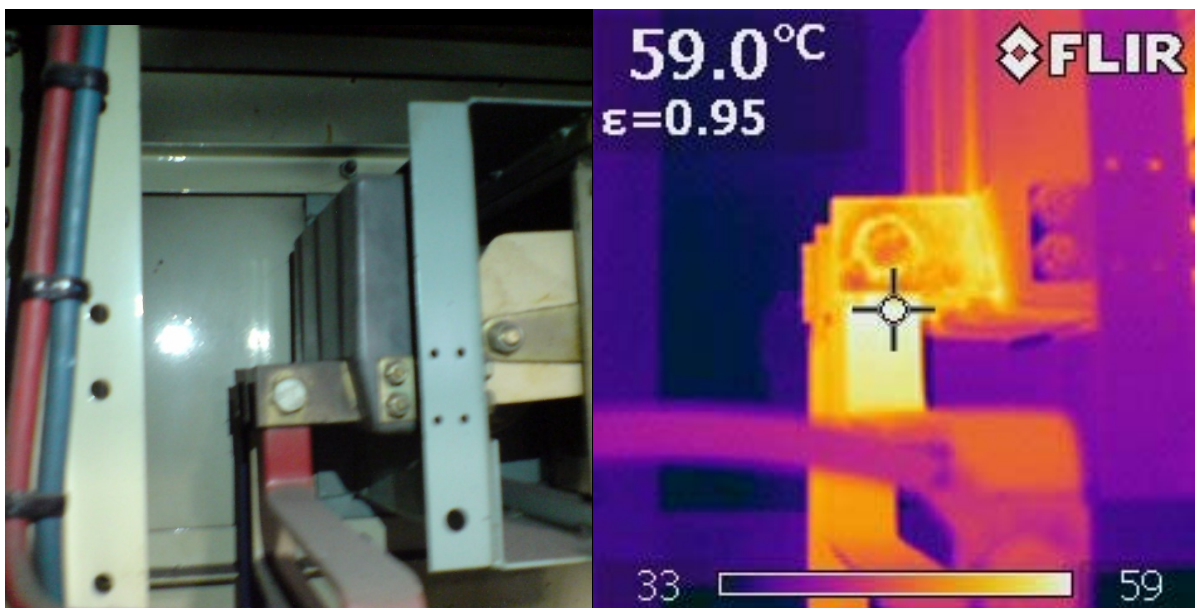


INFRA RED SCANNING (THERMOGRAPHY) &

ULTRA SOUND

Combining ultrasound and infrared testing methods is the safest and most un-intrusive way of testing that allows inspectors to easily see, hear and record areas of concern that have been difficult to detect before, extending the ability to accurately diagnose all areas of potential failure within a plant environment.

INFRA RED SCANNING (THERMOGRAPHY)



The Red phase supply of P36 MCC Isolator situated inside the Plant shows evidence of heat, the load is equal between phases. The Rph - 59°C, in relation to the other 2 phases. Need to be repaired as time permits, Class 2.

Method & Interpretation of results

What to check?

IR Scanning captures the heat radiated from an object. IR Scanning can not detect heat through objects like panels, Perspex, insulation tape and putty. From

a safety point of view only the LV panels and Transformer HT connections have been scanned.

It is required to check panels with the covers off and the load should ideally be at least at 40 % of the maximum load.

What to look for?

In general, you need to look for connections that are hotter than others. They signal high resistance possibly due to looseness, tightness or corrosion. Connection-related hot spots usually (but not always) appear warmest at the spot of high-resistance, cooling with distance from that spot.

As noted, overheating connections can, with additional loosening or corrosion, lead to a failure and should be corrected. The best solution is to create a regular inspection route that includes all key electrical panels and any other high-load connections, such as drives, isolators, controls etc. By saving thermal images, one could keep track annually of any changes that might occur. That way, you'll have baseline images to compare to, that will help you determine whether a hot spot is unusual or not, and to verify if repairs are successful.

Classification of faults

Temperature difference (Δt) based on comparison between similar components under similar loading are divided into 3 categories as described below.

Class	Temperature range (°C)	Action required
1	< 5°C	The start of a heat condition. This must be carefully monitored.
2	5 - 30°C	Developed overheating. It must be repaired as time permits.
3	>30°C	Acute overheating. Must be repaired immediately.

ULTRA SOUND

Ultrasound inspections can be performed at all voltage levels (low, medium and high) and is used to detect:

- Corona
- Partial discharge or tracking
- Arcing
- Mechanical vibrations (transformers)

When electrical systems such as switchgear, transformers, insulators or disconnects and splices fail, the results can be catastrophic. This is just as true in industrial plants as it is in the power transmission and distribution side. If left undetected, these conditions can become a source of an arc flash incident, which can result in a major safety hazard & production fall out.

Why ultra sound scanning

Arc flash can kill. Arc flash can be considered as a short circuit through the air. Arc flash incidents can happen from poor work habits, dropping of tools or accidental contact with energized equipment. However, there are conditions that produce the potential for arc flash within enclosed cabinets that can be detected before creating flashover or arc flash incidents. These conditions are arcing, tracking and corona. While infrared thermography will detect heat generated by arcing and in most instances tracking, it will not sense corona. If cabinets are enclosed, unless there is an IR test port, it is highly unlikely that infrared will detect the presence of these emissions.

How to scan?

Typically, an operator will scan around the door seams and air vents of enclosed electrical cabinets with the scanning module while listening through headphones and observing a display panel. Arcing, tracking and corona all have distinct sound qualities that can be heard. If there are no air paths, the inspector will use the wave-guide to probe around the cabinet wall. Due to a possible change in wave characteristics as the ultrasound moves from airborne to structure borne, the operator will change the frequency from 40 kHz (effective for airborne scans) to 25 kHz. Voltage will play a role in the diagnosis since corona will only occur at 1,000 volts and higher.

Definitions

Partial Discharges

Partial discharges are the defects found by ultrasound in medium and high voltage installations. They are unwanted electrical discharges that bypass isolation between a conductor and ground. The resulting current flow may cause breakdown and finally lead to the complete failure of the equipment.

Corona

Corona affects electrical conductors above 1kV. It produces ozone that deteriorates insulation, nitric acid that oxidizes metals in presence of humidity and electromagnetic interferences.

Tracking

Tracking is the formation of partially conductive paths across the surface of an electrical insulation. It is worsened by pollution and moisture.

Arcing

Arcing is a current flowing through air, producing a plasma discharge.