



DATA CENTER • DESIGN • BUILD • MAINTAIN

Infrared Inspection Report

Electrical Distribution Equipment

at

Sample Company

Address
Address 2

November, 2014

SAMPLE

Corporate Office

7031 West Oakland Street | Chandler, Arizona 85226
toll free: 800.509.6170 | office: 480.968.3191 | fax: 480.968.3111

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Contractor Licenses: AZ 228490, AZ 216136, CA 884661, NV 77127

TITAN POWER

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Sample Company
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Dear :

This is to report the findings of the infrared inspection of the electrical distribution equipment at your facility conducted on November 1st 2014. The work was performed by the undersigned, a certified infrared thermographer. I was assisted by an Electrician who opened the required equipment for inspection, and directed the inspection.

A list of the inspection items is enclosed.

Except as noted below and in the accompanying anomaly reports, all the equipment inspected was found to be operating at acceptable temperatures, with normal thermal signature patterns, and no localized heating that would indicate a defect or poor connection. Where applicable, temperatures observed were in correlation with the load currents.

One anomaly was detected. A report on that is enclosed.

This anomaly involves heating at the bus connection of the panelboards branch circuit breaker, with the possibility of overload on the branch circuit. It is located in PDU 201-A circuit 11. Heating at the breaker bus connection as well as heating of the neutral side indicates the possibility of an overload on the circuit.

While this does not warrant immediate attention, if possible some of the load on this circuit should be dispersed. The temperature rise indicated on the report was slight. Also bear in mind that a failure at this location could cause considerable damage to the surrounding components.

It should be noted that some of the equipment inspected appeared to be under a very light load at the time. Under these conditions, potential problems or deficiencies may not show up and the results of the inspections of those items should be considered inconclusive. However, if the loads observed are typical and are not expected to significantly higher at another time, then this may be of no consequence.

If there are questions regarding any aspect of this report, please let us know.

Respectfully submitted,

Titan Power, Inc.

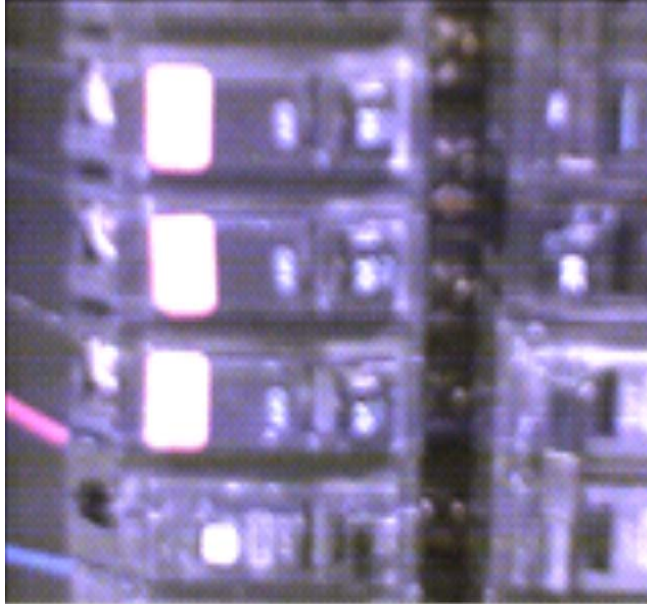
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Client: Sample

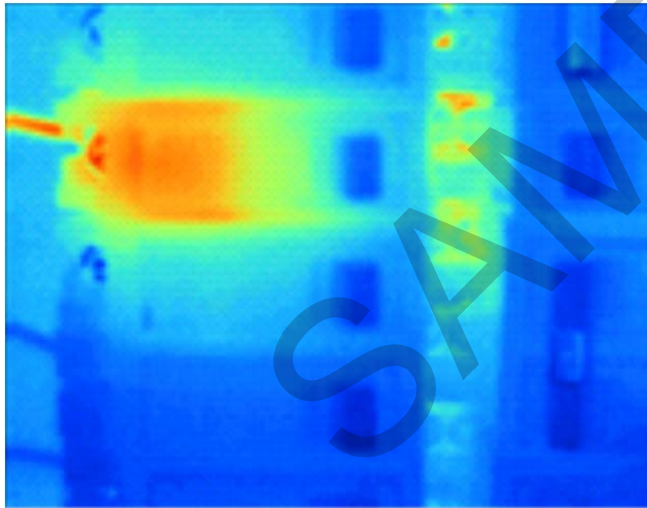
Date:

Time:



<i>Location:</i>	Second Floor Data Center
<i>Equipment:</i>	PDU 201-A
<i>Component:</i>	Circuit Breaker 11
<i>Mfg/type:</i>	GE – 20A 1P

<i>Electrical Load (Amps)</i>		
<i>Aθ</i>	<i>Bθ</i>	<i>Cθ</i>
		17.2
<i>Notes:</i>		



<i>Thermal Findings</i>
Significant heating at the circuit breaker connection to the bus
Temperature there= 93.6°
ΔT above ambient=29.9°
<i>Ambient: 68.7°</i>

<i>Image Notes:</i>
<i>Comments/Recommendations:</i> 20 amp breaker is 86% loaded. No danger, however load should be shed if possible.
<i>Thermographer:</i> Titan Power Inc.

Infrared Electrical Inspection-Background Information

The inspections process consists of examining the equipment with an infrared imaging radiometer, with the covers and dead fronts removed. The equipment being inspected should be energized and under normal to full load. Potential problems may not be discovered if the load is below 20% of the equipment's rating.

Whenever (1) temperatures observed exceed acceptable operating ranges, (2) thermal patterns do not conform to the expected signature, or (3) temperatures do not correlate with the load readings, we consider this to be a thermal anomaly. The item is then closely scanned, thermal images recorded, and other data such as load currents noted.

Reports are furnished on any significant anomalies found during the inspections. These reports would include an infrared image or thermogram and a corresponding visual light image. Also included are the date and time, the relevant temperature data, and a recap of other pertinent information. For electrical work, temperatures are given in degrees Celsius unless otherwise noted.

The ram infrared images are essentially monochromatic but the thermograms are usually displayed in color. The colors are applied to different temperatures to aid in visualization of the thermal patterns.

As you review any thermograms provided, please note the adjacent color palette temperature span. This temperature span is typically adjusted to provide the best image for identification of the problem-not to show relative temperatures between images. So, a minor temperature differential can look very serious in an image with a 10° span. While a

sever differential may appear less threatening in an image adjusted to a 50° span.

Also bear in mind that not all materials emit infrared radiation in the same relation to their temperature. While this difference is emissivity and is taken into account in our calculations and interpretation, it can create confusion for someone not trained in analyzing thermograms. Metals often appear cooler than plastics or painted objects at the same temperature. For example, an insulated wire may appear hotter in the thermogram than a metal lug even when the lug is actually several degrees warmer.

Recommendations for follow-up action generally follow temperature standards established by NETA and /or other organizations, with some adjustments for individual situations based on our own experience. But remember that these take into account only thermal and load data observed at the time.

It is important that you review any anomalies reported and make your own assessment of repair or investigation priority. Some other factors to consider include the likelihood that the load might be greater as some future time, the equipment's history, the critical level of the load served, and the potential cost of an in-service failure.

The load factor is particularly important because the heat generated at a poor connection or defective piece of equipment increases exponentially with the load current. For example, if the load were to increase by 50%, from 10 amps to 15 the heat generated at a defect would increase by 120%. Thus a relatively small change in the load could push a stable condition to catastrophic failure.

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LIST OF EQUIPMENT INSPECTED

<u>Basement Level</u>	<u>First Floor</u>	<u>Second Floor</u>	<u>Third Floor</u>
UPS 625kVA	PDU 105	PDU 203	PDU 302
Distribution Output Panel		PDU 201-A	PDU 307
Essential Panel		PDU 201	PDU 310
		PDU 208	PDU 311
		PDU 209	PDU 306
			PDU 303
			PDU 304
			PDU 308
			PDU 309

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TECHNICAL INFORMATION

Equipment Used:

Thermal Images-

Camera Model	Ti40FT
Camera Serial Number	Ti40FT-1002511
Manufacturer	Fluke
Calibration Range	-4.0°F to 662.0°F

Load amperages-

Fluke model 87 True RMS digital meter
with model 80i-400 current transformer

Thermographer Certification:

Titan Power - Level I certified by the Academy of Infrared Training Inc.

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