

# INFRARED RESEARCH INC.

100 Park City Road  
Rossville, GA

Telephone: 800-866-7480  
Fax: 706-866-7038



Infrared Thermographic Surveys  
jim@infraredresearch.com  
www.infraredresearch.com

## Report of Infrared Electrical Survey



**FOR:** Your Company  
Any Town, USA

**JOB:** 0609  
**CAMERA:** Inframetrics 395

**SURVEY DATE:** January 27, 28, 2006

**P.O. #** 438729

**ATTENTION:** Robert Raper

**TECHNICIAN:** Jim Garner

**SCOPE:** This infrared thermographic survey includes all electrical power distribution equipment from primary disconnects, transformers, main switchgear, secondary panels, motor control centers, disconnects, starters, control cabinets and low voltage panels. When cleaning and tightening is recommended, **we stress the importance of thorough cleaning before tightening.** Frequently, oxidation has occurred in the heated terminal connections and must be removed to make an effective repair. Current phase identified from left to right as A, B, and C. All problems identified by a red day glow sticker at area, with the item number indicated. There were 8 problems reported and numerous problems fixed during the survey. The next annual survey should be performed on **1/27-28/07.**



# International Testing Association Maintenance Testing Specifications 1997 (NETA MTS-1997):

## *Priority Ratings*

**Customer:** Your Company  
Any Town, USA

**Job #:** 0609  
**Date:** 1/27,28/06

**Emissivity =**.99

**Load condition greater than 30%.**

**Temperature difference ( $\Delta T$ ) based on comparisons  
between related components under similar loading.**

<u>Problems</u>	<u>Priority</u>	<u><math>\Delta</math> Temperature Component</u>	<u>Comments</u> *
4	1	>72°F	<b>Major discrepancy; repair immediately.</b>
0	2	37°F - 72°F	<b>Monitor continuously until corrective measures can be accomplished.</b>
4	3	19°F - 36°F	<b>Indicates <u>probable</u> deficiency; repair as time permits.</b>
0	4	0°F - 18°F	<b>Possible deficiency; warrants investigation.</b>
<b>Total Electrical Problems = 8</b>		<b>Total Steam Problems = 1</b>	

**\* The above classifications are representative of the load at the time of the survey. If the load increases, the temperature will increase dramatically by an exponential factor.**

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-PR-01 **Time:** 1056 **Date:** 2/05/04 **Emissivity:** .99 **Technician:** Jim Garner

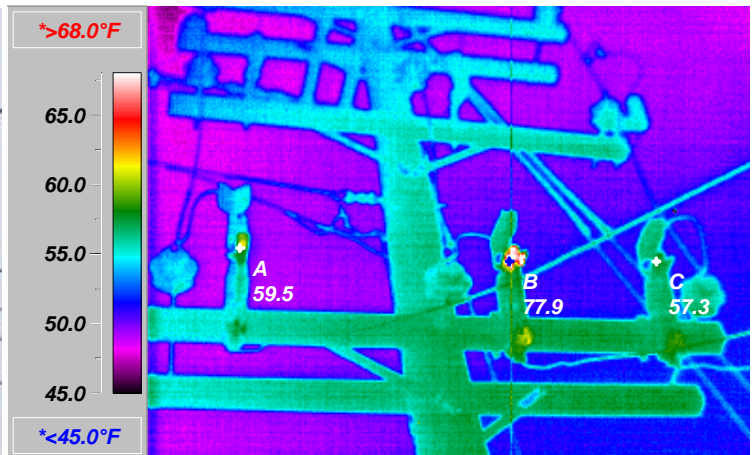
**General Location:** Eastside Substation

**Equipment Identification:** Pole # 640668

**Component:** Primary Disconnect

**Other:** Latch End

**Phase:**  A  B  C  L1  L2  LINE SIDE  LOAD SIDE



**Temperatures:** Phase A: 59 Phase B: 77 Phase C: 57 L1: L2:

**Amperage:** Phase A: Phase B: Phase C: L1: L2:

**Δ Temperatures:** 20 **Priority Assigned:** 3

**Probable Cause:** Loose and Dirty Primary Latch Connection

**Recommendations:** Disassemble and Inspect, Notify Utility Company, Replace Disconnect?

**Notes:**

Has this problem been corrected? \_\_\_ Yes \_\_\_ No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-MT-02 **Time:** 0930 **Date:** 2/18/04 **Emissivity:** .99 **Technician:** Jim Garner

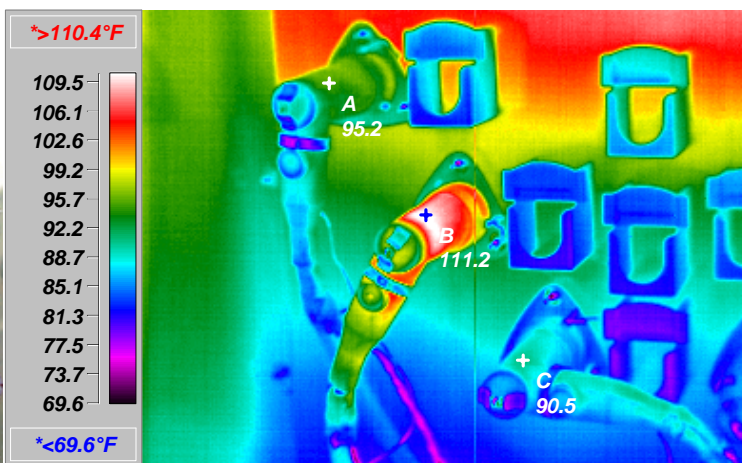
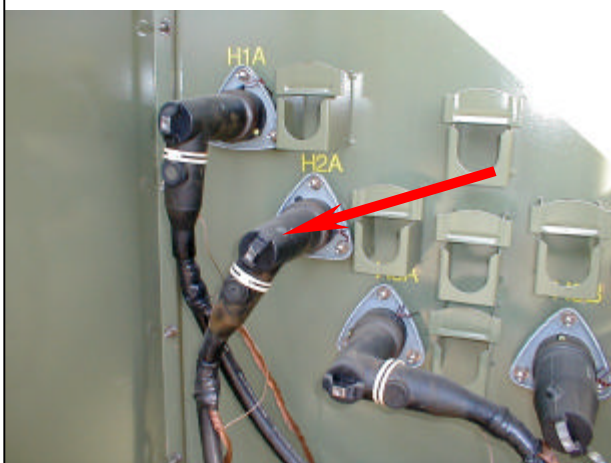
**General Location:** Southeast Substation

**Equipment Identification:** 2500 KVA Transformer # 00J202248

**Component:** Primary Elbow

**Other:** Phase H2A

**Phase:**  A  B  C  L1  L2  LINE SIDE  LOAD SIDE



**Temperatures:** Phase A: 95 Phase B: 111 Phase C: 90 L1: L2:

**Amperage:** Phase A: Phase B: Phase C: L1: L2:

**Δ Temperatures:** 21 **Priority Assigned:** 3

**Probable Cause:** Loose and Dirty Connection, Faulty Elbow

**Recommendations:** Disassemble and Inspect, Notify Utility Company to Replace Elbow

**Notes:**

Has this problem been corrected? \_\_\_\_Yes \_\_\_\_No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0417-03      **Time:** 0837      **Date:** 2/27/04      **Emissivity:** .99      **Technician:** Jim Garner

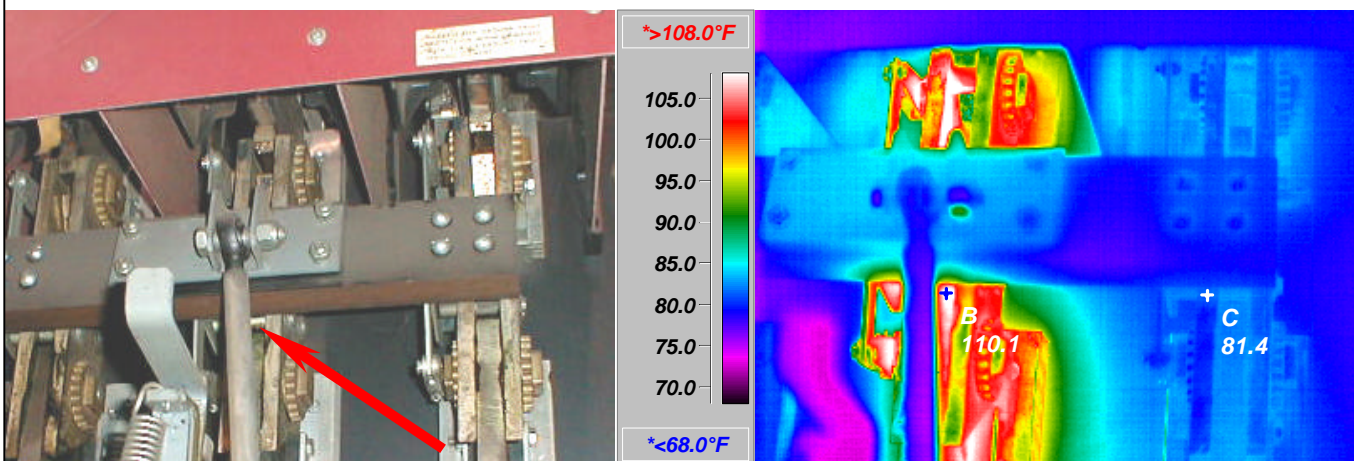
**General Location:** Main Electrical Distribution Platform # 2

**Equipment Identification:** Main Disconnect

**Component:** 3000 Amp Fused Disconnect

**Other:** Internal Heating, Hinge & Knifeblade

**Phase:**  A  B  C       L1  L2       LINE SIDE  LOAD SIDE



**Temperatures:**      **Phase A:**      **Phase B:** 110      **Phase C:** 81      **L1:**      **L2:**

**Amperage:**      **Phase A:**      **Phase B:**      **Phase C:**      **L1:**      **L2:**

**Δ Temperatures:** 29      **Priority Assigned:** 3

**Probable Cause:** Internal Heating, Hinge & Knifeblade Failure

**Recommendations:** Disassemble and Inspect, Clean Hinge, Knifeblade & Receiver, Set Torque to Manufacturer's Specs.

**Notes:**

Has this problem been corrected? \_\_\_\_ Yes \_\_\_\_ No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-MB-04 **Time:** 0853 **Date:** 2/23/04 **Emissivity:** .99 **Technician:** Jim Garner

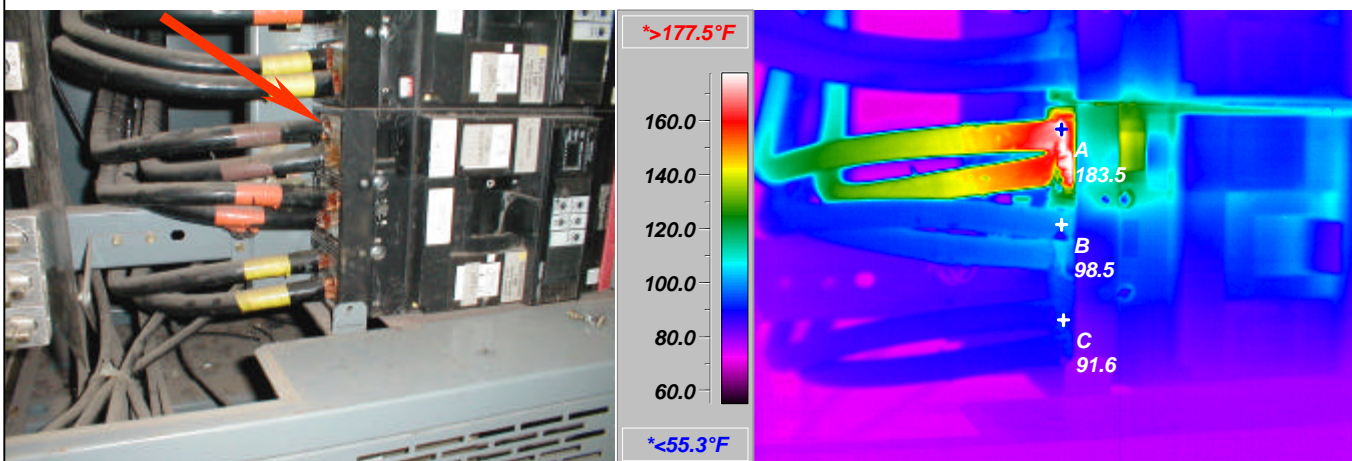
**General Location:** Electrical Distribution Room # 1 / Distribution Panel # 3

**Equipment Identification:** Feeder for Chiller # 1

**Component:** 800 Amp Breaker

**Other:** Wire & Connector

**Phase:**  A  B  C  L1  L2  LINE SIDE  LOAD SIDE



**Temperatures:** Phase A: 183 Phase B: 98 Phase C: 91 L1: L2:

**Amperage:** Phase A: Phase B: Phase C: L1: L2: 12

**Δ Temperatures:** 92 **Priority Assigned:** 1

**Probable Cause:** Loose and Dirty Connection

**Recommendations:** Disassemble and Inspect, Clean and Tighten Wires & Connector

**Notes:**

Has this problem been corrected? \_\_\_Yes \_\_\_No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-HS-05    **Time:** 1059    **Date:** 2/19/04    **Emissivity:** .99    **Technician:** Jim Garner

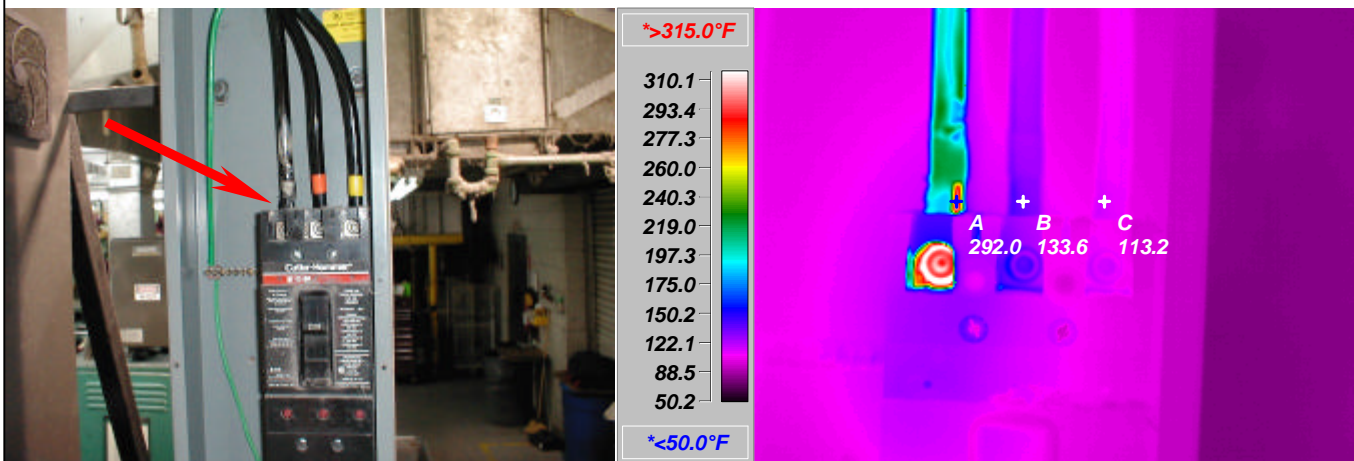
**General Location:** Muschamp Twisting Department

**Equipment Identification:** Feeder for Twister # 6

**Component:** 200 Amp Breaker

**Other:** Wire & Sta-Kon Connector

**Phase:**  A    B    C     L1    L2     LINE SIDE    LOAD SIDE



**Temperatures:**    **Phase A:** 292    **Phase B:** 133    **Phase C:** 113    **L1:**    **L2:**

**Amperage:**    **Phase A:**    **Phase B:**    **Phase C:**    **L1:**    **L2:**

**Δ Temperatures:** 179    **Priority Assigned:** 1

**Probable Cause:** Loose and Dirty Connection, Faulty Splice/Crimp, Insulation Failure

**Recommendations:** Disassemble and Inspect, Clean Wire, Rewire Connection

**Notes:**

Has this problem been corrected? \_\_\_\_Yes \_\_\_\_No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.



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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-V-07    **Time:** 1100    **Date:** 2/06/04    **Emissivity:** .99    **Technician:** Jim Garner

**General Location:** Twisting Department

**Equipment Identification:** Muschamp Twister # 2 Control Cabinet

**Component:** Starter MC-1

**Other:** Wire & Connector / Insulation Failure

**Phase:**  A  B  C     L1  L2     LINE SIDE  LOAD SIDE



**Temperatures:**    **Phase A:** 236    **Phase B:** 651    **Phase C:** 235    **L1:**    **L2:**

**Amperage:**    **Phase A:**    **Phase B:**    **Phase C:**    **L1:**    **L2:**

**Δ Temperatures:** 416    **Priority Assigned:** 1

**Probable Cause:** Loose and Dirty Connection, Insulation Failure

**Recommendations:** Disassemble and Inspect, Clean Connector, Rewire Connection

**Notes:**

Has this problem been corrected? \_\_\_\_ Yes \_\_\_\_ No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ELECTRICAL DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-MB-08 **Time:** 1217 **Date:** 2/23/04 **Emissivity:** .99 **Technician:** Jim Garner

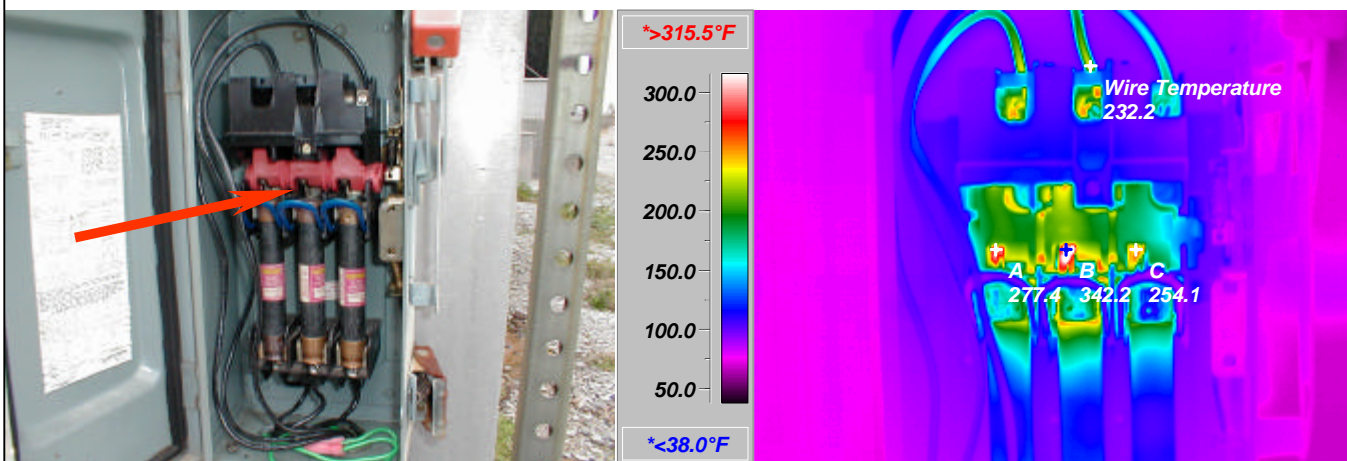
**General Location:** Outside South End Superba 100 Ton Cooling Tower

**Equipment Identification:** Feeder for Pump P-2

**Component:** 30 Amp Fused Disconnect

**Other:** Internal Heating, Hinge & Knifeblade

**Phase:**  A  B  C  L1  L2  LINE SIDE  LOAD SIDE



**Temperatures:** Phase A: 277 Phase B: 342 Phase C: 254 L1: L2:

**Amperage:** Phase A: Phase B: Phase C: L1: L2: 12

**Δ Temperatures:** 98 **Priority Assigned:** 1

**Probable Cause:** Loose and Dirty Connection, Hinge & Knifeblade Failure

**Recommendations:** Disassemble and Inspect, Clean Wires, Replace Disconnect, Inspect for Possible Wire Insulation Failure

**Notes:**

Has this problem been corrected? \_\_\_ Yes \_\_\_ No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED STEAM DATA REPORT

**Customer:** Your Company, Any Town, USA

**Item #:** 0412-HR-09 **Time:** 1045 **Date:** 2/03/04 **Emissivity:** .99 **Technician:** Jim Garner

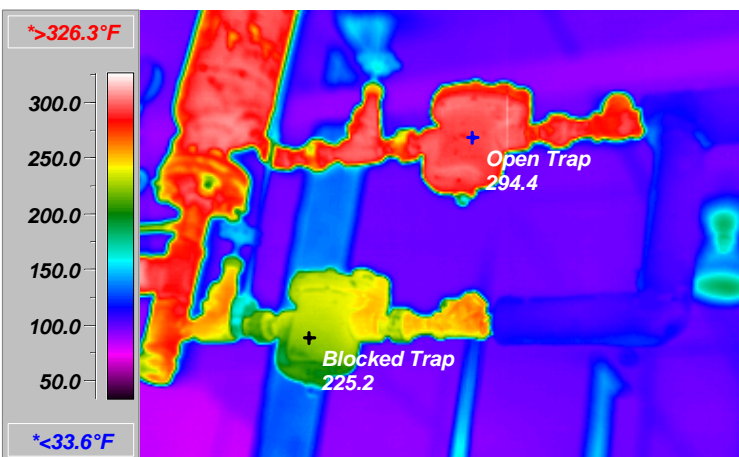
**General Location:** Heat Set Department

**Equipment Identification:** Suessen Machine # 6 Steam Traps

**Component:** Top Trap Open

**Other:** Bottom Trap Blocked

**Phase:**  A  B  C  L1  L2  LINE SIDE  LOAD SIDE



**Temperatures:** Phase A: Phase B: Phase C: L1: L2:

**Ampage:** Phase A: Phase B: Phase C: L1: L2:

**Δ Temperatures:** **Priority Assigned:**

**Probable Cause:** Blocked Strainers or Traps

**Recommendations:** Clean Strainers and Traps, Replace Traps?

**Notes:** **REPAIR IMMEDIATELY!**

Has this problem been corrected? \_\_\_ Yes \_\_\_ No

Date Corrected \_\_\_\_\_.

Corrected By: \_\_\_\_\_.

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## INFRARED ROOF DATA SCAN

**Customer:** Your Company, Any Town, USA

**Item #:** 0065-10

**Time:** 1231

**Date:** 6/14/03

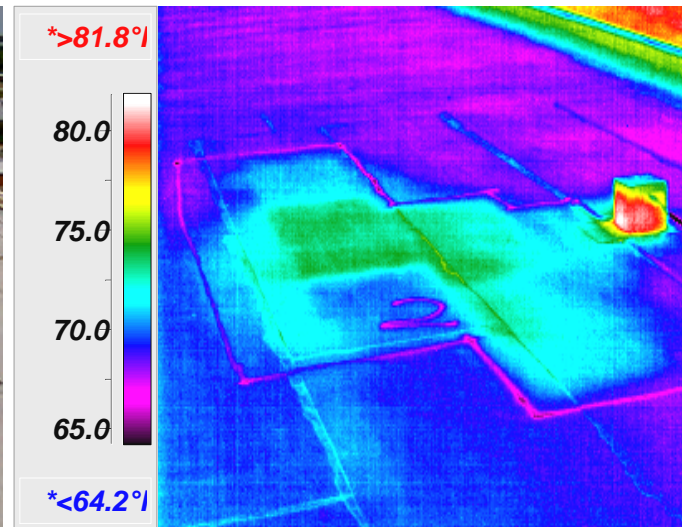
**Emissivity:** 1.0

**General Location:** Building A3, 13th Floor Roof

**Description:** North Side

**Size:** 8 X 11.5

**Square Footage:** 92



**Notes:** Remove & replace wet insulation, reroof area. Approximate cost 92 x \$2.50 = \$230.

**Has this problem been corrected?**  Yes  No

**Date Corrected** \_\_\_\_\_.

**Corrected By:** \_\_\_\_\_.

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## **Descriptive Paragraph**

*Infrared Research Inc., with 28 years experience, has provided over 6400 infrared thermographic surveys. We are certified by the American Society of Nondestructive Testing (ASNT) as a **Level II Technical Corporation** with two full time thermographers. We employ Inframetrics high-resolution microbolometer cameras. Reports are computer generated with glossy thermograms & real time photographs; results are stored on CD disk and accessible through our web site. Electrical, steam, refractory, roof diagnostic residential-building envelope and environmental thermographic services are offered. Please see our web site at <http://www.infraredresearch.com>*

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***You may copy and paste the following links into your browser for viewing.***

For electrical report example, click <http://www.infraredresearch.com/reports/reportexample.pdf>

For roof introduction, click <http://www.infraredresearch.com/reports/introroofs.pdf>

For residential/building survey, click <http://www.infraredresearch.com/reports/residence.pdf>

## 4 Key Points to Choosing an Infrared Consulting Company

There are key things to keep in mind when comparing Infrared Consulting Companies to provide you with thermographic services that are out-lined here. There is still other things to consider as well when considering what you are really paying for that are discussed in a paper called "[Quality Information, what can you really afford](#)" that you may wish to review.

### 1. How long has the company been in business? How many infrared inspections have they performed?

Look for companies that are stable and have experience using infrared in a variety of applications. This demonstrates that the technicians can work at an efficient pace and can differentiate between real problems and normal operating conditions. It typically takes 3 to 6 months of in the field experience for a new thermographer to be able to work on his own. During this time frame he will need consistent one on one mentoring from a professional thermographer to help him fully understand and interpret the infrared images.

By considering how long the company has been in business and the quality of their work, will help you in determining what the practical longevity will be of the company. As in any business, business failures within the first few years are extremely high. You will be building a long term working relationship with the Infrared consulting company and you will not want to have to keep jumping from one to another over the course of a few years because they don't stay in business.

### 2. How many certified technicians are on staff? How many cameras does the company own?

Many companies that contract out their infrared inspections are requiring that the "Certified Thermographer" be a level II certified thermographer with at least 6 months of practical in the field experience before he comes on the job site. They have learned that it does not pay to have inexperienced infrared thermographers who are not properly trained performing these inspections.

Look for a company that has sufficient staff and equipment to work on *your* schedule. You don't want to have your plans disrupted should there be a camera problem. A full staff is particularly important when considering weather related scheduling. You will want your infrared inspection company to be able to "jump" as soon as the correct weather condition appears. Also, you will find it very helpful if your infrared inspection company has a fully staffed office where your scheduling and billing questions will always be answered promptly.

### 3. What cameras are being used to perform the inspection?

Look for high resolution. The latest models have 320 x 240 focal plane arrays. The importance of resolution is that it ensures enough detail to be able to pinpoint the exact location of the hottest component, which in most instances indicates the origin of the problem.

Look for a fully radiometric imager, with a temperature measurement accuracy of +/-2% of range, or 2 degrees C. This will ensure precise temperature measurement. Be sure your service provider has their equipment re-calibrated annually and certified by the manufacturer.

Look for full digital storage capability for the infrared images. This allows the images to be archived should the need arise to get future temperature measurements out of an object in the image.

Look for your inspectors to utilize small and lightweight systems. The advantage to you is that the technician will be able to move quickly and freely throughout your facility, with no limit to where he can inspect your equipment.

### 4. What information are you receiving after the inspection is complete?

Look for follow-up documentation of past problems, preferably CD-ROM disk. Were they all repaired and re-inspected? What remains outstanding? Perhaps a repair was made but the equipment was not under load at the time of the inspection and therefore could not be tested and closed out. Is this information clear in the reports you receive?

Look for graphic representation of the equipment's history. Does the report contain useful visuals to help you see the trends over time?

Look for high resolution, color, glossy thermograms and photos, with corresponding pre-printed work order forms

Look for logical organization of the problems found. Are they listed in such a way that your engineer can make an efficient repair plan?

What media are used to deliver the information? Can you receive your report over the Internet? Can you make additional copies or share the report electronically?

This information was obtained from [www.prothermographer.com](http://www.prothermographer.com)

## Quality Information, what can you really afford?

Today more than ever companies are choosing to out source their infrared inspection programs to outside consulting companies who specialize in performing PdM (Predictive Maintenance) inspections. There are over 600 infrared consulting companies in the U.S., of which only 200 are listed in the Yellow pages. Additionally there are also 2 to 5 new infrared consulting companies going into business each week. Many of these 600 plus companies are utilizing the large supply of outdated infrared imaging equipment that has been around since the early 1970's. With a corresponding lack of professionally trained and certified thermographers standing behind these cameras. You have a real "buyer beware" market.

All too often companies that are choosing to contract out their Infrared IR PdM inspection programs don't have the time to consider what they are really trying to purchase. Price alone is often the deciding factor, based on an assumption that all IR consulting companies are the same. **Be warned, this is a fallacy.**

When contracting an infrared consulting company, what you are really paying for is "Quality Information" and the emphasis is on *Quality*. You need the right kind of information on which you can make decisions. You are paying for thorough, consistent, accurate, knowledgeable and accountable information. That type of "Quality Information" is not provided by the lowest bidder. We could compare the health of a company's facility to a human body. Would it be wise for us to use the cheapest town Doctor to provide us with a diagnosis and correct treatment of a cancerous brain tumor? On the other hand, would we seek out the services of a specialist who deals directly with this type of ailment? They are both Doctors. Which one would you trust with your life in their hands? Doesn't the same thing apply to the health of a company's facility? You are paying for quality information on which you can make decisions with regard to your facilities health. A less than top quality inspection by a lower bidder can easily be 1,000 times more expensive. **By trying to shave a few hundred dollars off the cost of an inspection, you may cost yourself hundreds of thousands dollars in the end from just one missed problem.** Just remember, "You get what you pay for."

This information was obtained from [www.prothermographer.com](http://www.prothermographer.com)

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