JERSEY INFRARED CONSULTANTS

P.O. Box 39
Burlington, NJ 08016
Phone: (609) 386-1281
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Infrared Inspection Report

for

ABC Shipping Company
100 Marine Terminal
Port of Newark, NJ 07114

on

MV Horizon Trader

Report Date: 12/23/2021

Job Number: 1234.7

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December 23, 2021

Mr. Joseph Smith
ABC Shipping Company
100 Marine Terminal
Port of Newark, NJ 07114

RE: INFRARED ELECTRICAL SYSTEM SURVEY REPORT
OUR JOB NUMBER: 20-1234.7

Dear Mr. Smith:

Here is our completed report in hard copy and electronic format for the Infrared Electrical System Survey performed for ABC Shipping Company on MV Horizon Trader. The survery was conducted while the vessel was docked at the Port of Newark locted in Newarl, NJ.

Thank you for this opportunity to serve you. If you have any questions or if we can be of further assistance, please feel free to contact us.

Very truly yours,

R. James Seffrin
Level III
Infraspection Institute Certified Infrared Thermographer # 1131

RJS:kb

Enclosure

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INTRODUCTION TO THE INFRARED ELECTRICAL SYSTEM SURVEY

Infrared thermography is a form of non-contact, non-destructive testing used to detect and document thermal patterns and associated temperatures across a given surface. Performed regularly, infrared inspections can help to identify incipient equipment failures.

Our Infrared Surveys are performed by Certified Thermographers using a portable infrared imaging system called FLIR ThermaCAM. This equipment detects infrared energy emitted from an object and converts it into an image which is displayed on a monitor screen.

Because infrared energy is a direct and proportional function of temperature, the video image is designed to depict temperature levels on the monitor. This thermal image looks very similar to a black and white or a color television picture where the various shades of color represent different temperature levels throughout the chosen temperature range. In the black and white mode, darker shades of gray correspond to lower temperatures while lighter shades of gray correspond to higher temperatures. In the color mode, colors are matched to the reference bar at the side of the monitor screen. Temperature values increase for those colors which appear closer to the top of the scale.

Our FLIR ThermaCAM equipment has the capability to sense object temperatures from -10° Celsius to +1500° Celsius, with sensitivity of as little as 0.07 Celsius degrees.

When an area or component with an unusual temperature differential is located, our thermal imager is used to measure the temperature of the problem area.

Once the temperature and location of the problem area have been noted, a photograph is taken of the image displayed on the FLIR ThermaCAM monitor. These Thermograms, along with a standard photograph and our problem definition, provide you with the necessary information to correct a problem before it becomes serious.

For your reference as a maintenance scheduling tool, the following temperature differential table is presented. This table is intended only as a guideline based on our experience with electrical system inspections. Actual scheduling of repairs is the customer's responsibility.

Temp. Differential:	Priority 3	1 - 3 C°	Possible deficiency; inspect
	Priority 2	4 - 15 C°	Repair as time permits
	Priority 1	Over 15 C°	Major deficiency; repair as soon as possible

It must be noted that the above temperature differential/severity guide is based on our experience with electro/mechanical inspections. Although some of the problems identified in this report may seem insignificant, the ultimate decision to repair them is the customer's responsibility.

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December 23, 2021

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100 Marine Terminal
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THERMOGRAPHER'S COMMENTS
OUR JOB NUMBER: 20-1234.7

On December 10, 2021 an Infrared Electrical System Survey was performed for ABC Shipping Company on MV Horizon Trader. The survery was conducted while the vessel was docked at the Port of Newark locted in Newarl, NJ

The Survey covered electrical equipment in the areas listed on the "List of Equipment Surveyed."

Four (4) problems were located during the Survey, all of which required thermograms. All problems were photographically recorded. These photographs, along with their respective thermograms and a brief description of each problem, appear on the following pages of this report.

It should be noted that the problems described in picture number 3 has an extremely high temperature differentials. This problem requires immediate attention.

It is recommended that the cause of each problem be investigated and that the proper corrective measures be taken. A follow-up Survey should then be performed once repairs have been made. Infrared surveys are then recommended at least once a year as part of a preventive maintenance program.

Please note that all inspections are performed with the electrical system in an "as found" condition. No attempt is made to verify that the system is under full load at the time of the infrared survey.

Ammeter readings, where provided, are given as a reference only and are not necessarily indicative of an overloaded circuit.

This report depicts thermal patterns in electrical system components at the time of the Infrared Survey. Assurances regarding the integrity of the electrical system are neither provided nor implied.

If you have any questions or if we can be of further assistance, please feel free to contact us.

Very truly yours,

R. James Seffrin
Level III
Infraspection Institute Certified Infrared Thermographer # 1131

RJS:kb

Customer Name: ABC Shipping Company
Job Name: MV Horizon Trader

Job Number: 1234.7

Cost Savings Report
for
Electrical/Mechanical Survey

This Cost Savings Report calculates the estimated cost savings realized from this infrared inspection. The calculations utilized in this report are based upon insurance industry cost estimates for loss experience with commercial and industrial facilities. These calculations take into account the severity of each exception along with the overall size of the facility.

The values shown below multiply the number of exceptions found by the severity of each exception. By subtracting the cost to perform the inspection, the potential net savings from this report are can be calculated.

Because no one can actually calculate the exact cost savings provided by an infrared inspection, the numbers contained in this report are intended to serve as a guide.

Total # of Critical or Serious Anomalies = 4	$ 32000.00
Total # of Intermediate or Minor Anomalies = 0	$ 0.00

Customer Name: ABC Shipping Company
Job Name: MV Horizon Trader

Job Number: 1234.7

Report Summary

Report Date:	12/23/2019
Job Number:	1234.7
Type of Inspection:	Delta Electrical System
Purpose of Inspection:	PPM
Date of Inspection:	12/10/2021
End User:	Joseph Smith
Project Location:	Production Facility 250 Manufacturing Lane My Town, Any State 00000
Thermographer:	Seffrin, R. James
Certification Number:	1131
Certification Level:	III
Qualified Assistant(s):	Bill Norman
Equipment Used:	FLIR E-60 S/N 49029124
# of Items Inspected:	8
# of Image Pages:	4
Comments:	Sample report - Information provided is for sample purposes only

Weather History:

12/10/2021	Day Skies: Indoor	Night Skies: N/A
	Day Highs: mid 30's	Night Lows: N/A
	Last Precipitation:	

Customer Name: ABC Shipping Company
Job Name: MV Horizon Trader

Job Number: 1234.7

Summary of Images

Picture	Location	Equipment	Priority
1	3rd Deck	Port Side Panel	2
2	3rd Deck	Panel Outside Room 310	2
3	2nd Deck	Port Side Panel	1
4	Main Engine Room	SWBD Room	2

Area/Image No. 1 **Job No.** 1234.7 **Date** 12/10/2021 **Time** 08:53

Location 3rd Deck **Equip #** Break #13 **Equipment** Port Side Panel

Wind Speed N/A N/A **From** N/A **Sky** Indoor **Distance** <5'

E 1.0 **R/T** N/A **Lens** 1x **Filter** N/A **Window T %** N/A

Load: **Rated** 15 Amps **Measured** 7 Amps **%** 46.67%

Ambient Temp 26 °C **ΔT** 9.00 above Other Connections

Comments Conductor Connection temperatures:

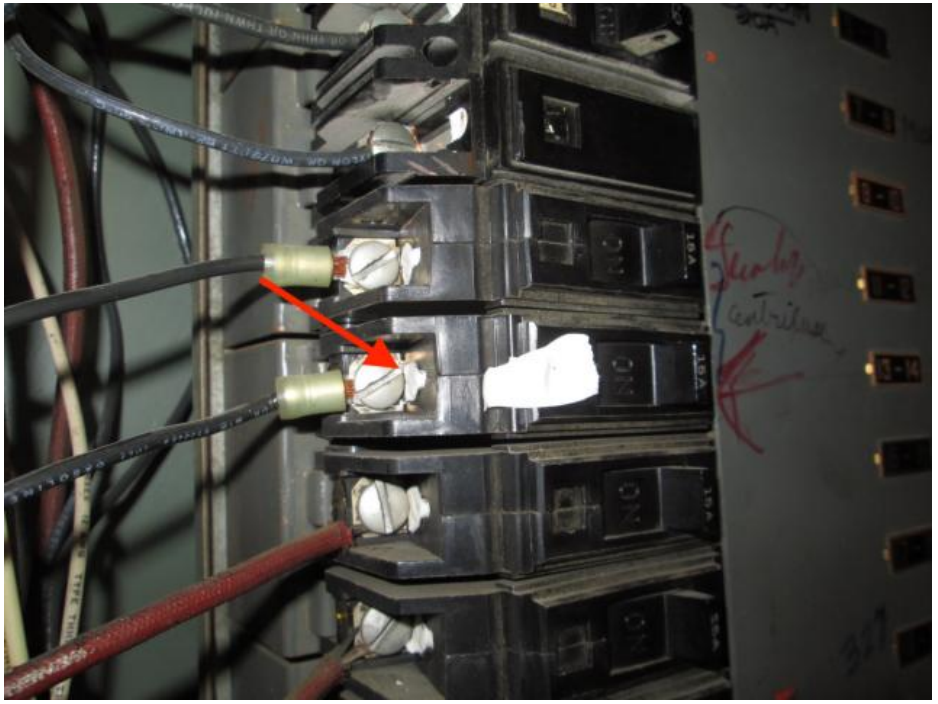
	Left
Upper	27°C
Middle	36°C
Lower	27°C

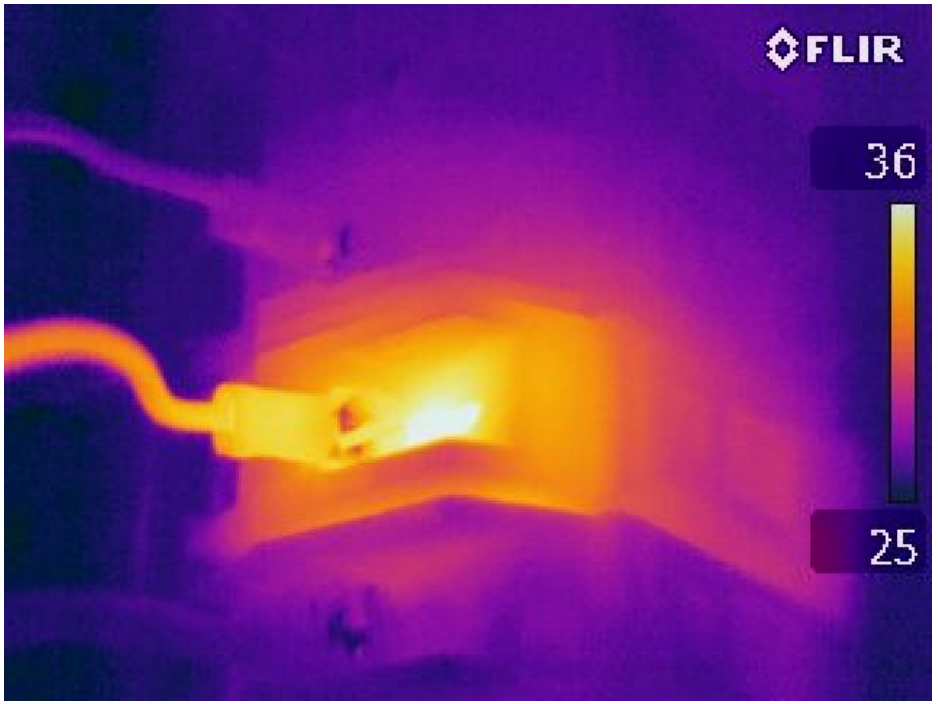
Referenced Delta T Criteria: NETA Component / Component

Obj. Priority 2 **Subj. Priority** **Avg. Priority:** 2

Reinspect date **Ambient Temp.**

Notes





Area/Image No. 2 **Job No.** 1234.7 **Date** 12/10/2021 **Time** 09:10

Location 3rd Deck **Equip #** Breaker #2

Equipment Panel Outside Room 310

Wind Speed N/A N/A **From** N/A **Sky** Indoor **Distance** <5'

E 1.0 **R/T** N/A **Lens** 1x **Filter** N/A **Window T %** N/A

Load: **Rated** 15 Amps **Measured** 10 Amps **%** 66.67%

Ambient Temp 26 °C **ΔT** 15.00 above Lower Connection

Comments Conductor Connection temperatures:

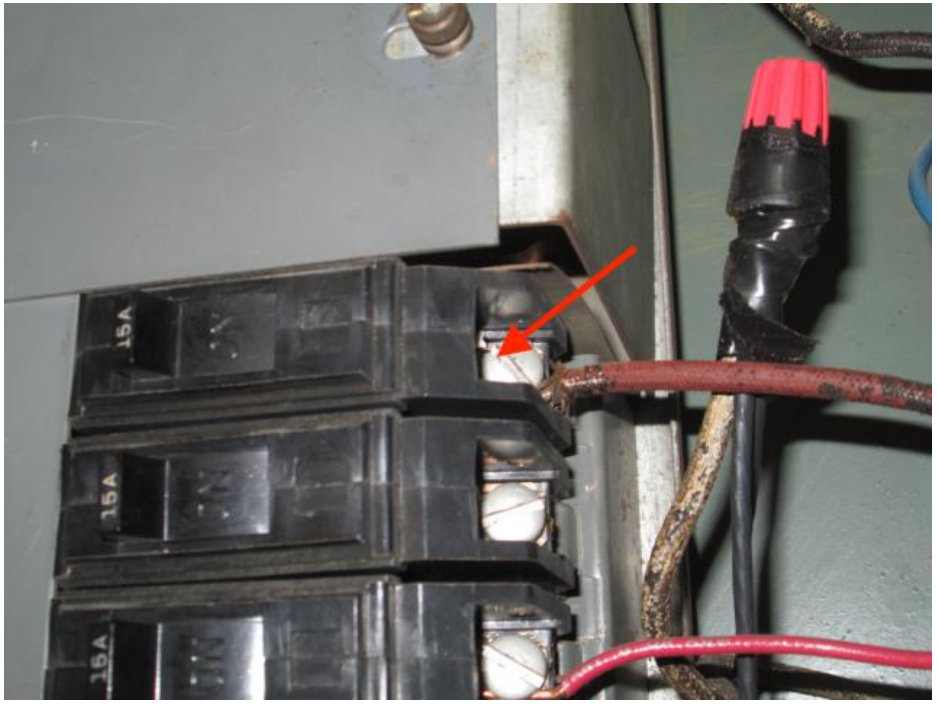
	Right
Upper	41°C
Middle	27°C
Lower	26°C

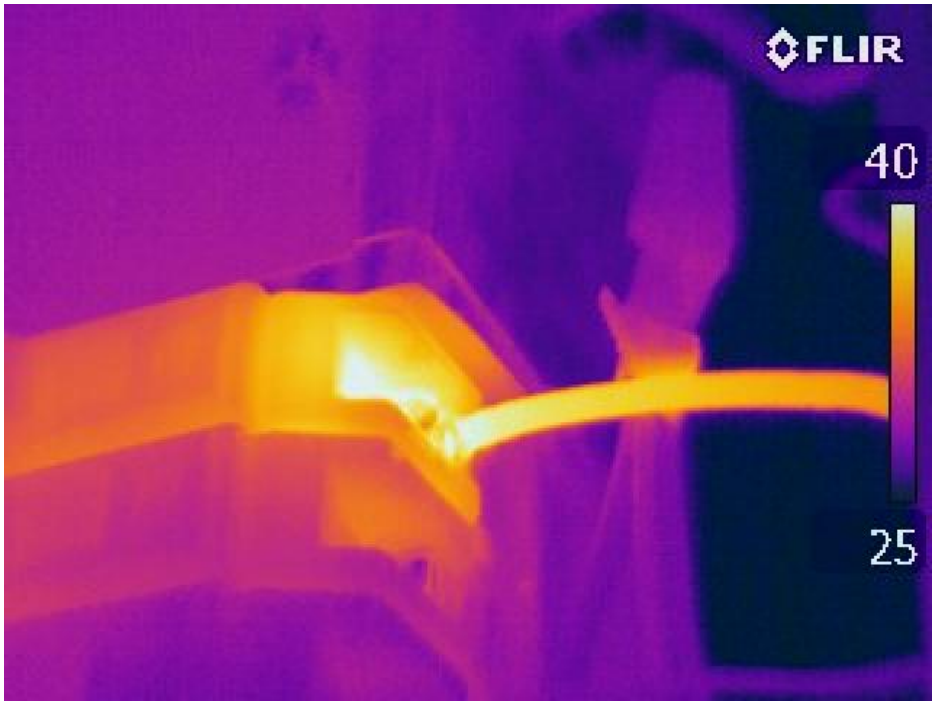
Referenced Delta T Criteria: NETA Component / Component

Obj. Priority 2 **Subj. Priority** **Avg. Priority:** 2

Reinspect date **Ambient Temp.**

N





Area/Image No. 3 **Job No.** 1234.7 **Date** 12/10/2021 **Time** 09:10

Location 2nd Deck **Equip #** Breaker #24

Equipment Port Side Panel

Wind Speed N/A N/A **From** N/A **Sky** Indoor **Distance** <5'

E 1.0 **R/T** N/A **Lens** 1x **Filter** N/A **Window T %** N/A

Load: **Rated** 15 Amps **Measured** 11 Amps **%** 73.33%

Ambient Temp 30 °C **ΔT** 20.00 above Lower Left Connection

Comments Conductor Connection temperatures:

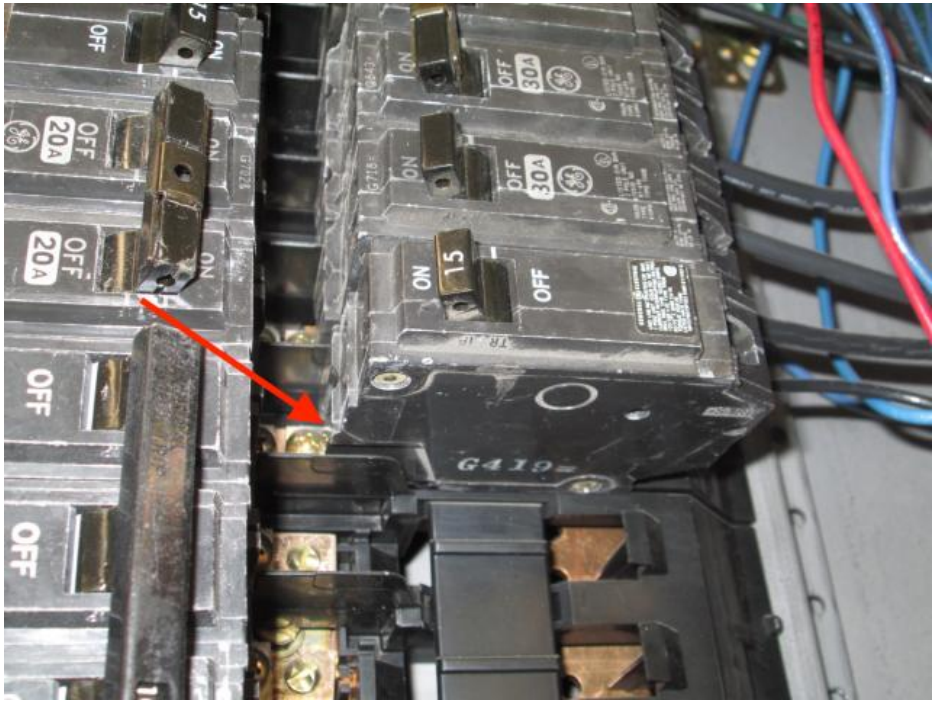
	Left	Right
Lower	31 °C	51 °C

Referenced Delta T Criteria: NETA Component / Component

Obj. Priority 1 **Subj. Priority** **Avg. Priority:** 1

Reinspect date **Ambient Temp.**

Notes



Area/Image No. 4 **Job No.** 1234.7 **Date** 12/10/2021 **Time** 03:15

Location Main Engine Room **Equip #** Breaker #1

Equipment SWBD Room

Wind Speed N/A N/A **From** N/A **Sky** Indoor **Distance** <5'

E 1.0 **R/T** N/A **Lens** 1x **Filter** N/A **Window T %** N/A

Load: **Rated** 50 Amps **Measured** 27 Amps **%** 54%

Ambient Temp 31 °C **ΔT** 10.00 above Lower Connection

Comments Left Conductor Connection Temperatures:

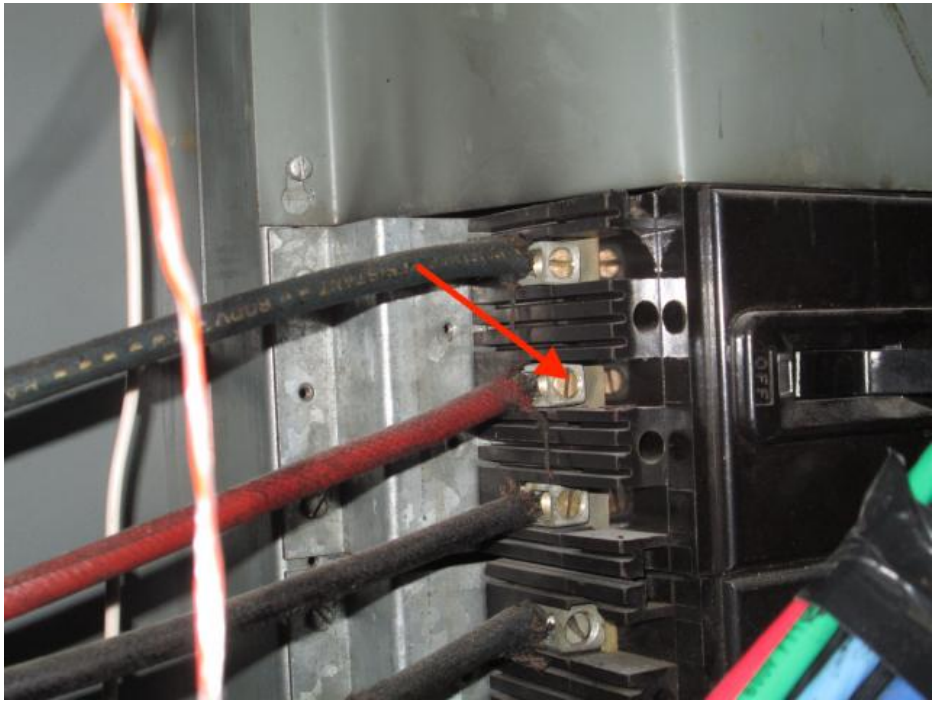
Upper	41°C
Middle	49°C
Lower	39°C

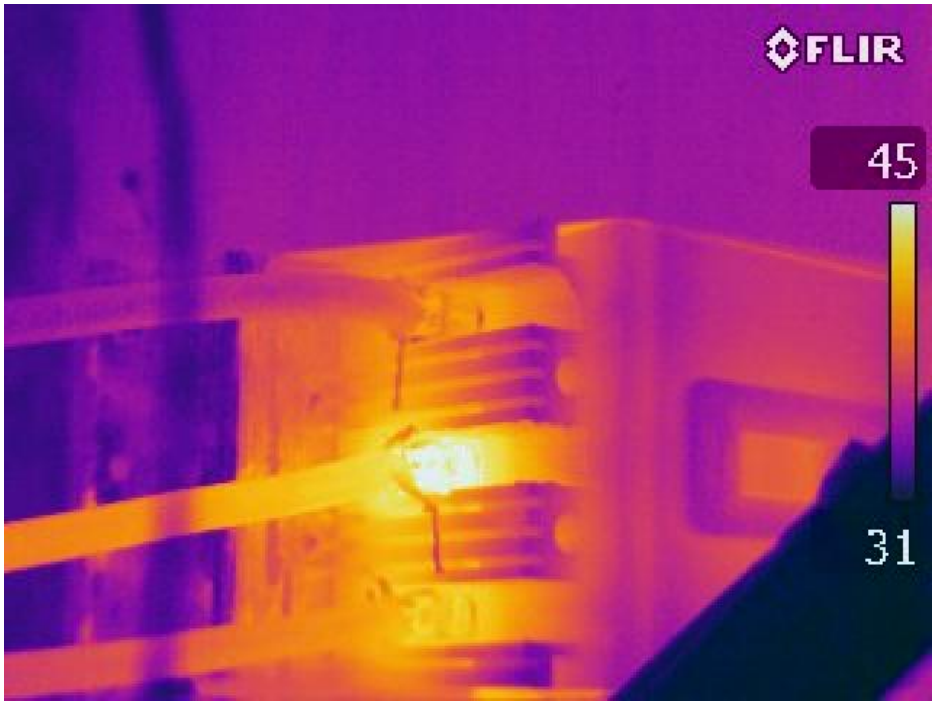
Referenced Delta T Criteria: NETA Component / Component

Obj. Priority 2 **Subj. Priority** **Avg. Priority:** 2

Reinspect date **Ambient Temp.**

Notes





Database Terminology

Upon entering into an area, our personnel collect the necessary data to construct the database by recording the nameplate information on each piece of electrical equipment.

Listed below are some common abbreviations used for equipment type.

Air Handler Unit	A H U	Lightning Arrestor	L A
Automatic Transfer Switch	A T S	Lighting Contactor	L C
Battery Rack	B A T T	Metering Cabinet	M E T
Bus Duct	B U S	Motor	M T R
Capacitor	C A P	Motor Control Center	M C C
Circuit Breaker	C B	Motor Controller	M C
Control Cabinet	C C	Oil Circuit Breaker	O C B
Current Transformer	C T	Peckerhead	P K H D
Disconnect Switch	D I S C	Potential Transformer	P T
Distribution Panel	D P	Power Distribution Unit	P D U
Emergency Distribution Panel	E D P	Power Panel	P P
Emergency Power Panel	E P P	Power Transformer	X F M R
Emerg. Power Transformers	E X F M R	Switchgear	S G
Environmental Control Unit	E C U	Uninterruptable Power Supply	U P S
Fire Pump Panel	F P P	Voltage Regulator	V R
Generator	G E N	Variable Speed Drive	V S D
Incoming Lines	I L	Variable Frequency DriveV	F D
Junction Box	J B		

In Service	Equipment is observed in the "on" position. Unless otherwise noted, no attempt is made to verify that the device is under load.
Picture No.	Corresponds to the predictive maintenance inspection card number.
Delta T	Temperature rise noted on the predictive maintenance inspection card.
Visual	Notation for broken parts, excessive dirt, rust, dead animals, etc. The results are either pass (P) or fail (F).
Ultrasound	Results of ultrasonic test data (when performed). The results are either pass (P) or fail (F).
Follow-up Required	Indicates a follow-up Survey should be performed.
Comments	Summary of findings. More details can be found on the predictive maintenance inspection card.

Job No. : 1234.7
Date : 12/10/2021
Route Number : 1

List of Equipment Inspected : 1

Date	Location 1	Location 2	Equip Type	Equip ID	In Service	Image No.	Priority	Visual	Ultra Sound
12/10/2021	Bridge	Port Side Electrical Panel	CB	ITE	Yes			Pass	N/A
12/10/2021	Bridge	Starboard Side Electrical Panel	PP	SP-PP	Yes			Pass	N/A
12/10/2021	3rd Deck	Starboard Side Panel	PP	5A	Yes			Pass	N/A
12/10/2021	3rd Deck	Port Side Panel	PP	3E	Yes	1	2	Pass	N/A
12/10/2021	3rd Deck	Panel Outside Room 310	PP	3E	Yes	2	2	Pass	N/A
12/10/2021	2nd Deck	Starboard Side Panel	PP	PP-AC-4	Yes			Pass	N/A
12/10/2021	2nd Deck	Port Side Electrical Panel	PP	NP 6/CS	Yes	3	1	Pass	N/A
12/10/2021	Main Eng. Room	SWBD Room	DP	EM Dist	Yes	4	2	Pass	N/A