

This is a SAMPLE REPORT. As such, many sections have been omitted. The purpose of this document is to illustrate the primary components of a typical project's PredictiveIR report.

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Infrared Inspection of Electrical / Mechanical Equipment

3/7/2010

**ACME
COMPANY**

Purpose of Infrared (IR) Thermography

Infrared thermography is an integral part of any predictive maintenance and cost control program. Utilizing Commercial Infrared, LLC on a regularly scheduled basis for electrical and mechanical systems will improve the reliability and profitability of these systems for your operation.

Background and Explanation of the IR Process

What is infrared radiation? IR radiation differs from visible radiation (light) only in its wavelength. Red light has a longer wavelength than blue light and infrared (IR) radiation has a longer wavelength than red light. Since red light has the longest wavelength of all visible light, radiation with a longer wavelength than red light is referred to as infrared, which is not visible to the human eye. In all other aspects, visible and infrared waves are similar. Infrared radiation lies between visible light on its short wavelength end and microwave selection on its longer wavelength end.

All objects emit electromagnetic radiation of a wavelength dependent of the object's temperature. As an object becomes hotter, the amount of energy emitted by that object increases. In infrared thermography, this radiation is detected and measured by a sophisticated lens and detector. The camera containing the detector converts the radiation into electrical signals that can be displayed on a monitor, and stored electronically for inspection and analysis. Accurate temperature readings can be displayed on the thermographs (Infrared images) with temperature differences and graphing tools that are useful in determining the repair priorities of any potential problems found during the infrared survey.

Infrared scanning is now a valuable part of your cost control and predictive maintenance program. The advantages of infrared scanning include:

- Measurements do not require contact with the object and can be made with the object under full load.
- Discrete temperature measurements are available to aid in determining the severity of problems.
- Infrared scanning is fast. Large areas can be scanned quickly because of the microsecond response of the equipment.
- Modern infrared scanners are very accurate
- Safety, use of infrared scanners means measurements are made from a safe distance from objects such as high voltage equipment, equipment at high temperatures, or equipment in a corrosive environment.

The following report lists the objects scanned during this survey and provides a summary of finding including the recommended corrective action for all objects with abnormal temperatures. It provides you with a photograph of the object in question, an infrared thermograph of the object, analysis data, and conclusions.

Definitions and General Notes

Problem Temperature Rise:

The problem temperature rise shown for each finding is the temperature difference in Fahrenheit, between the object and a reference temperature. When available, a similar piece of equipment (to that being scanned) is used as the reference. This could be one phase of a three-phase system. If a comparison like this cannot be made, the reference temperature is the ambient air temperature. This could be done for a motor, gear set, etc. In those cases when no comparison is needed, the actual temperature is shown (such as a kiln, boiler, etc.). The higher the temperature is above ambient, the more serious the problem. Temperature differences, even though small, can be serious depending upon the equipment, the load or voltage it is carrying, and the need for continuity of operation. The significance of unusual heat is not limited to the apparent results of bad connections, overloaded circuits or phases, and insulation breakdown, to name a few. The heat itself, if it is allowed to continue, may lead to other problems not immediately present at this time, for example, premature tripping of circuit breakers or fatigue of materials such as metals or insulators.

Remedial Action:

The following criteria should be used for prescribing remedial action to problem areas by your maintenance staff or a qualified electrical contractor:

Temp. Above Reference

1 – 15 degrees (F)

16 – 30 degrees (F)

31 – 60 degrees (F)

Over 60 degrees (F)

Time Frame for Corrective Action

6 months

3 months

As soon as possible

Immediately

Thermograph:

A thermograph is a photograph displaying the thermal image appearing on the infrared detector.

Busway:

When using infrared scanning to check busways, and bus plugs, it should be noted that the temperature rise given is the surface temperature on the outside of the busway. *The temperature inside is approximately four times greater.*

List of Equipment Surveyed during this inspection

**SAMPLE REPORT – SECTIONS MAY BE OMITTED*

RED TEXT = Items with indications of maintenance attention

All reports feature a detailed list of equipment scanned, sorted by location within your facility. Items requiring maintenance are highlighted.

Mezzanine Switch Gear Area

MCC-B Section -1

- | | |
|-------------------------|-----------------|
| 1. Main Lug Compartment | 4. AU-13 1/3 HP |
| 2. AU-14 Back Dock | 5. AU-7 1/3 HP |
| 3. AU-12 1/3 HP | |

MCC-B Section – 4

- | | |
|--------------------------|---------------|
| 1. Main Lugs Compartment | 4. AU-3 10 HP |
| 2. AU-1 10 HP | 5. AU-4 10 HP |
| 3. AU-2 10 HP | 6. AU-5 10 HP |

MCC- B Section 6

- | | |
|----------------------------------|---------------------------------|
| 1. Main Lugs Compartment | 4. #3 Evaporator Blow Mold Room |
| 2. # 1 Evaporator Blow Mold Room | 5. #4 Evaporator Blow Mold Room |
| 3. #2 Evaporator Blow Mold Room | 6. #5 Evaporator Blow Mold Room |

Switch Gear – B on Mezzanine

Section – 1

1. Main 3000 Amp Breaker

Section – 2

1. Heat and Air Transformer AC
2. RC-2 Main Breaker
3. RC-3 Main Breaker

Section – 3

1. Panel HA Main Breaker
2. RC-1 Main Breaker
3. RC – 5 Main Breaker

4. Service To DP-4 Breaker Main

5. MEC – A

Section – 4

1. Transformer to DP – 3
2. RP-4 Main Breaker
3. RP-7 Main Breaker
4. Re grind Service Main Breaker
5. RC – 4 Main Breaker

6. MCC – B Main Breaker
7. 225 Amp Roof Top Condenser
8. 70 Amp Roof Top Condenser #1
9. 70 Amp Roof Top Condenser #2

Blow Mold Room

1. Panel DP-4
- 2. Blow Mold #5**
3. Blow Mold # 4

4. Blow Mold # 3
5. Blow Mold # 2

Roof Top and Air Compressor Room

1. AC Unit #7 Disconnect
2. AC Unit #8 Disconnect
3. AC Unit #9 Disconnect
4. AC Unit #6 Disconnect
5. Ventrol Disconnect For Buttermilk Room
6. Ventrol Disconnect For Water Filler Room

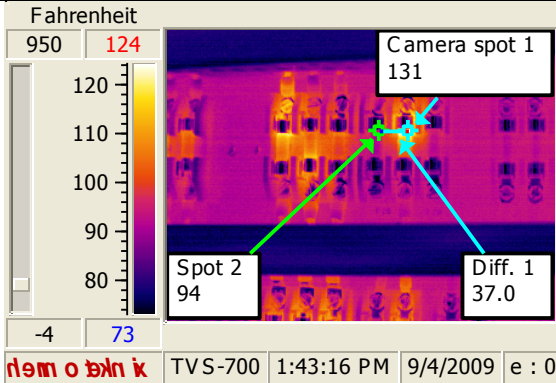

7. Spare Panel
8. Disconnect For AC #1
9. Disconnect For AC #2
10. Disconnect For AC#3
11. Disconnect For AC #4
12. Disconnect For AC#5
13. Ventrol Disconnect For Filler Room

A typical report page includes details of the equipment scanned, including reference images, where potential problems were found as well as the recommended action.

IR Image Information

Equipment

Inspection Date	9/4/2009	Image Information	9
Inspection Time	01:43 PM	Section	B
Background Temperature	80.6°F	Equipment	Bl
		Thermographer	Ray Burleson Level I&II Certified

	
Thermograph	Reference

Measurements

Item	Value	Measurement
Camera spot 1	Value	131.2°F
Spot 2	Value	94.2°F
Diff. 1	Difference	37.0°F

Recommendations

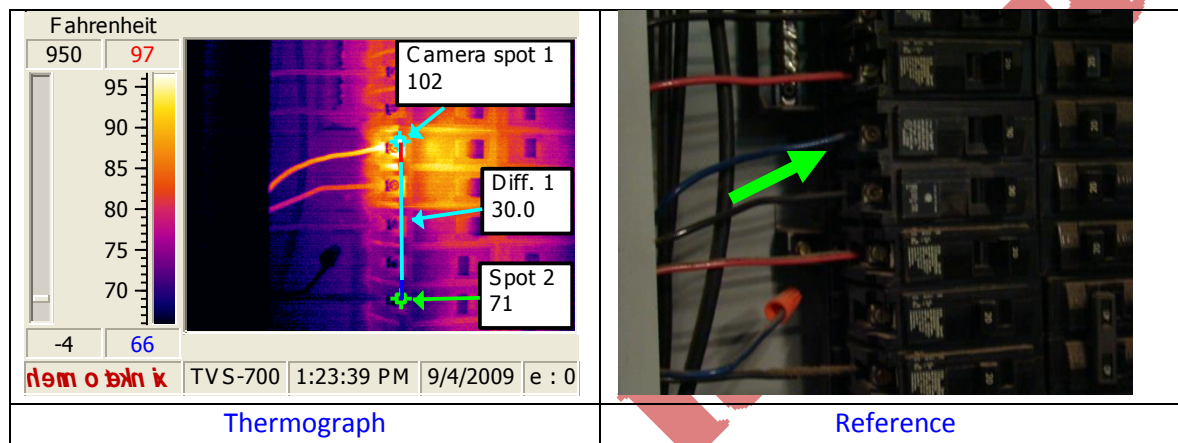
The IR Thermograph indicates damaged fuse holders on Fuse 215 line side, fuse 275 load side, and fuse 214 line side.

Shut off power, inspect, and replace fuse holders.

IR Image Information

Equipment Information

Inspection Date	9/4/2009	Image Information	99040006
Inspection Time	01:23 PM	Section	Switch Board SWD Section 3
Background Temperature	82.4°F	Equipment	Panel A-1
		Thermographer	Ray Burleson Level I&II Certified



Measurements

Item	Value	Measurement
Camera spot 1	Value	101.5°F
Spot 2	Value	71.5°F
Diff. 1	Difference	30.0°F

Recommendations

The IR Thermograph indicates a connection problem on breaker #17. Shut off power, inspect, clean, strip, and redo connection.

At the end of the report, a summary of **all** equipment scanned is provided, color-coded to help you prioritize any required maintenance.

Summary of Inspection at ACME COM

Reference Image	Section	ΔT	Recommendation
99040012	Blow Mold Area	25.6°F	The IR Thermograph indicates a damaged fuse holder on C phase line side of main disconnect. Shut off power, inspect, clean, strip, and redo connection.
99040013	Blow Mold Area	35.8°F	The IR Thermograph indicates a damaged fuse holder on fuse below wire #409. Shut off power and replace fuse holder.
99080001	Ammonia Compressor Room	33.2°F	The IR Thermograph indicates a connection problem on C phase line side of main breaker. Shut off power, inspect, clean, strip, and redo connection. Also check contacts in breaker.
99080002	MCC in Compressor Room	99.3°F	The IR Thermograph indicates a knife blade going bad on C phase line side of main disconnect. Shut off power and replace disconnect.
99080003	MCC in Compressor Room	80.8°F	The IR Thermograph indicates a bad fuse clip on C phase line side of fuse block. Shut off power and replace fuse clip.
99080004	Box Maker Area	9.8°C	The IR Thermograph indicates a connection problem on breaker #12. Shut off power, inspect, clean, strip, and redo connection.

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