Infrared Thermography & Acoustical Inspection Report

Mobile: 613-223-2172
INFO@THERMO-VIEW.CA
WWW.THERMO-VIEW.CA

Infrared Thermography Services

Thermo-view is a service and consulting firm specializing in infrared thermography services and acoustical imaging. With certified Level II and level III thermographers from a recognized training provider, ITC FLIR Canada,as well as Level I Ultrasound certified, you can be assured of the highest quality in service.

Thermo-view's thermographers are also licensed commercial / industrial electricians with over 40 years of combined experience in the trade. Having worked in all type of environments you can be certain that you will be provided with sound advice to any anomalies and detailed recommendations would be part of your report.

We can assist in the inspections of your electrical, mechanical, or building systems.

OUR MISSION

1) Never compromise the safety of our employees, our customers, or their facilities,

2) Be proactive in our thinking philosophy, be professional in all services provided,

3) Help our customers in reducing costly energy losses in identifying systems or structure anomalies.

IR and Acoustical imaging inspections as part of your preventive maintenance program, provides a fast, accurate and cost-effective means of verifying the condition of your equipment or building. Our services has saved our clients time and money. With the ability to "see" what the naked eye cannot, thermal imaging can help identify potential risks of failure or malfunction before they become critical and in some cases life threatening. Infrared scanning / thermal imaging is recommended by the insurance industry as a valuable tool in your maintenance program.

Think Thermally! It will save you time and money!

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The following is a guideline issued by the International Testing Association
Maintenance Testing Specifications, 1997 (NETA MTS-1997)
Temperature Difference (Delta T)
Based on comparison between
Similar components under similar load

Temperature Difference	Priority	Recommended Action
>16 Celsius	A	Major discrepancy, repair immediately
4 - 15 Celsius	B	Indicates probable deficiency, repair ASAP
1 - 3 Celsius	C	Possible deficiency, warrants investigation
0 Celsius	D	For information only

Report Review and Summary

This section provides information for the client which summarizes the work completed, the way the inspection was conducted and the anomalies found referring the client to the report page to view further analysis.

We conduct infrared inspections for:

- all types of electrical equipment inspections as per CSA Z463 standard
- generators as inspections apply to CSA 282 standard
- building inspections,
- roof inspections
- computer room HVAC as it applies to air movement within equipment racking

Thermo-View has acquired a FLIR Si124 Acoustical Imager. This instrument permits us to detect:

- air leaks within a pressurized, or vacuum closed system
- detect leaks in dry type sprinkler systems
- detect Partial Discharge in electrical system that may consist in corona, tracking or arcing.

View pages 13, 14 and 15 provide a sample of an Acoustic Imaging report

The following pages reflect the type of report you can expect to receive after we have conducted an IR or Acoustical inspection at your facilities.

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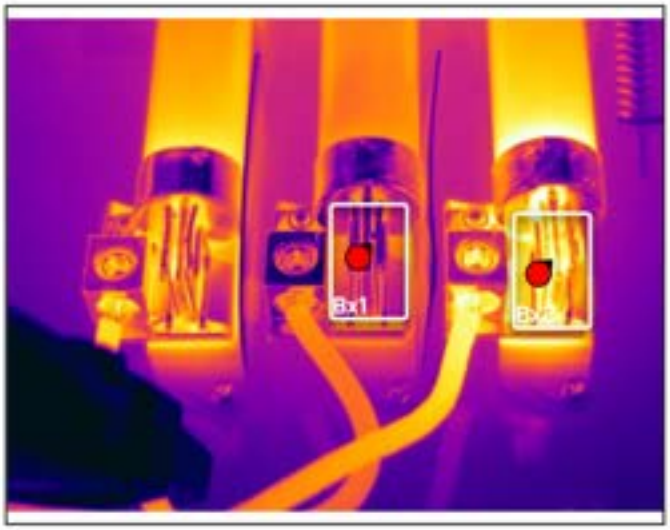
File Name: FLIR2183.jpg

Created:



Measurements

Bx1	
Max	61.4 °C
Avg	44.1 °C
Bx2	
Max	93.2 °C
Avg	64.5 °C
Dt1	
Bx2.Max-Bx1.Max	31.7 °C

Image Parameters

Emissivity	0.92
Reflected temp.	19.0 °C
Distance	1.00 m
Atmospheric temp.	21.0 °C
Relative humidity	66.0%

Sensor readings

AC 1	77.8300 A
AC 2	80.2500 A
AC 3	78.7700 A

Temp. Difference(Dt1): 32 **A - Major discrepancy, repair immediately**

NOTE:	Load side of 200A switch. Investigate, repair and re-scan.

Text annotations

Location	Mech mezzanine
Floor / level	Second floor
Equipment	Switch fusible
Equipment ID	Compressor no.2
Circuit #	200amp sw
Ampacity	View recorded value noted as AC
Fault	Overheating at fuse clips
Recommendation	Clean, check and re-tighten.

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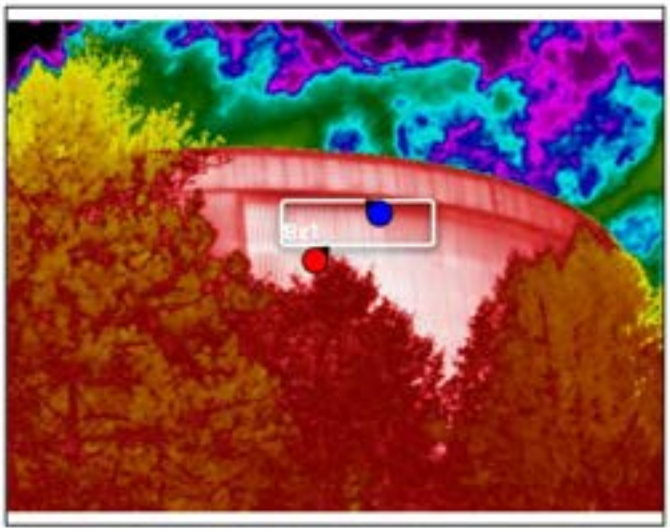
File Name: FLIR0692.jpg

Created:



Measurements	
Bx1	
Max	28.5 °C
Avg	25.7 °C
Min	21.8 °C

Image Parameters	
Emissivity	0.92
Reflected temp.	17.0 °C
Distance	20.00 m
Atmospheric temp.	19.0 °C
Relative humidity	71.0%

NOTE:	Water tower structure. Client requested to see if thermal imaging could pick up water exfiltatring from the structural walls.

Text annotations

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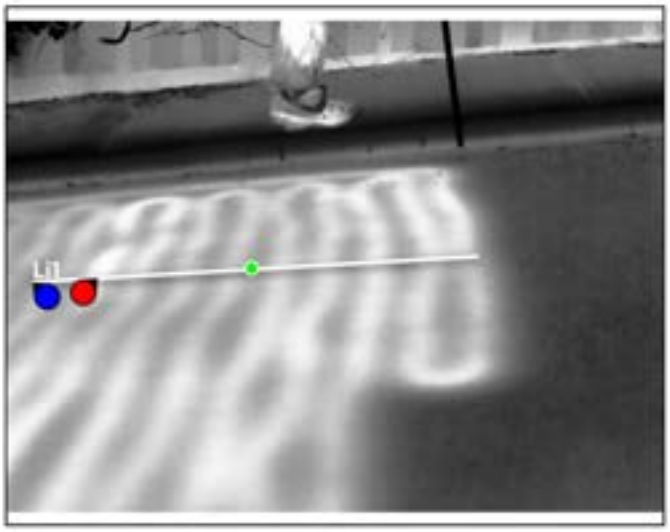
ABC manufacturing
123 Johnson Street Canada.
Multipurpose infrared scan. 01/01/2024

File Name: FLIR3079.jpg

Created:

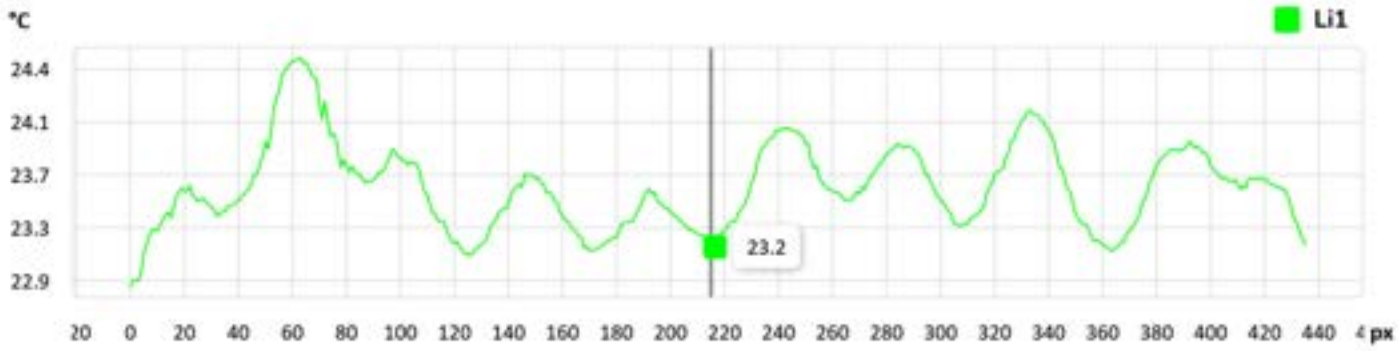


Measurements

Li1	
Max	24.5 °C
Avg	23.6 °C
Min	22.8 °C

Image Parameters

Emissivity	0.92
Reflected temp.	21.0 °C
Distance	4.00 m
Atmospheric temp.	20.5 °C
Relative humidity	81.0%



NOTE: Radiant ramp heating for an underground parking garage. Local university, client needed to confirm location of cables that were and are not functioning for repairs. Plot is the measurement line Li1 profile.

Text annotations

Note	End at 83ft from garage door frame. Down ramp

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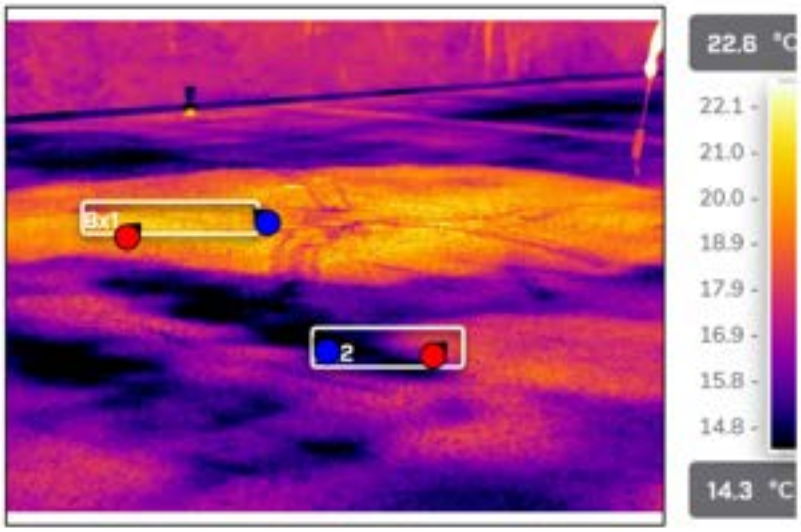
File Name: FLIR1527.jpg

Created:



Measurements

Bx1	
Max	22.2 °C
Avg	20.0 °C
Min	17.3 °C
Bx2	
Max	18.8 °C
Avg	15.8 °C
Min	13.1 °C

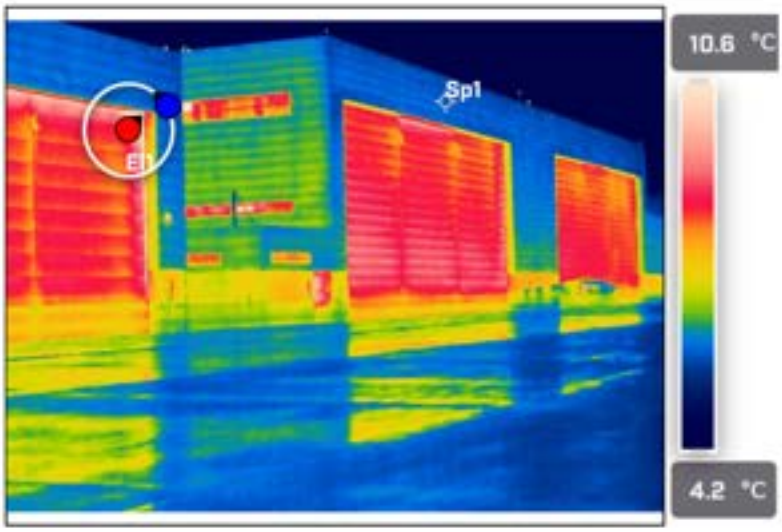
Image Parameters

Emissivity	0.92
Reflected temp.	23.0 °C
Distance	3.00 m
Atmospheric temp.	21.0 °C
Relative humidity	70.0%

NOTE:	Area between quadrant A & B . Again mix of dry and humid area. Humid area is around roof drain

Text annotations

File Name: FLIR0771.jpg



Created:

Measurements

El1	
Max	12.9 °C
Avg	7.9 °C
Min	5.8 °C
Sp1	6.0 °C

Image Parameters

Emissivity	0.92
Reflected temp.	10.0 °C
Distance	37.00 m
Atmospheric temp.	9.0 °C
Relative humidity	77.0%

NOTE:	Building no. 1, airport aircraft hanger for Global Master aircrafts. Building inspection conducted for air tightness

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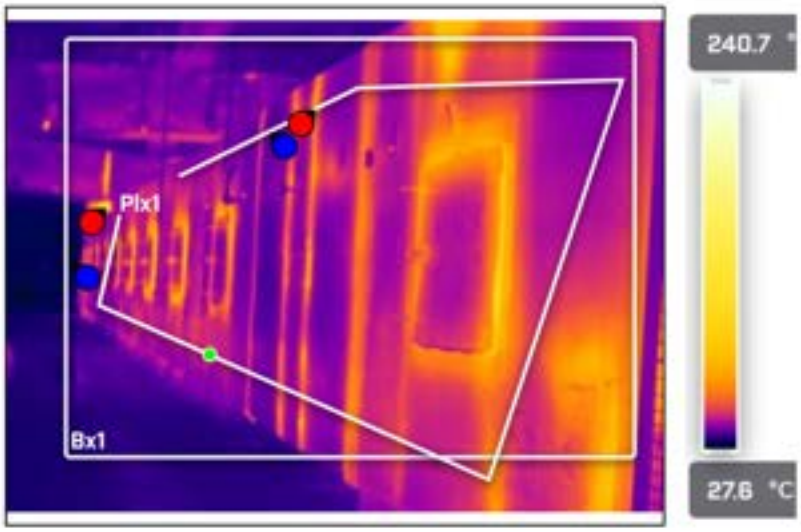
File Name: IR_0254.jpg



Created:

Measurements

Bx1	
Max	170.5 °C
Avg	58.9 °C
Min	27.5 °C
Plx1	
Max	96.1 °C
Avg	58.4 °C
Min	44.8 °C

Image Parameters

Emissivity	0.94
Reflected temp.	35.6 °C
Distance	1.50 m
Atmospheric temp.	32.2 °C
Relative humidity	50.0%

NOTE:	Line furnace ovens for paint drying of rolling sheet metal. IR enables to view efficiency of furnace walls.

Text annotations

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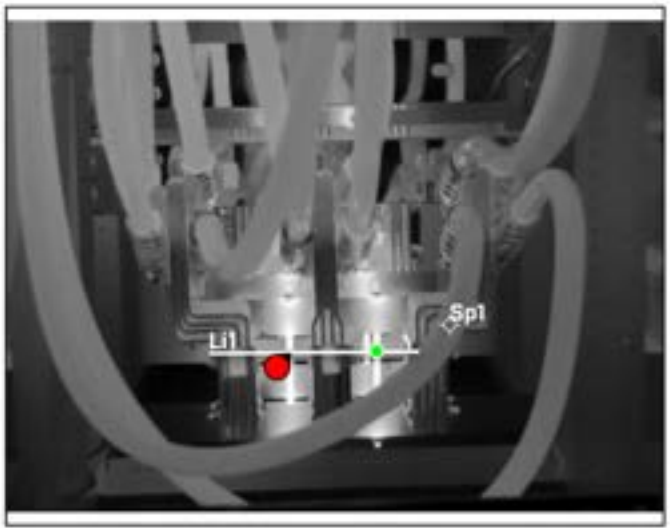
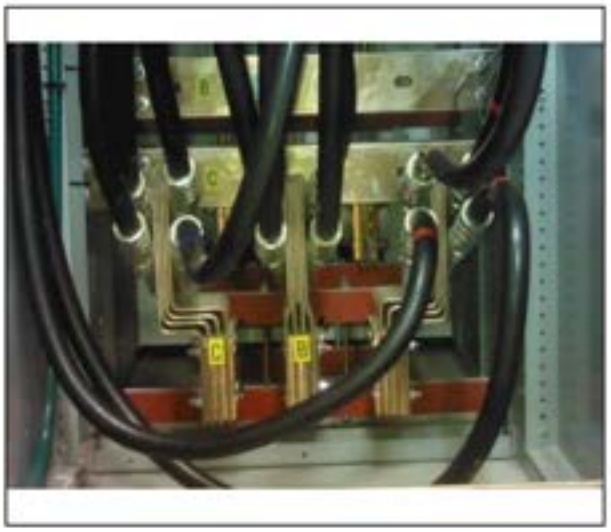
Multipurpose infrared scan. 01/01/2024

File Name: FLIR1459.jpg

Created:





Measurements

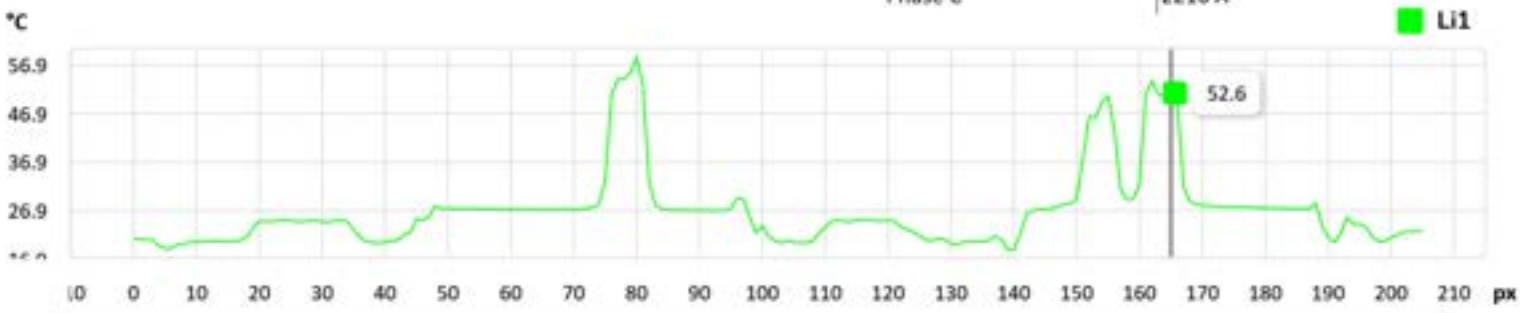
Li1		
Max	58.5 °C	Line measurement plot shown.
Avg	26.8 °C	
Sp1	22.1 °C	

Image Parameters

Emissivity	0.92
Reflected temp.	18.0 °C
Distance	1.00 m
Atmospheric temp.	16.0 °C
Relative humidity	32.0%

Meter Readings

Phase A	2150 A
Phase B	2219 A
Phase C	2216 A



Text annotations

Location	Main elect rm
Generator component	Cell 2 gen 2 breaker
CMMS	10-125-0006
Generator's electrical distribution	Feed to Emerg. panel. 3200 Amp breaker
Information	1hr into load bank test
Fault	no fault
Recommendation	for trending purposes

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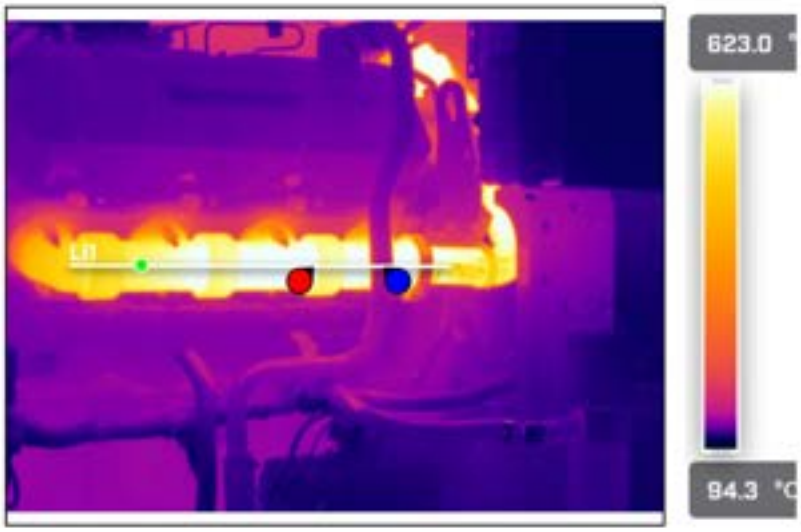
File Name: FLIR1472.jpg

Created:



Measurements	
Li1	
Max	644.8 °C
Avg	*561.4 °C
Min	*164.9 °C

Image Parameters	
Emissivity	0.92
Reflected temp.	35.0 °C
Distance	1.00 m
Atmospheric temp.	34.0 °C
Relative humidity	16.0%

Meter Readings	
Phase A	370.4A
Phase B	365.4A
Phase C	352.8A

NOTE: Generator load testing per CSA 282. Images are collected and compared from other yearly inspections for changes in equipment condition.

Text annotations	
Location	Generator room
Generator component	engine exhaust
CMMS	n/a
Generator control panel	n/a
Information	90 minutes into generator load test
Fault	no fault
Recommendation	for trending purposes

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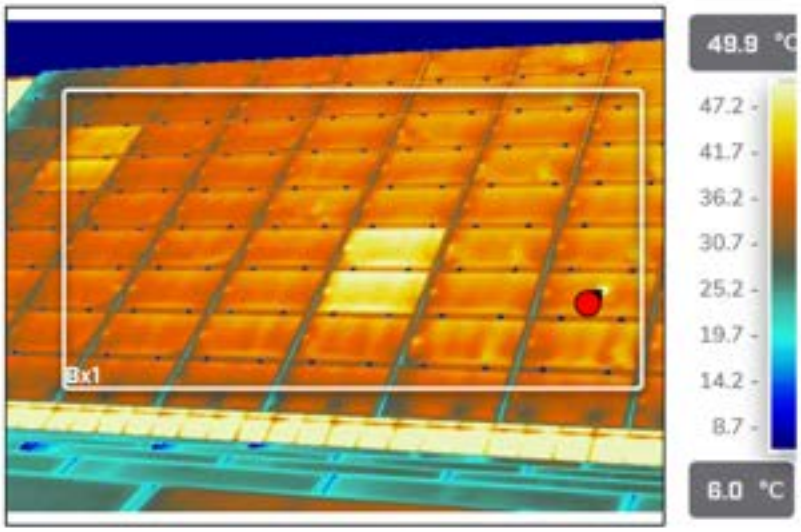
File Name: FLIR0414 - Copy.jpg



Created:

Measurements

Bx1	
Max	59.8 °C
Avg	39.4 °C

Image Parameters

Emissivity	0.63
Reflected temp.	9.0 °C
Distance	18.00 m
Atmospheric temp.	13.0 °C
Relative humidity	47.0%

NOTE:	Local High School, large array

Text annotations

IR cameras can easily detect hot spots, defective or off line solar panels in an installed array.
Large sections of photo-voltaic cells can be scanned in a single sweep.

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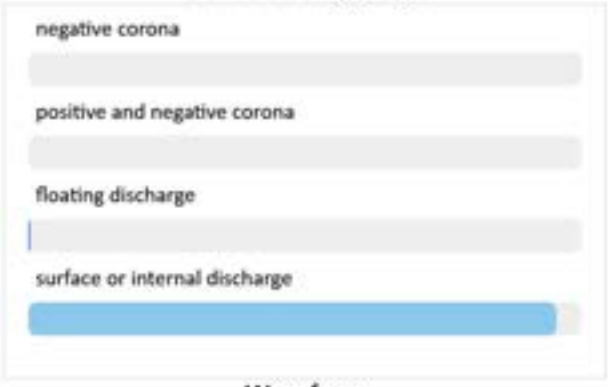
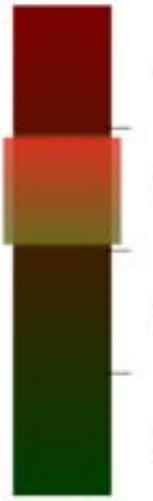
Properties	
File name	AC13T810_00018_240302_1157_0018
Created	2024-03-02 11:58:07 AM
Camera serial	AC13T810
Measured dB	22.5 dB
Voltage	0.6 kV
Distance	2.00 m
Location	switchgear

Partial Discharge Type



Severity



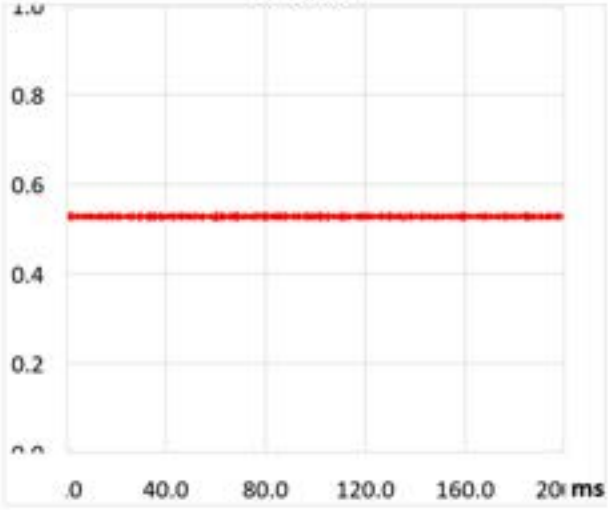
Description

This is classified as a surface or internal discharge. The discharge appears to be strong and might rapidly escalate to complete insulation breakdown.

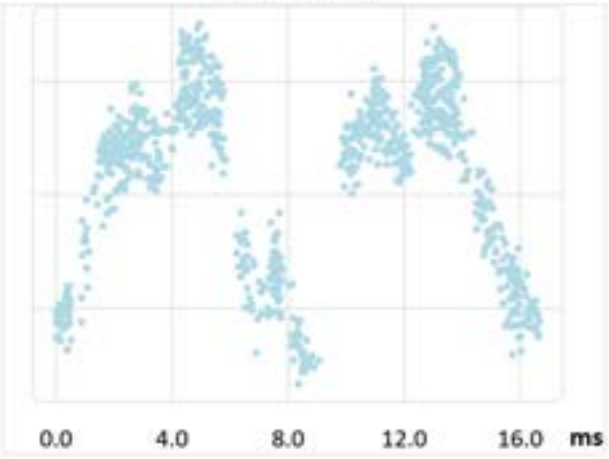
Recommendation

Immediate action. Visual inspection. Cleaning of polluted surfaces. Repair or replacement of the components.

Waveform



PRPD Pattern



Electrical room main switchgear. Acoustic imager used to locate possible arcing within cabinet without opening covers and doors.

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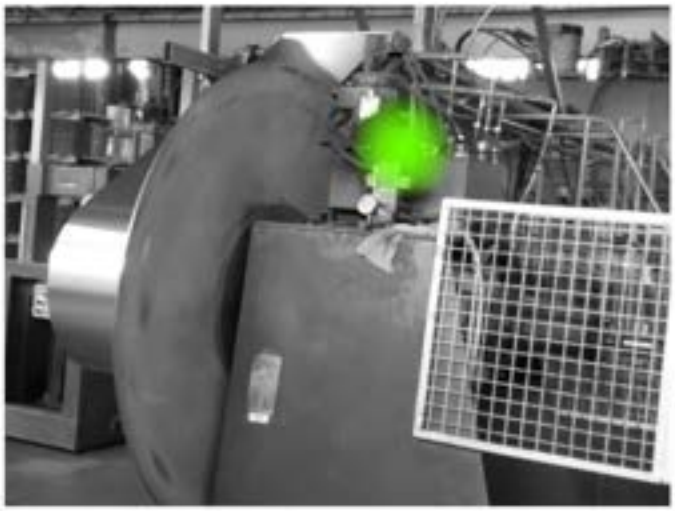
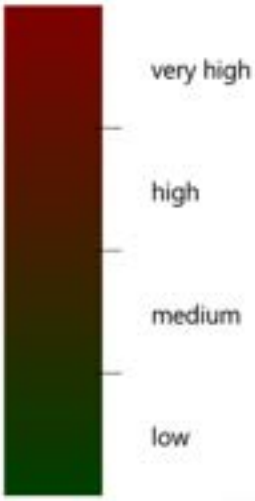


6

Properties	
File name	AC13T810_00005_231102_1520_0005
Created	2023-11-02 3:20:53 PM
Camera serial	AC13T810
Measured dB	30.6 dB
Voltage	
Distance	10.00 m
Location	Roller run off, start of line.

Severity



Description

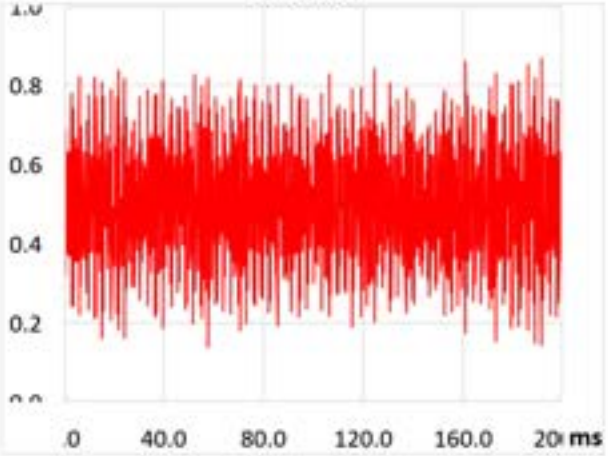
Air solenoid valve purging. No issues here.

Recommendation

Partial Discharge Type

No partial discharge type detected.

Waveform



6

56.89 $ based on energy cost
13.47 L/min 30.6 dB

Based on
50 weeks per year
6 days per week
12hrs per day

PRPD Pattern

No plot to display

12

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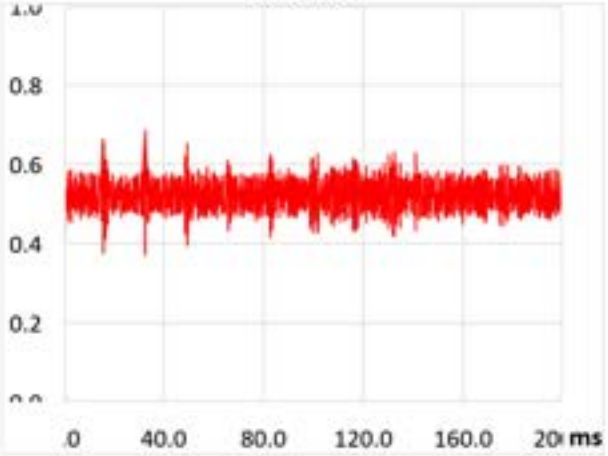
Properties	
File name	AC13T810_00004_231102_1519_0004
Created	2023-11-02 3:19:22 PM
Camera serial	AC13T810
Measured dB	-3.3 dB
Voltage	13.5 kV
Distance	50.00 m
Location	support insulator

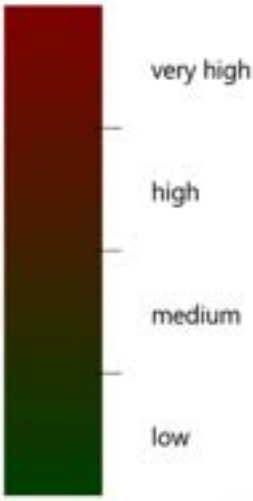
Partial Discharge Type

- negative corona
- positive and negative corona
- floating discharge
- surface or internal discharge

Waveform



Severity



Description

The detected sound source does not resemble a partial discharge. It might be another type of sound source or a reflection from another type of sound source. If you are unsure, take more snapshots of the location from different angles and at different times. Also ensure that the AC frequency is correct. The partial discharge analysis will fail if the AC frequency is incorrect.

Recommendation

Typically no action required.

PRPD Pattern

No plot to display

Our IR inspections are compliment to visual inspections which allows us to view anomalies that would have gone undetected if electrical equipment would not be opened for proper viewing. Here, a slit was noticed in many of the feeder cables. The slit went all to way to the aluminum conductor. This was brought up to the client which was able to remedy the issues.

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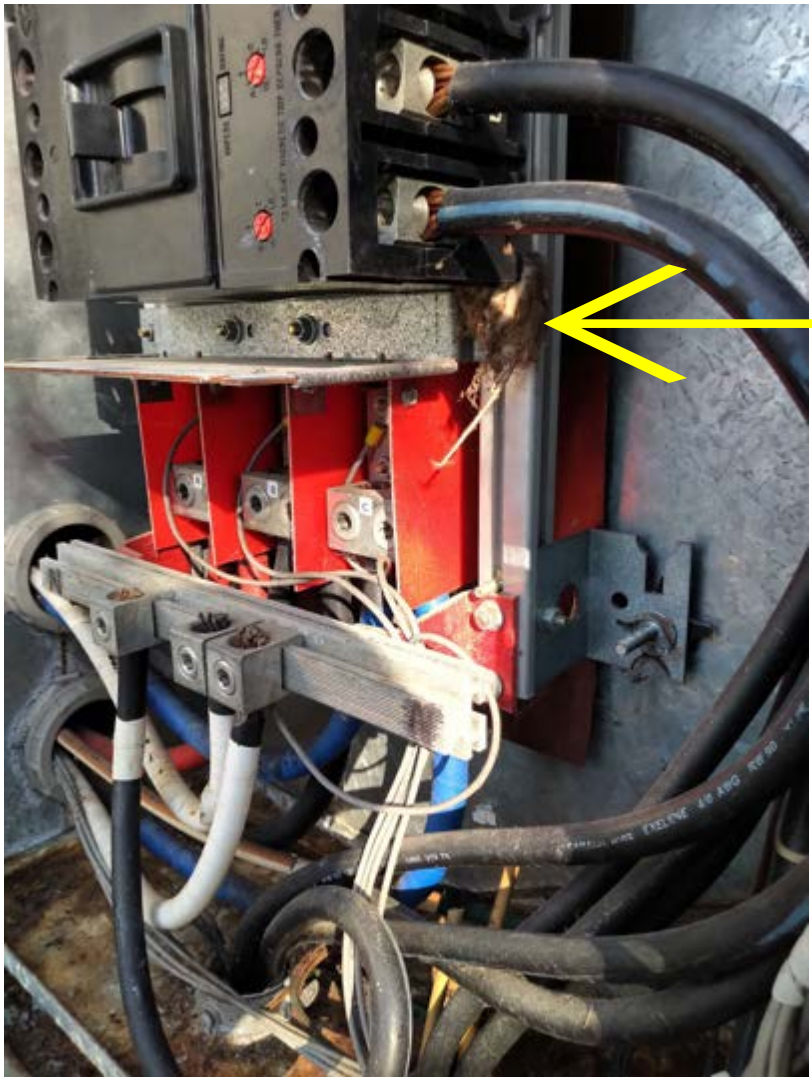

Small rodents are also found inside cabinets that have open holes which have not been sealed.

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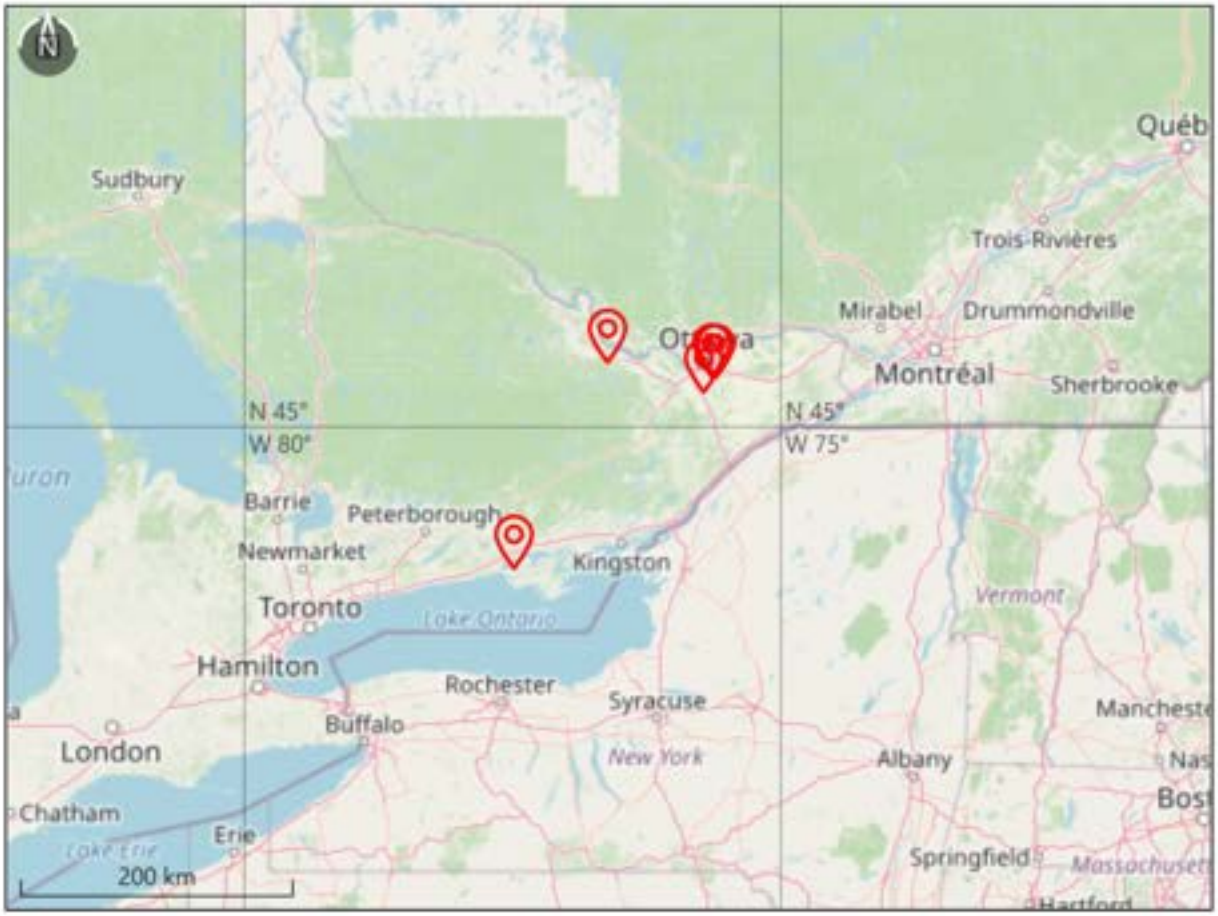

Our infrared cameras provide GPS positioning when images are recorded. This feature confirms inspection locations.

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