INFRARED DIVISION
(972) 832-9671

INFRARED ELECTRICAL INSPECTION

Prepared for:

XYZ Customer

Dallas, TX 75390

Inspection Location:

Dallas Campus

April 10, 2007

JOB # 1010-1252

JOB # 1010-1252

CONTENTS

(Infrared Electrical/Mechanical Report)

All faults have been prioritized by temperature classification to help the customer facilitate an appropriate repair schedule.

Infrared Inspection Prepared For:

XYZ Customer

Inspection Location:

Dallas, TX.

PROJECT: Electrical Inspection **DATE:** April 10, 2007

P.O.#: **JOB#:** 1010-1252

I hereby certify that the above listed project was thermogrammed by myself or under my direction; and that the enclosed photographs, data and analysis are the results of this inspection.

CERTIFIED THERMOGRAPHER

10007

Certificate Number

972-832-9671

Contact Phone Number

INFRARED ELECTRICAL INSPECTION

SURVEY INTENT

It was the intent of this thermographic inspection to survey electrical equipment selected by the customer, with the objective of locating potential problems and determining their seriousness.

BACKGROUND

Thermal radiation (heat) is constantly being emitted by all objects and is converted into a television like image by a specialized infrared camera. This technique for imaging and measuring heat is called Thermography.

The thermal images produced by the infrared camera allows for meaningful interpretation of the thermal properties of various objects and at the same time makes it possible to pinpoint potential problems at a stage where damage can still be prevented and costly heat related problems identified.

RESULTS

The results are presented in the form of a hard copy image (thermogram) of the thermal anomaly. The data with the resultant temperature differential(s) is given with the thermogram. In the particular case of electrical inspections, a temperature differential of the hot phase to a normal phase is usually presented, called temperature rise. If the components are under sufficient load and excess temperatures measured directly on the faulty part itself, the following categories are used unless a client specifies otherwise.

Ideally, thermographic electrical inspections should be carried out under normal full load. Since this is not often practical, the temperature change and severity classification must be viewed along with varying conditions and type of equipment.

Severity Criteria

Electrical Equipment Severity Criteria

Classification	Priority	Temp. Rise	Comments
BASELINE DATA ONLY	**0**	**0 ° F**	**No Problems Found. For Baseline purposes only.**
MINOR PROBLEM	**4**	**1° - 49° F**	**Repair as a part of regular maintenance; little probability of physical damage.**
INTERMEDIATE PROBLEM	**3**	**50° - 79° F**	**Repair as soon as scheduling permits. Monitor load and change as needed. Inspect for physical damage. There is a probability of damage to the affected component, but less in the surrounding components.**
SERIOUS PROBLEM	**2**	**80° - 120° F**	**Repair in the immediate future. Inspect the surrounding components for probable damage.**
CRITICAL PROBLEM	**1**	**120° F or greater**	**Repair immediately. Inspect surrounding components for any damage.**

These classifications are based on observed temperature rise only. The importance of the item involved to the operation must be considered when determining timing of corrective action. In addition, the temperature rise is dependent on the load on the equipment; a minor finding on lightly loaded equipment could be more serious when the equipment is fully loaded.

There are no rules for the assessment of excess temperatures, which are measured on indirectly overheated surfaces. Indirect overheating can be caused by hidden faults, e.g., breaker contactors inside a breaker where the temperature is measured from the outside casing.

Components located outside are affected by wind speed and air temperature, therefore the severity of the problem may be higher than indicated.

Experience shows that breakers and other components with internal faults where an approximate temperature increase of 10% has been measured on the surface are considerably hotter inside. Very often the faulty parts are severely damaged.

Mechanical and other equipment, such as bearing temperatures, transformer surface temperatures, temperature variations in heat transfer or cooling equipment, etc., are classified according to normal versus abnormal temperature or according to the severity of the problems found. This might be based on 30% of the cooling fins on a transformer being plugged or a minor leak in a steam line. An inspection should also be made after a problem has been fixed, to ensure it has been corrected properly.

Inspection Routing and Equipment Checklist

Client:	**XYZ Customer**
Jobsite:	**Campus**

Open Problem	Status	Location	Equipment	IR Item No	Visual Item No.
		Building R	**MCC B**		
Yes	Tested		AHU-2 Starter	8	
		NC Building			
		Mechanical Room NC 2.306			
Yes	Tested		Panelboard 2ECHB		4
		North Plant			
Yes	Tested		CT-5 Starter		2
Yes	Tested		CT-6 Starter		3
			Switchboard NJDHC		
Yes	Tested		1D - Pump CH-1		1
		South Plant			
			MCC 1		
No	Not Tested		Condenser Water Pump #1 (No Load)		
			MCC 4		
Yes	Tested		3A - Panel HB	7	
			MCC 8		
No	Not Tested		Chiller 4 (No Load)		
		Y Building			
Yes	Tested		D1HC - Distribution Panel	3	
			MCC A		
Yes	Tested		1A - Unit AC-5	1	
Yes	Tested		1B - Unit AC-1	2	
		Zale Lipshy			
		Mechanical Room G-32			
			EMCCB/HB		
Yes	Tested		3A - AHU 5	6	
			MCC/CP2		
No	Not Tested		1D - PCHP (No Load)		
		Mechanical Room G-48			
			EMCCA/HB		
Yes	Tested		3C - AHU11-2	4	
			MCCA/HB		
Yes	Tested		2A - RAF #11	5	

Infrared Images - Prioritized List by Temperature Rise

Problem # 7 **Barcode:** **Temp Rise:** 239.5 **% Load:** 62.7%

Location: South Plant \ MCC 4
Equipment: 3A - Panel HB
Component: B phase line side fuse clip.
IDN File: 0c893e65-68d7-40c9-89a3-a3cb24240fcf.idn

	Temp	Phase	Load
Component:	327.5	B Phase	62.7%
Reference:	87.9	C Phase	59.4%
Threshold:			
Ambient:	72.0		
Wind Speed:	0		
Rat.Load:	100%		
Severity:	1		

Problem # 2 **Barcode:** **Temp Rise:** 84.1 **% Load:** 66.3%

Location: Y Building \ MCC A
Equipment: 1B - Unit AC-1
Component: B and C phase line side, and B phase load side connections on breaker
IDN File: 1f7fa48b-3c2e-49b4-8b5b-378266aef3e2.idn

	Temp	Phase	Load
Component:	249.6	B Phase	99.5%
Reference:	165.5	A Phase	105%
Threshold:			
Ambient:	71.0		
Wind Speed:	0		
Rat.Load:	150%		
Severity:	2		

Problem # 1 **Barcode:** **Temp Rise:** 74.7 **% Load:** 55.6%

Location: Y Building \ MCC A
Equipment: 1A - Unit AC-5
Component: B and C phase line side lug connection on contactor
IDN File: 252bff03-5140-43a1-8e33-ece052b5d35d.idn

	Temp	Phase	Load
Component:	251.4	B Phase	75%
Reference:	176.6	C Phase	75%
Threshold:			
Ambient:	71.0		
Wind Speed:	0		
Rat.Load:	135%		
Severity:	3		

Problem # 6 **Barcode:** **Temp Rise:** 55.3 **% Load:** 45.6%

Location: Zale Lipshy \ Mechanical Room G-32 \ EMCCB/HB
Equipment: 3A - AHU 5
Component: B Phase load side connection on contactor
IDN File: 219304ec-e243-4b29-87af-8c81ebdb9171.idn

	Temp	Phase	Load
Component:	164.8	B Phase	41%
Reference:	109.5	A Phase	36.5%
Threshold:			
Ambient:	70.0		
Wind Speed:	0		
Rat.Load:	90%		
Severity:	3		

Infrared Images - Prioritized List by Temperature Rise

Problem # 4 **Barcode:** **Temp Rise:** 38.6 **% Load:** 34.1%

Location: Zale Lipshy \ Mechanical Room G-48 \ EMCCA/HB
Equipment: 3C - AHU11-2
Component: C phase load side connection on contactor
IDN File: 6e9bc22b-18d1-4fa5-a5be-d211ac3d8762.idn

	Temp	Phase	Load
Component:	146.1	C Phase	30.7%
Reference:	107.5	A Phase	30.7%
Threshold:			
Ambient:	70.0		
Wind Speed:	0		
Rat.Load:	90%		
Severity:	4		

Problem # 5 **Barcode:** **Temp Rise:** 38.7 **% Load:** 42.7%

Location: Zale Lipshy \ Mechanical Room G-48 \ MCCA/HB
Equipment: 2A - RAF #11
Component: T1 and T3 phase load side connections
IDN File: 8462361a-6ac0-4375-8b41-be844346df5a.idn

	Temp	Phase	Load
Component:	152.5	T1	6.4%
Reference:	113.7	T2	7.7%
Threshold:			
Ambient:	70.0		
Wind Speed:	0		
Rat.Load:	15%		
Severity:	4		

Problem # 3 **Barcode:** **Temp Rise:** 20.8 **% Load:** 34.1%

Location: Y Building
Equipment: D1HC
Component: A phase load side connection on Breaker #15
IDN File: e2e92561-0a5d-4edc-99d2-27938310d682.idn

	Temp	Phase	Load
Component:	100.9	A Phase	34.1%
Reference:	80.1	C Phase	35.1%
Threshold:			
Ambient:	71.0		
Wind Speed:	0		
Rat.Load:	100%		
Severity:	4		

Infrared Images - Prioritized List by Temperature Rise

Problem # 8 **Barcode:** **Temp Rise:** 15.7 **% Load:** 42.2%

Location: Building R \ MCC B
Equipment: AHU-2 Starter
Component: B phase load side lug connection
IDN File: f86a40ed-d8ec-4093-ab4b-b0c348d79646.idn

	Temp	Phase	Load
Component:	135.9	B Phase	11.4%
Reference:	120.2	A Phase	11%
Threshold:			
Ambient:	73.0		
Wind Speed:	0		
Rat.Load:	27%		
Severity:	4		

Visual Images

Problem # 1 **Barcode:** **Severity Code:** 1

Location: North Plant \ Switchboard NJDHC
Equipment: 1D - Pump CH-1
Component: No Load. Visual inspection revealed damaged wire and connection.
Picture: f0a9ca95-9636-461c-8513-3359ede8bf74.idn

Problem # 2 **Barcode:** **Severity Code:** 1

Location: North Plant
Equipment: CT-5 Starter
Component: C phase line side motor overload connection on contactor
Picture: ca1e34a8-a52a-48a7-8540-85ab50b556a0.idn

Problem # 3 **Barcode:** **Severity Code:** 1

Location: North Plant
Equipment: CT-6 Starter
Component: B phase motor overload connection on contactor
Picture: d6648cd5-8c5d-4394-9cbb-e02f4718f0ba.idn

Problem # 4 **Barcode:** **Severity Code:** 1

Location: NC Building \ Mechanical Room NC 2.306
Equipment: Panelboard 2ECHB
Component: NEC code violation. Two wires in breaker #3
Picture: e4b08a3a-4939-4443-b1bf-818245d3bc6c.idn
