

Volume 11 Issue 1 - January 2022

Director's Message



In an effort to reduce the risk of injuries associated with arc flash, many facilities have installed IR transmissive windows or ports that permit infrared inspections without having to open panel covers. Although windows and ports can provide a measure of safety and help to reduce labor associated with infrared inspections, they pose unique challenges not associated with direct line-of-sight imaging.

Typically constructed of a metal frame with a fixed IR transparent material, switchgear windows allow a thermographer to perform thermal imaging into metal enclosures. Switchgear ports consist of a metal frame with small openings through which an imager may be sighted. Depending upon type, some ports have a single hole; others have metal screens containing multiple holes.

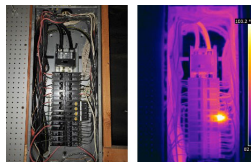
Windows and ports will always attenuate infrared energy received by the imager. This attenuation will affect both qualitative and quantitative data; however, the greatest challenge posed by windows and ports involves temperature measurement. Due to their small openings, it is not possible to accurately measure temperature through screened ports. Accurate temperature through windows and single opening ports is possible only if the following conditions are met:

- Window opening must be larger than IR lens objective
- Target must be at or beyond imager's minimum focus distance
- Both window transmittance and target emittance values must be known and properly entered into imager's computer
- Imager lens must be kept perpendicular to, and in contact with window

When it is not possible to meet all of the above conditions, imagery should be evaluated only for its qualitative value. As always, any inexplicable hot or cold exceptions should be investigated for cause and appropriate corrective action taken.

IR Inspections of AFCI Devices

An Arc Fault Circuit Interrupter (AFCI) is an advanced type of electrical circuit breaker that automatically opens the circuit it protects when it senses a dangerous electrical arc. Designed to help prevent electrical fires, an AFCI can distinguish the difference between electrical arcs caused by defective equipment and those associated with the normal operation of devices such as light switches.



In order to monitor for dangerous electrical arcing on a circuit, AFCI devices have electronic circuitry built into them. This circuitry can cause the body of the AFCI to run several degrees warmer than ambient temperature. Depending upon the settings of your thermal imager, these devices may show a marked contrast to their surroundings.

This thermogram shows three of four AFCI devices operating at ambient temperature. These devices had failed and were no longer

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protecting against arc faults. (Images courtesy Houston Thermal Inspections and Infrared Imaging)

When thermographically inspecting AFCI devices, be sure to inspect the line and load side connections at the AFCI device as well as the neutral bus bar connection for the subject breaker. Should you find an AFCI device that is operating close to ambient temperature, it is likely that the internal circuitry has failed making the device incapable of protecting against arc faults. Such devices should be further tested and replaced should they be found defective.

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Written by practicing thermographers, TI Reporter™ contains preformatted templates for a wide variety of infrared inspection applications including, but not limited to: electrical systems, mechanical systems, building envelopes, flat roofs, underground piping, and steam systems. TI Reporter™ automatically calculates temperature limits for electrical and mechanical equipment and can provide cost savings reports. The software is designed for in-house thermographers as well as thermographic consultants.

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