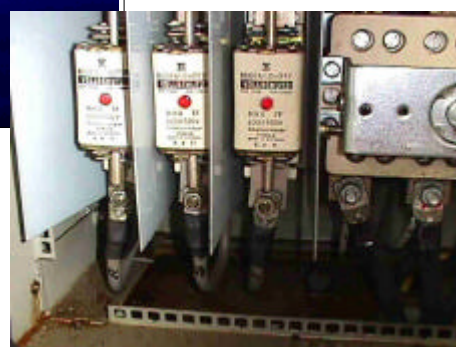
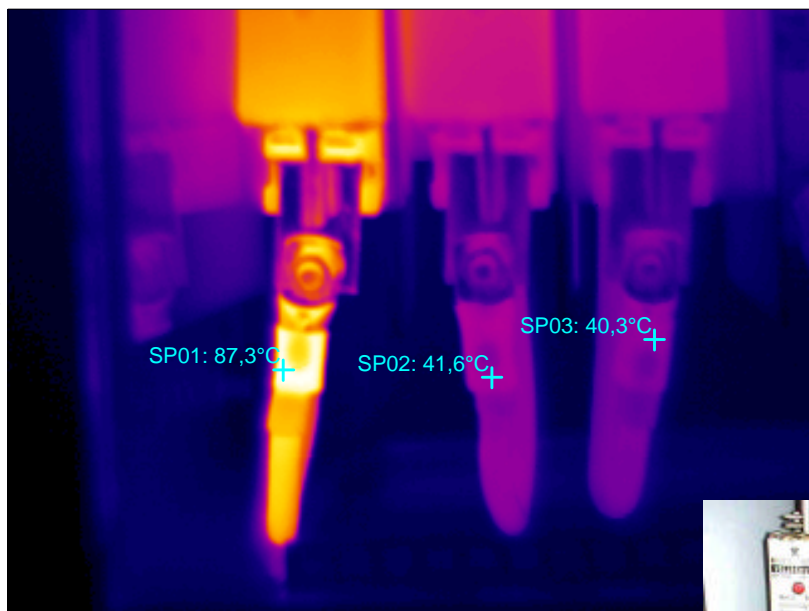


Thermographic Inspection



Information report

Job references:

Company:	Industry
Your ref:	PO-1000
Our ref:	5000
Operator:	Erik Sørbøsveen
Date of insp:	15.02.02 - 17.02.02

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Job description / comments

Part 2 (IR-reports)

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5	DB-1060	Distr. heattrace	Earthfault breaker for F4	5
6	DB-1010	Mainswitch, circuit 8	Phase L1	6
7	DB-101	9K5 and 9K6	Dimension problem	7
8	DB-1013	K3 (High speed contactor)	Link L2 to L3	8
9	LP-2086	Hvac, power section	Breaker Q-2050	9
10	Elevator panel	Protection breaker E7	Connection 1 (L1)	10
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Part 3 (Detailed checklists)

3:1	Switchboards, transformers, panels, boxes etc.

Part 4

Summary of inspection

Job description

1. Classification of initiative.

All the IR-reports in chapter 2, has a classification of condition. They have been given a "Grade" number, and at the bottom of each page there is a short explanation. More detailed information:

Grade 0: Normal, ok; - No need of initiative. (Recheck of initiative done)

Grade 1: Minor deviation; - To be monitored, new check to be arranged.

Grade 2: Significant deviation; - Repairs to be done as soon as possible

Grade 3: Unacceptable deviation; - Immediate repairs to be done

2. Repairs left to be done.

All

3. Info about Oceanor.

Oceanor's Thermographic Inspectors are certified according to Norwegian NEMKO. Requirements for this certificate are:

- The inspector has to be a el. technician.
- Necessary education/training in thermography. (minimum level 1)
- Repetition course by Nemko (theoretical and practical) every 2'nd year.
- Yearly repetition of safety regulations (FSL), working on low voltage equipment.
- Yearly calibration of instruments.

Oceanor, Nemko cert. no. T002.

Oceanor have carried out thermographic inspections since 1990, and supply this service to a wide spectre of customers:

- Shore-based industry.
- Carferries / fastferries
- Oiltankers
- Oilriggs / plattforms

Complete colour-reports can be supplied by e-mail or/and as a hardcopy or Cd.

Thermographic Inspection Information report

IR-Report no: 4
Place: Switchboard room 1
Equipment: S-1001, section 4:1
Description: Distr. Hvac
Controlpoint: UZ-element, phase L1



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	40 A	130,5°C
SP02	42 A	60,7°C
SP03	39 A	54,0°C

Normaltemp. (reference)	45°C
Diff SP01-Normaltemp.	85,5°C
Ambient temp.	18,0°C

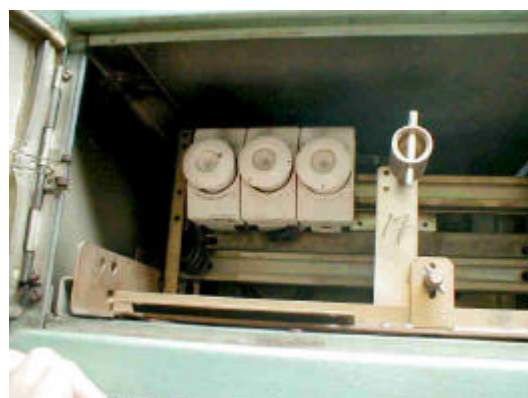
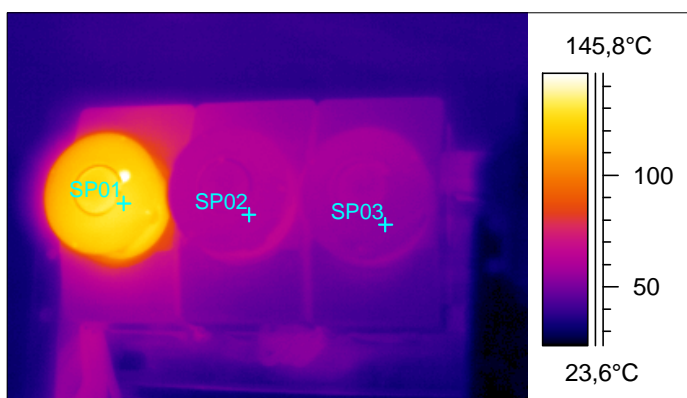
Object parameter	Value
Emissivity	0,80
Object distance	1,0 m

Suppl. info if available	Value
Nominal load (In)	63 A
Power at insp. (%)	64,0

IR information	Value
Date of inspection	19.02.01
Camera type	ThermaCAM PM695 PAL

Operator	Erik Sørbøsveen
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Grade 3



Fault description

Comments:

Poor bottomscrew or fuse causes the critical temperature. Immediate repair to be done.

Recommendation:

UZ-element to be changed. Do also check wires for damage.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 5
Place: Switchboard room 2
Equipment: DB-1060
Description: Distr. heattrace
Controlpoint: Earthfault breaker for F4



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	6 A	67,0°C
SP02	6 A	37,4°C
SP03	9 A	32,9°C

Normaltemp. (reference)	32°C
Diff SP01-Normaltemp.	35,0°C
Ambient temp.	20,0°C

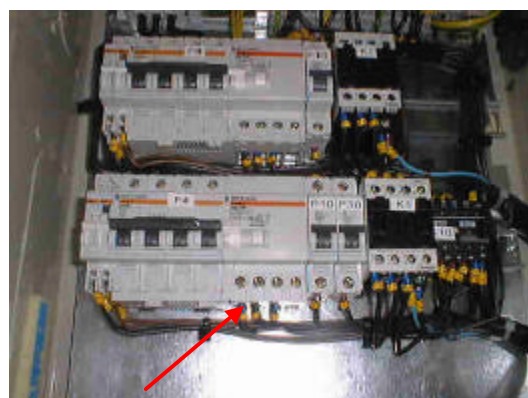
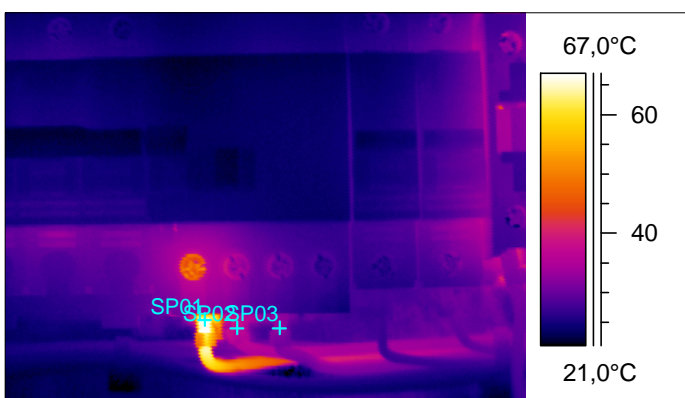
Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Suppl. info if available	Value
Nominal load (In)	16 A
Power at insp. (%)	43,8

IR information	Value
Date of inspection	13.02.02
Camera type	THV 550

Operator	Erik Sørbøsveen
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Grade 2



Fault description

Comments:

L1 wire is connected at the wrong side of the clip and causes this hotspot.

Recommendation:

Wire to be redone. Check wire and clip for damage of heat.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 6
Place: Switchboard room 2
Equipment: DB-1010
Description: Mainswitch, circuit 8
Controlpoint: Phase L1



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	5,2 A	46,8°C
SP02	5,2 A	32,0°C
SP03	5,2 A	29,0°C

Normaltemp. (reference)	28°C
Diff SP01-Normaltemp.	18,8°C
Ambient temp.	15,0°C

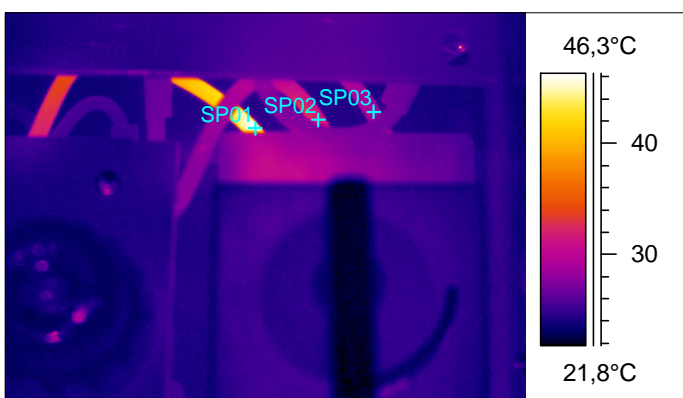
Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Suppl. info if available	Value
Nominal load (In)	11 A
Power at insp. (%)	47,3

IR information	Value
Date of inspection	07.02.02
Camera type	THV 550

Operator	Erik Sørbøsveen
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Grade 2



Fault description

Comments:

This is the supply for circulation pump no 3. Wire underneath breaker cover is probably loose.

Recommendation:

Check/retorque all terminals underneath breaker cover in a suitable period.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 7
Place: Switchboard room 2
Equipment: DB-101
Description: 9K5 and 9K6
Controlpoint: Dimension problem



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	21,5 A	114,6°C
SP02	21,5 A	88,3°C
SP03	21,5 A	87,6°C

Suppl. info if available	Value
Nominal load (In)	22 A
Power at insp. (%)	97,7

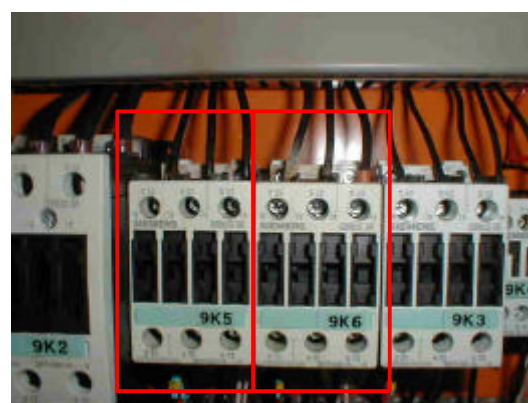
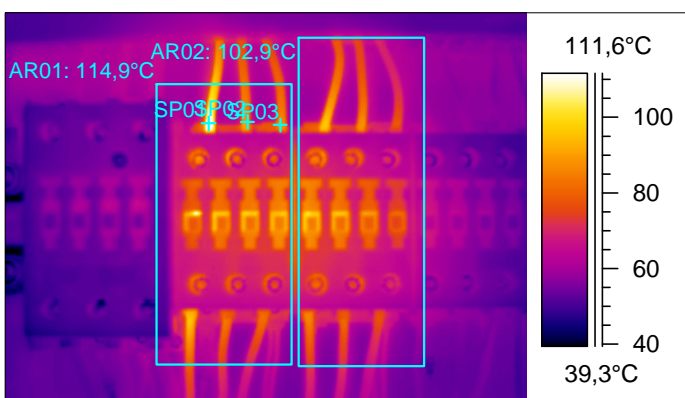
Normaltemp. (reference)	55°C
Diff SP01-Normaltemp.	59,6°C
Ambient temp.	22,0°C

IR information	Value
Date of inspection	05.12.01
Camera type	ThermaCAM PM695 PAL

Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Operator	Erik Sørbøsveen
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Grade 3



Fault description

Comments:

Both contactors and wires on these circuits have a dimension problem. Burnmarks on wires (2,5 mm²) and very high temperature on the contactors. Wires in cable-channel are over 70°C.

Recommendation:

Increase dimensions on both contactors and wires. Immediate repair to be done.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 8
Place: Switchboard room 3
Equipment: DB-1013
Description: K3 (High speed contactor)
Controlpoint: Link L2 to L3



Measuringvalues / Condition

Measurepoint	Load	Temperature
AR01:max	6 A	42,7°C

Normaltemp. (reference)	25°C
Diff AR01:max - Normaltemp	17,7°C
Ambient temp.	15,0°C

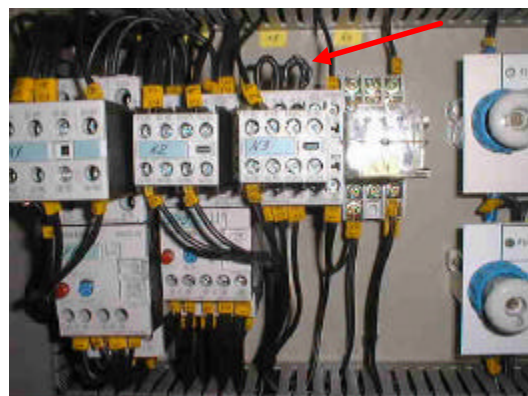
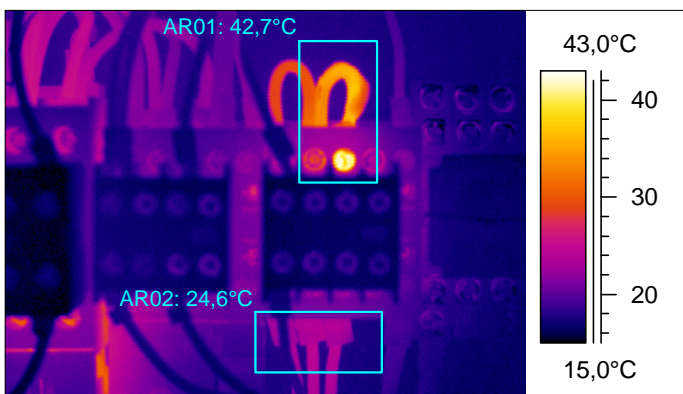
Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Suppl. info if available	Value
Max load	7 A
Power at insp. (%)	85,7

IR information	Value
Date of inspection	07.02.02
Camera type	THV 550

Operator	Erik Sørbøsveen
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Grade 3



Fault description

Comments:

This is the highspeed contactor for the supplyfan. The wirelink is burned and have been much warmer at a earlier stage.. The connection clip is burned and "black" as well. Do only run this fan on lowspeed until contactor has been replaced.

Recommendation:

Contactor and wirelink to be changed. **Contactortype: Siemens G/990512#E04# / 3RT1017-1AP01**

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 9
Place: Switchboard room 4
Equipment: LP-2086
Description: Hvac, power section
Controlpoint: Breaker Q-2050



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	9 A	22,8°C
SP02	9 A	52,1°C

Normaltemp. (reference)	22°C
Diff SP02-Normaltemp.	30,1°C
Ambient temp.	16,0°C

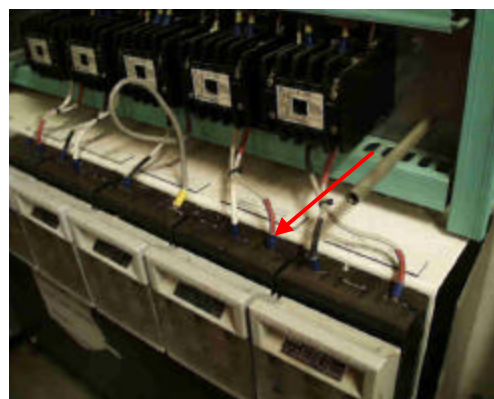
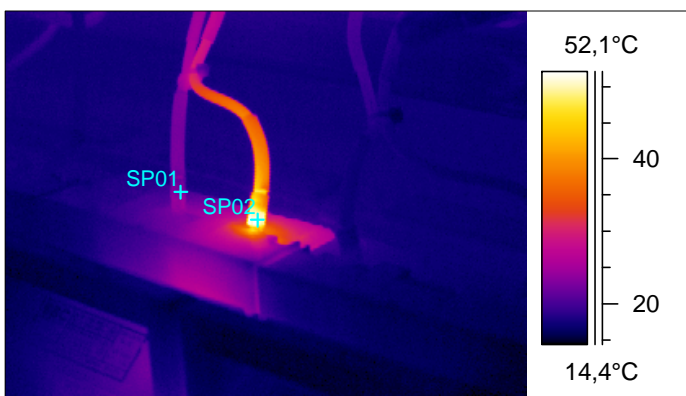
Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Suppl. info if available	Value
Max load	16 A
Power at insp. (%)	56,3

IR information	Value
Date of inspection	07.03.02
Camera type	THV 550

Operator	Erik Sørbøsveen
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Grade 2



Fault description

Comments:

This breaker is located at the right hand side. Poor cables shoe is probably the reason for this heatup, but it could be a poor fuseclamp inside breaker as well.

Recommendation:

Replace cables shoe and check fuseclamp for damage.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 10
Place: Elevator room
Equipment: Elevator panel
Description: Protection breaker E7
Controlpoint: Connection 1 (L1)



Measuringvalues / Condition

Measurepoint	Load	Temperature
SP01	0,2 A	74,5°C
SP02	0,2 A	33,2°C

Normaltemp. (reference)	33°C
Diff SP01-Normaltemp.	41,5°C
Ambient temp.	30,0°C

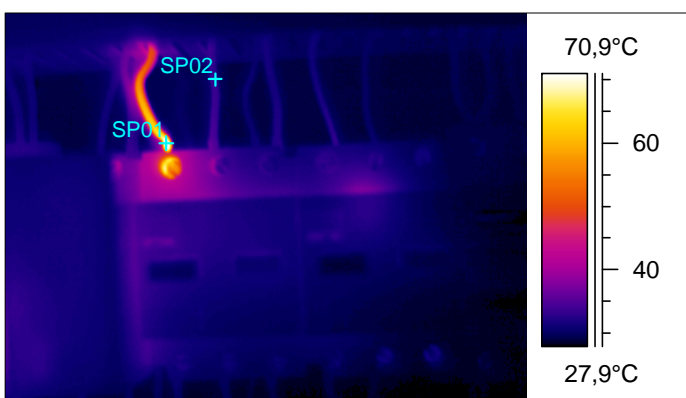
Object parameter	Value
Emissivity	0,95
Object distance	0,5 m

Suppl. info if available	Value
Max load	0,3 A
Power at insp. (%)	66,7

IR information	Value
Date of inspection	30.08.01
Camera type	ThermaCAM PM695 PAL

Operator	Erik Sørbøsveen
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Grade 3



Fault description

Comments:

Connection clip is wide open and both wire and clip is burned.

Recommendation:

Protection breaker and wire to be replaced immediately. **Type: Siemens 11E 3VE1.**

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 11
Place: Boiler room
Equipment: H-1302C
Description: Hotwater-heater
Controlpoint: Heater elements



Measuringvalues / Condition

Measurepoint	Load	Temperature
AR01:max	34 A	219,6°C

Normaltemp. (reference)	55°C
Diff AR01:max - Normaltemp	164,6°C
Ambient temp.	15,0°C

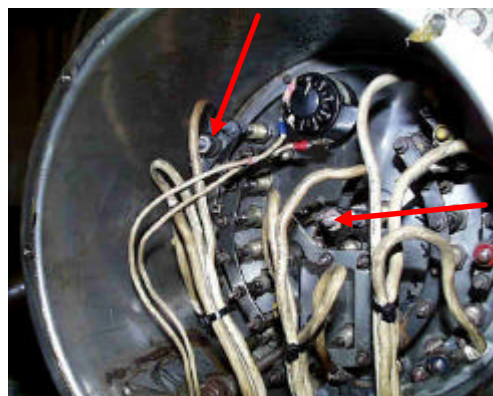
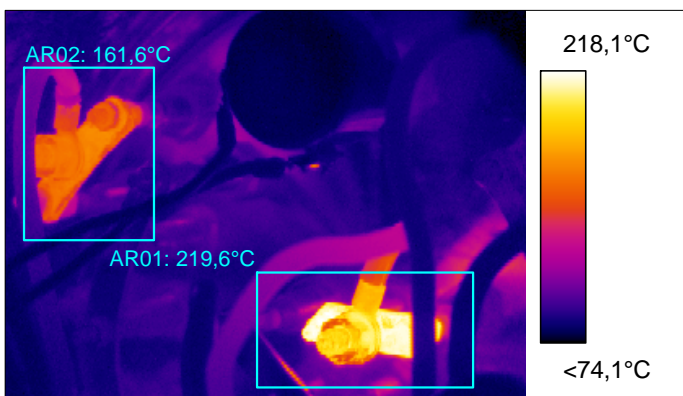
Object parameter	Value
Emissivity	0,90
Object distance	0,5 m

Suppl. info if available	Value
Max load	34 A
Power at insp. (%)	100,0

IR information	Value
Date of inspection	07.03.02
Camera type	THV 550

Operator	Erik Sørbøsveen
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Grade 3



Fault description

Comments:

Critical temperatures on two connection-points for heatelements. Immediate repair to be done.

Recommendation:

Cablesheets to be replaced and a general cleanup on all connectionpoints/wires inside this box must be done. Check heater elements for damage, they might be changed as well.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

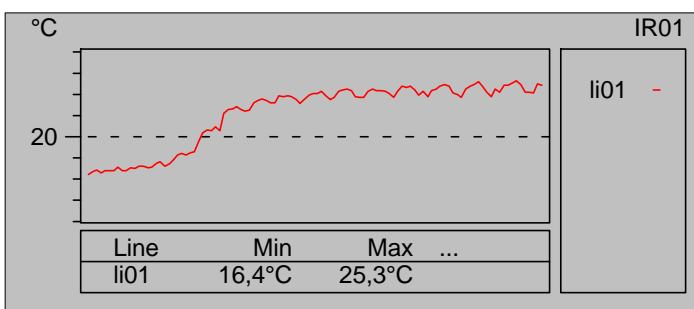
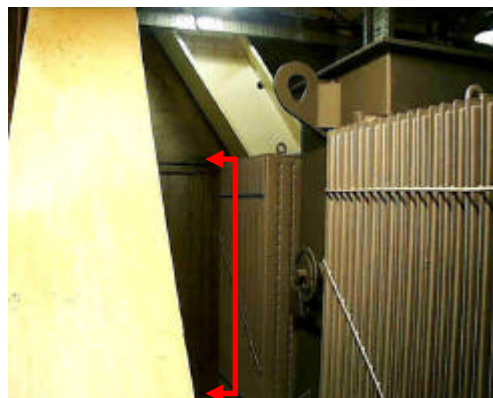
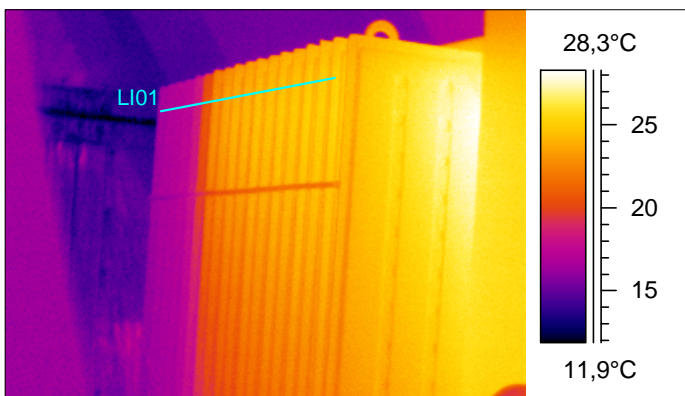
Grade 3 = Unacceptable deviation

Thermographic Inspection Information report

IR-Report no: 12
Place: Transformer room
Equipment: T-1003
Description: 6,6kv/440V trafo
Controlpoint: Cooling ribs prim. side



Measuringvalues / Condition



Measurepoint	Temperature
LI01:max temp.	25,3°C
LI01:min temp.	16,4°C
Normaltemp. (reference)	25°C
Diff Normaltemp. - LI01:min	8,6°C
Ambient temp.	15,0°C

Load	Value
Max load (In)	1000 A
Max load (In) Load at insp.	170 A

IR information	Value
Date of inspection	06.03.02
Time of creation	10:34:10
Emissivity	0,95

Operator	Erik Sørbøsveen
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Grade 1

Fault description

Comments:

There is a marked temperature-dropp on six of the cooling ribs furthest out. Could it be dirt inside that obstruct oil-circulation?

Recommendation:

To be confirmed by supplier.

Repaired by / date:

Rechecked by / date:

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation

Inspection program

Place	Equipment	Grouping	Nr.	Description	Last insp.	Insp. date	Note
Switchboard room 1	S-1001	section	1-2-3-4-5	440V Swb.	Feb 2001	17.02.02	Fault, ref report no 4
Switchboard room 1	DB-1049			Distr. lighting	Feb 2001	17.02.02	
Switchboard room 1	DB-1051			Distr. heating	Feb 2001	17.02.02	
Switchboard room 1	LP-2387			Hvac distr. 1	Feb 2001	17.02.02	
Switchboard room 1	LP-2388			Hvac distr. 2	Feb 2001	17.02.02	
Switchboard room 2	S-1002	section	1-2-3	440V Swb.	Feb 2001	17.02.02	
Switchboard room 2	DB-1010			Distr. Circ. pumps	Feb 2001	17.02.02	Fault, ref report no 6
Switchboard room 2	DB-1060			Distr. heating	Feb 2001	17.02.02	Fault, ref report no 5
Switchboard room 2	DB-101			Starter panel	Feb 2001	17.02.02	Fault, ref report no 7
Switchboard room 2	LP-2390			Hvac distr. 3	Feb 2001	17.02.02	
Switchboard room 3	S-1003	section	1-2	440V Swb.	Feb 2001	17.02.02	
Switchboard room 3	DB-1013			Ventilation panel	Feb 2001	17.02.02	Fault, ref report no 8
Switchboard room 3	DB-1014			Distr. lighting	Feb 2001	17.02.02	
Switchboard room 4	S-1004	section	1-2	440V Swb.	Feb 2001	17.02.02	
Switchboard room 4	LP-2086			Hvac panel	Feb 2001	17.02.02	Fault, ref report no 9
Switchboard room 4	DB-2346			Light & heat panel	Feb 2001	17.02.02	
Transformer room	T-0001			440/230V transformer	Feb 2001	17.02.02	
Transformer room	T-0002			440/230V transformer	Feb 2001	17.02.02	
Transformer room	T-0003			6,6kv/440V transformer	Feb 2001	17.02.02	Fault, ref report no 12
Elevator room	Elevator panel			Relays and contactors	Feb 2001	17.02.02	Fault, ref report no 10
H-1302A	Hotwater boiler A			Heater elements	Feb 2001	17.02.02	
H-1302B	Hotwater boiler B			Heater elements	Feb 2001	17.02.02	
H-1302C	Hotwater boiler C			Heater elements	Feb 2001	17.02.02	Fault, ref report no 11

Summary of inspection at Information report

IR-rep. no	Equipment	Description	Controlpoint	Grade	Note
4	S-1001, section 4:1	Distr. Hvac	UZ-element, phase L1	3	not repaired
5	DB-1060	Distr. heattrace	Earthfault breaker for F4	2	not repaired
6	DB-1010	Mainswitch, circuit 8	Phase L1	2	not repaired
7	DB-101	9K5 and 9K6	Dimension problem	3	not repaired
8	DB-1013	K3 (High speed emulator)	Link L2 to L3	3	not repaired
9	LP-2086	Hvac, power section	Breaker Q-2050	2	not repaired
10	Elevator panel	Protection breaker E7	Connection 1 (L1)	3	not repaired
11	H-1302C	Hotwater-heater	Heater elements	3	not repaired
12	T-1003	6,6kv/440V trafo	Cooling ribs prim. side	1	follow up

Grade 0 = Ok

Grade 1 = Monitored

Grade 2 = Significant deviation

Grade 3 = Unacceptable deviation