

# DIAGTECH®

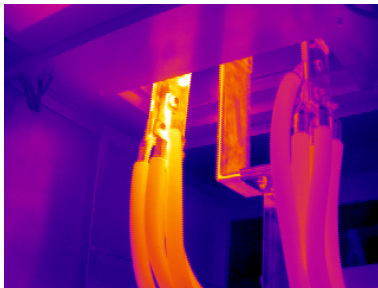
## TECHNICAL DIAGNOSTIC INFRARED THERMOGRAPHY ULTRASOUND

### PREVENTIVE MAINTENANCE INSPECTION : PERTINENT EXAMPLES OF PROBLEMS THAT CAN BE DETECTED WITH INFRARED THERMOGRAPHY

Thermographic inspection of some equipments

Thermal pictures taken with a FLIR THV 550, 595 or P40 equipment

Digital pictures taken with a digital KODAK or CANON camera



OPERATORS : Fabien STURNI\*, André LEHMANN or Pascal ZILLER\*

WRITER OF THIS REPORT : Jean-Michel KNAB\* and Stéphanie VALENTIN

\* CNPP-certified Thermograph enabled to control electrical fittings with Infrared Thermography according to the D19 technical document of the french Association of Damages Insurance Companies APSAD

*-----Your Partner in preventive Maintenance-----*

**DIAGTECH S.A.R.L.**  
32, rue du Village  
F-67170 HOCHSTETT (Headquater)

Phone: 00 33 3 88 51 56 82  
Telefax: 00 33 3 88 51 56 70  
e-mail: [diagtech.tir@wanadoo.fr](mailto:diagtech.tir@wanadoo.fr)

Manager :  
Jean-Michel KNAB \*

R.C.S. (Trade Register) Strasbourg B 408 535 136  
APE-Code : 7490B  
N°TVA (VAT Number) : FR41408535136

Website : [www.diagtech.fr](http://www.diagtech.fr)

Mediterranean office +33.4.78.40.59.76  
mail: [diagtech.mediterranee@wanadoo.fr](mailto:diagtech.mediterranee@wanadoo.fr)

German branch  
e-mail: [diagtech.de@gmx.net](mailto:diagtech.de@gmx.net)

## **AIMS OF THE INFRARED THERMOGRAPHIC CONTROL OF ELECTRICAL FITTINGS**


- DETECTION AND ANTICIPATION OF ABNORMAL OVERHEATINGS AND / OR OF EXCESSIVE OVERHEATING VARIATIONS WHICH CAN, AMONG OTHERS, LEAD INTO :

- A DAMAGING TO THE CONCERNED EQUIPMENTS
- A SHORT CIRCUIT
- A FIRE START
- AN UNTIMELY RELEASING
- A BREAKDOWN OF PRODUCTION

- CONTRIBUTION TO THE DECISION ELEMENTS ALLOWING A CORRECTIVE INTERVENTION ADAPTED TO THE PLANT AND MACHINERY, FITTINGS OR EQUIPMENTS IDENTIFIED IN THIS WAY.

AT FIRST, THERE IS A QUALITY CONTROL TO BE DONE (SEARCHING OF THE HOT SPOTS) AND IN CASE OF DETECTION OF A MALFUNCTION, A QUANTIFICATION (OVERHEATING VALUES) WILL ALLOW TO DEFINE THE EMERGENCY DEGREES (RISKS) AND THE NEED OF CORRECTIVE AND / OR PREVENTIVE INTERVENTIONS.


### **RISK SCALE / EMERGENCY DEGREE :**

**RISK :**  REPAIR IMMEDIATELY OR AS SOON AS POSSIBLE. TAKE ADVANTAGE OF THE AVAILABILITY OF THE CAMERA ON YOUR SITE IN ORDER TO MAKE A CONTROL AFTER A POSSIBLE REPAIR.

**RISK :**  REPAIR SHORTLY, IN THIS CASE ON RECEIPT OF THE INTERVENTION REPORT.

**RISK :**  CORRECTIVE INTERVENTION TO BE PLANNED WITHIN 2 OR 4 WEEKS.

**RISK :**  IN THE COURSE OF THE MAINTENANCE CALENDAR.

**RISK :**  THIS COLOUR CODE SHOWS THAT THERE IS A PARTICULAR PROBLEM ON THIS EQUIPMENT :

- TOO HIGH TEMPERATURE IN THE ENCLOSURE
- IMBALANCED LOADS ON THE PHASE CONDUCTORS
- BADLY VENTILATED COMPONENT...

### **THE CORRECTIVE INTERVENTION HAVE TO BE CARRIED OUT BY THE CLIENT.**

After each intervention, the suppression of all defects has to be controled, for example with a infrared thermometer.

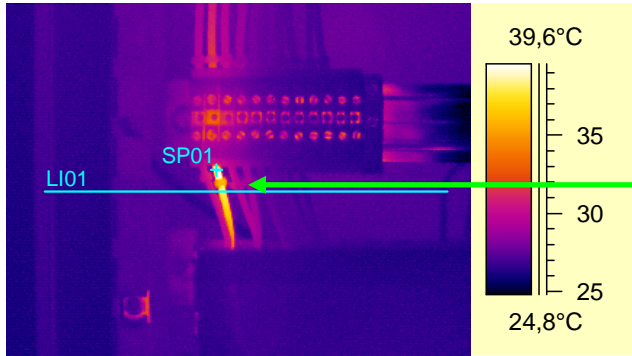
**WARNING :**

- A defect can hide another one of minor importance
- A new component is not necessary free from defects
- ...

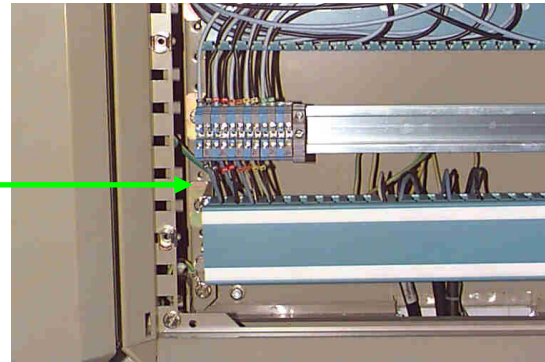
# DESCRIPTION OF A REPORT PAGE

**LOCATION :**

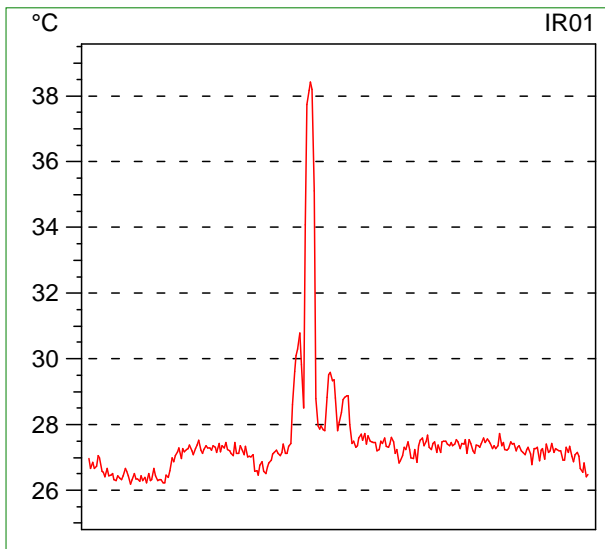
BUILDING / PREMISES	EQUIPMENT	COMPONENT
IN ORDER TO ALLOW A	CERTAIN IDENTIFICATION OF THE COMPONENT	



THERMOGRAM



PHOTO



THERMIC PROFILE OF LI01

IR information	Value
Date of creation	23/07/1996
Time of creation	15:42:09
File name	G0723-03.img
Camera type	THV 550
Camera serial number	656089
Camera lens	20
Object parameter	Value
Emissivity	0,98
Label	Value
SP01	40,2°C
LI01 : max	38,4°C
LI01 : min	26,2°C

DATA CONNECTED WITH THE THERMOGRAM

THE X-AXIS IS PROPORTIONAL TO THE LENGTH OF LI01

**Kind of defect / Interpretation of the measuring :**

IN THIS FRAME, WE INDICATE YOU CLEARLY THE ORIGIN AND THE KIND OF THE DEFECT.

**Recommendations / Emergency degree :**

COLOUR CODE OF EMERGENCY DEGREE **RISK :**

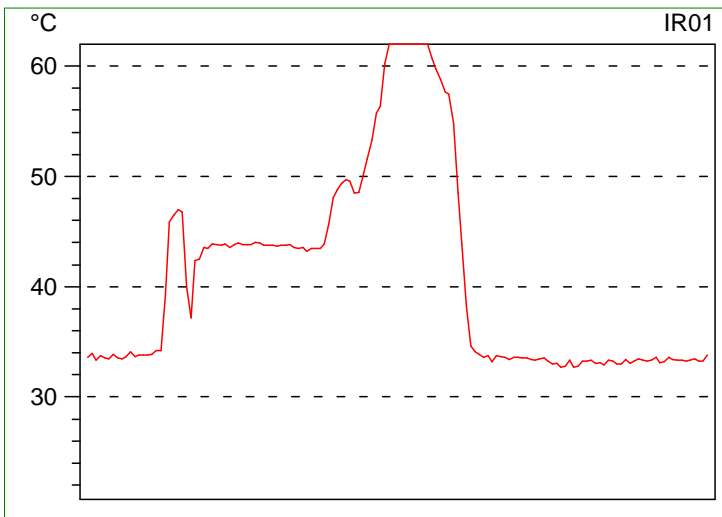
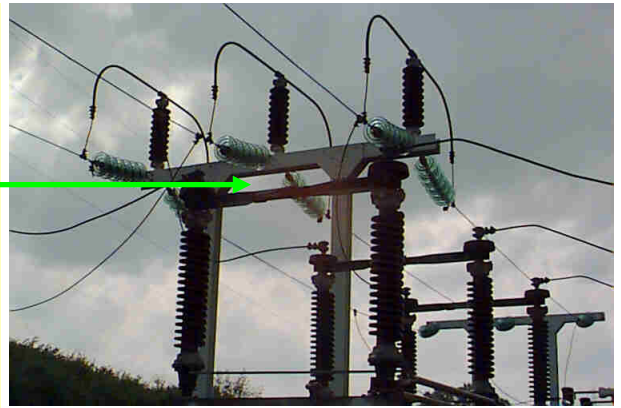
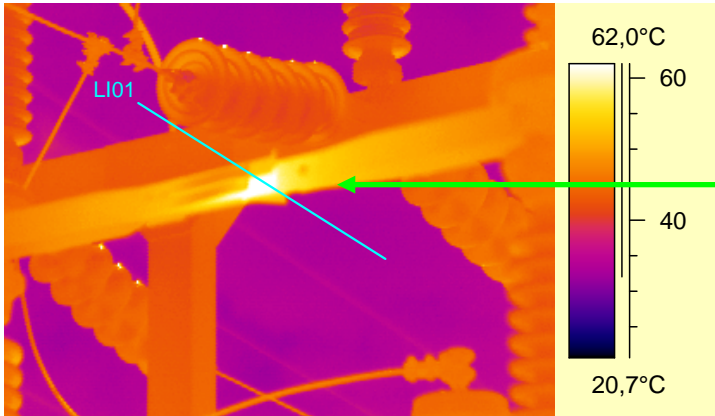
HERE, WE RECOMMEND THE CORRECTIVE ACTION TO BE UNDERTAKEN BY YOU, AS WELL AS THE INTERVENTION DEADLINE.

**Corrective action of the compagny :**

NATURE	DATE	OPERATOR	SIGNATURE
THIS FRAME IS USED FOR THE FOLLOW-UP OF THE REPAIRS, IT'S RESERVED TO YOU.			

**LOCATION :**

BUILDING / PREMISES	EQUIPMENT	COMPONENT
DELIVERY STATION	DISCONNECTING SWITCH TRANSFORMER 3	BAR 3021



IR information	Value
Date of creation	27/08/1997
Time of creation	14:48:06
File name	H0827-31.img
Camera type	THV 550
Camera serial number	656089
Camera lens	10
Object parameter	Value
Emissivity	0,60
Label	Value
LI01 : max	63,6°C
LI01 : min	32,7°C

**Kind of defect / Interpretation of the measuring :**

**RISK :**

HEATING OF THE CONNECTION BETWEEN THE FIXED PART AND THE MOBILE PART OF THIS HIGH TENSION DISCONNECTING SWITCH. THE HOTTEST POINT IS ON LI01.

**Recommendations / Emergency degree :**

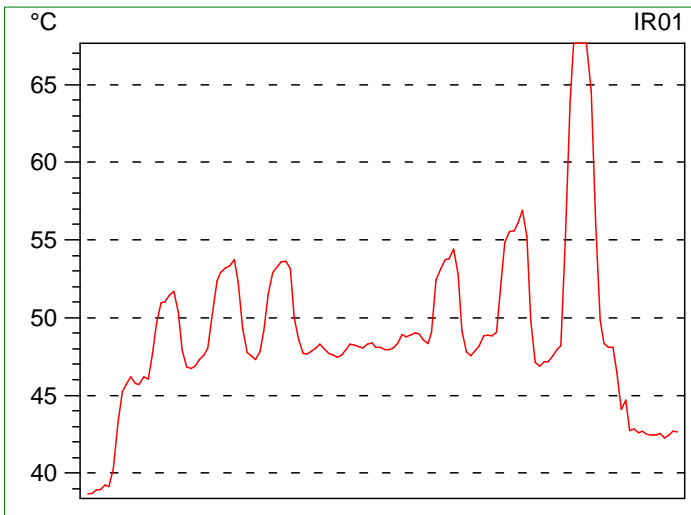
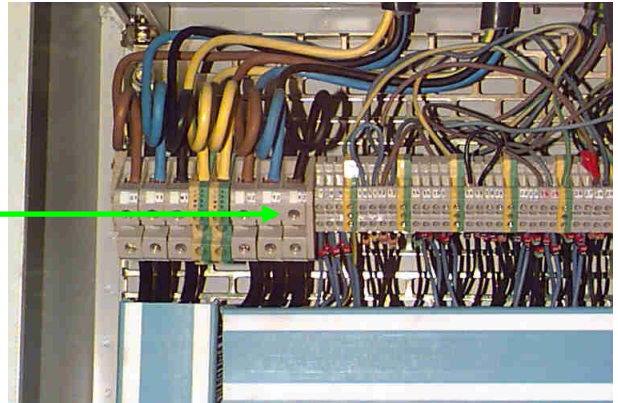
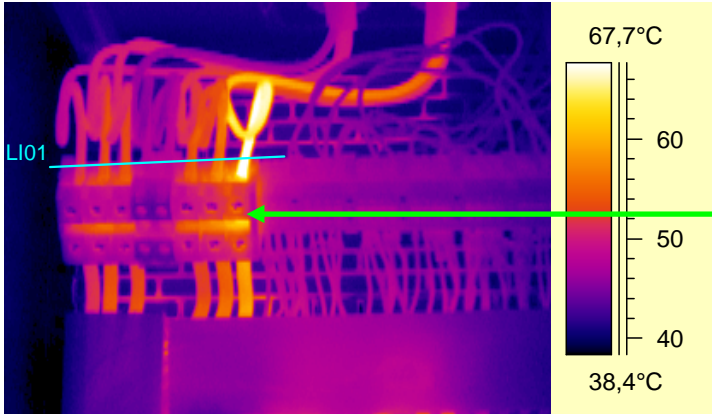
JUST MAKE A MAINTENANCE WORK ON THE CONNECTION OF THIS POLE. CONTROL THE ELIMINATION OF THE DEFECT WITH THE HELP OF AN INFRARED THERMOMETER WITH LASER AIMING. ACT ACCORDING TO THE RESULTS. INTERVENE WITHIN TWO OR FOUR WEEKS.

**Corrective action of the compagny :**

NATURE	DATE	OPERATOR	SIGNATURE

**LOCATION :**

BUILDING / PREMISES	EQUIPMENT	COMPONENT
SUBSTATION PUMPING	CUPBOARD PUMPS	TERMINAL HOLDER D2



IR information	Value
Date of creation	18/07/1996
Time of creation	08:47:25
File name	G0718-01.img
Camera type	THV 550
Camera serial number	656089
Camera lens	20
Object parameter	Value
Emissivity	0,98
Label	Value
LI01 : max	69,0°C
LI01 : min	38,7°C

**Kind of defect / Interpretation of the measuring :**

**RISK :**

SIGNIFICANT HEATING OF THE BLACK CONDUCTOR ON THE UPPER SIDE OF TERMINAL HOLDER D2.  
TIGHTENING PROBLEM.

**Recommendations / Emergency degree :**

CONTROL THE STATE OF THE TERMINAL AND THE CONDUCTORS, REPLACE AND / OR SHORTEN IF NECESSARY.  
INTERVENE WITHIN TWO OR FOUR WEEKS.

**Corrective action of the company :**

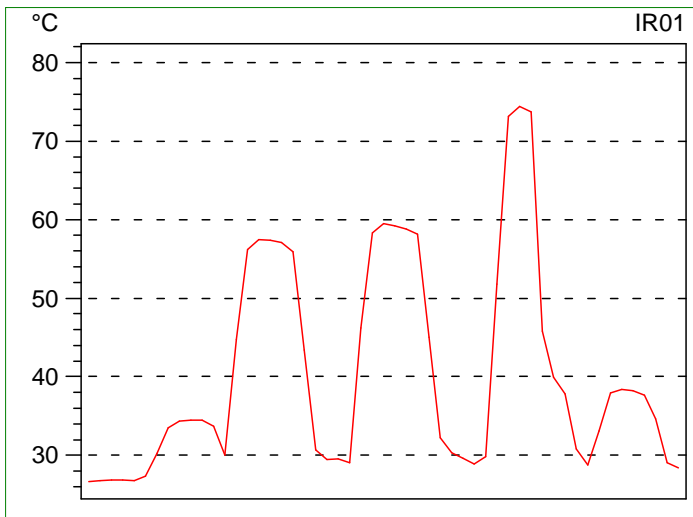
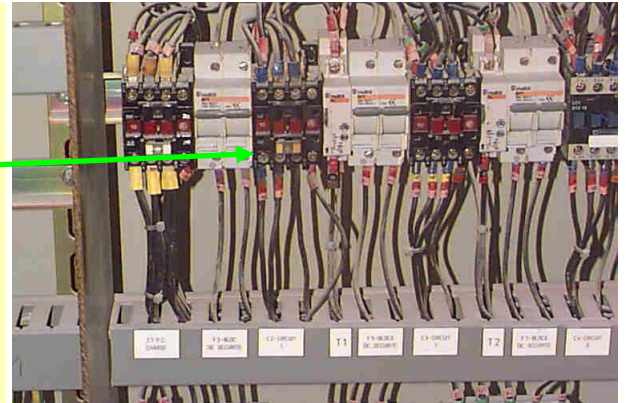
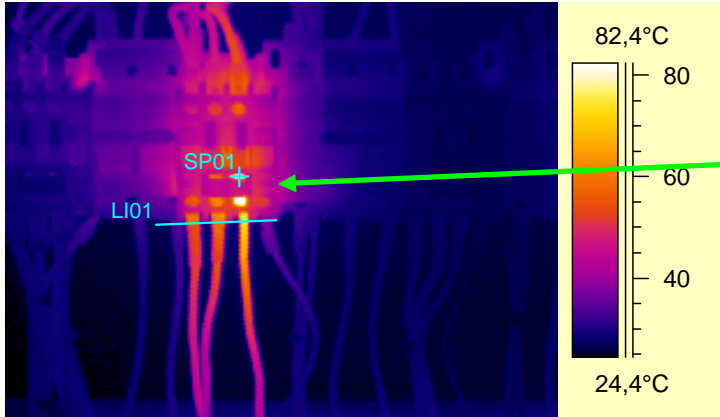
NATURE	DATE	OPERATOR	SIGNATURE

WITHOUT THE VERY HIGH RESOLUTION OF OUR CAMERA  
WE WOULD NOT BE ABLE TO QUALIFY SO PRECISELY SUCH A DEFECT.

**DIAGTECH**

**LOCATION :**

BUILDING / PREMISES	EQUIPMENT	COMPONENT
PACKAGING	CUPBOARD CONVEYOR	CONTACTOR 7Q1



IR information	Value
Date of creation	10/09/1996
Time of creation	12:58:53
File name	G0910-31.img
Camera type	THV 550
Camera serial number	656089
Camera lens	20
Object parameter	Value
Emissivity	0,98
Label	Value
SP01	92,0°C
LI01 : max	74,4°C
LI01 : min	26,7°C

**Kind of defect / Interpretation of the measuring :**

**RISK :**

SIGNIFICANT HEATING OF THE CONDUCTOR, BELOW ON THE RIGHT SIDE OF THE SWITCH. NEVERTHELESS THE FIRST CAUSE IS INSIDE OF THE CONTACTOR (SP01 AT +92°C). THE HEATING HAPPENS BETWEEN THE FIXED CONTACT AND THE MOBILE CONTACT OF THIS PHASE ON THE LOWER PART OF THIS EQUIPMENT.

**Recommendations / Emergency degree :**

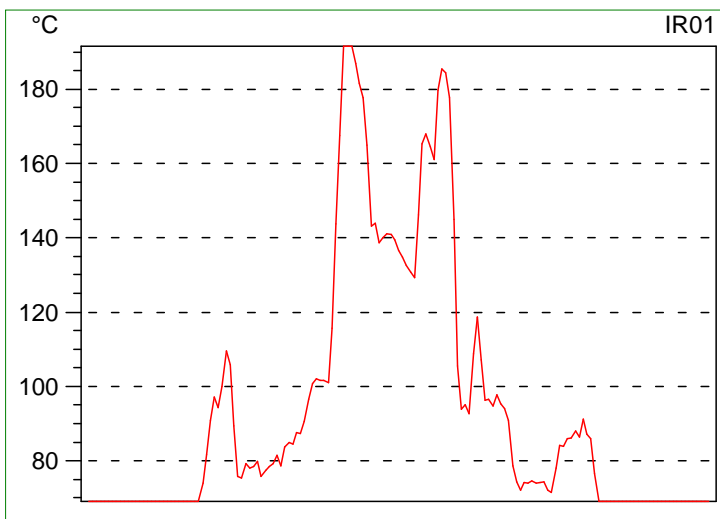
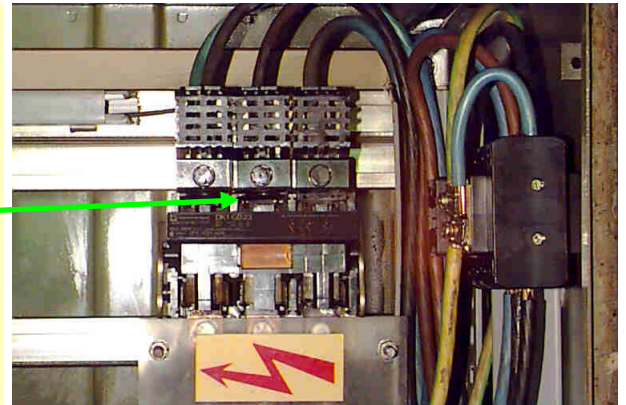
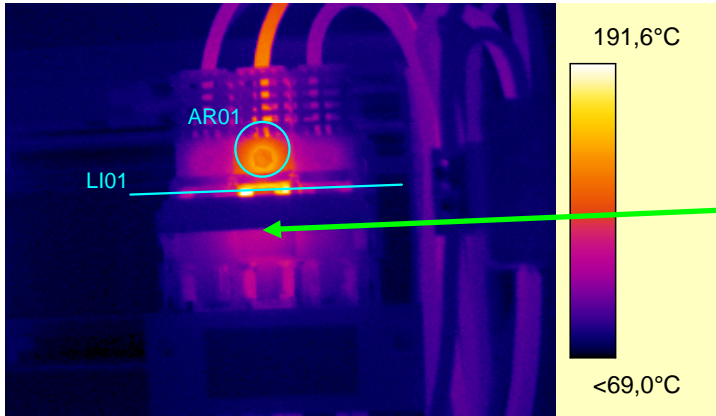
REPLACE THE CONTACTOR.  
INTERVENE WITHIN TWO DAYS.

**Corrective action of the company :**

NATURE	DATE	OPERATOR	SIGNATURE

**LOCATION :**

BUILDING / PREMISES	EQUIPMENT	COMPONENT
BOILER ROOM	CUPBOARD PUMPS	FUSES SWITCH Q1



IR information	Value
Date of creation	03/12/1996
Time of creation	10:06:11
File name	G1203-13.img
Camera type	THV 550
Camera serial number	656089
Camera lens	20
Object parameter	Value
Emissivity	0,98
Label	Value
LI01 : max	197,7°C
LI01 : min	<69,0°C
AR01 : max	152,1°C

**Kind of defect / Interpretation of the measuring :**

**RISK :**

VERY SIGNIFICANT HEATING OF THE CONNECTION BETWEEN THE FUSE AND ITS SUPPORT ON THE UPPER PART OF THE CENTRAL PHASE.  
BUCKLING OF THE PINCHING BLADES OF THE FUSE.

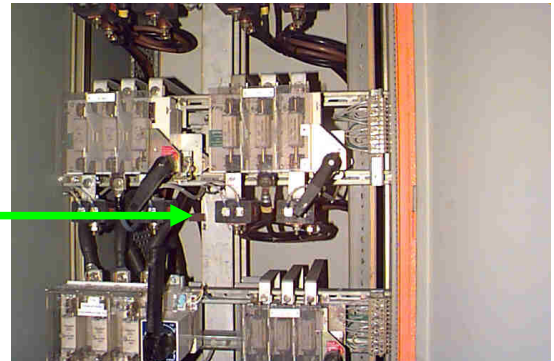
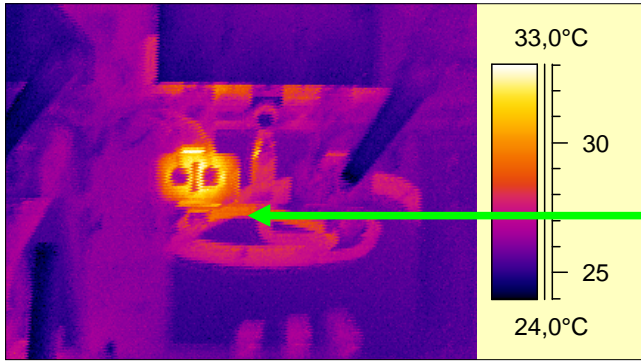
**Recommendations / Emergency degree :**

REPLACE THE SWITCH AND THE FUSES.  
INTERVENE AS QUICKLY AS POSSIBLE.

**Corrective action of the company :**

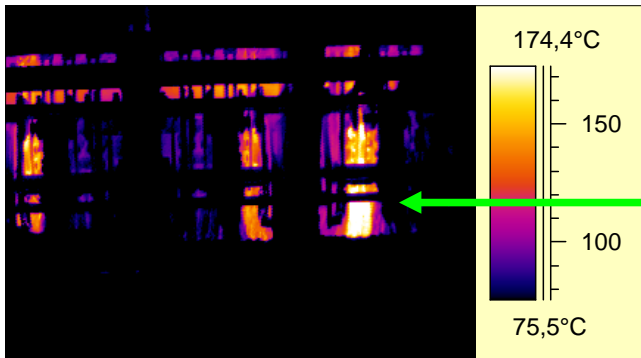
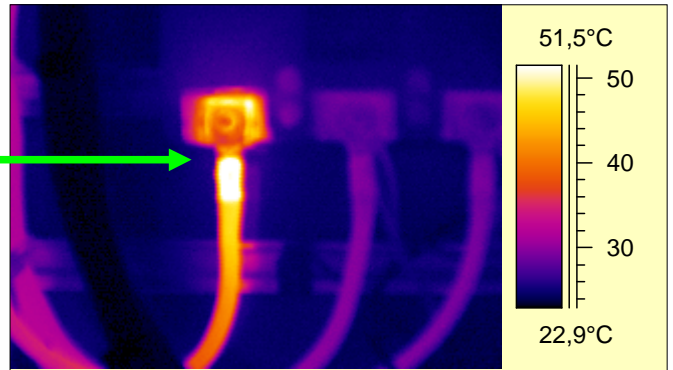
NATURE	DATE	OPERATOR	SIGNATURE

OTHER EXAMPLES...



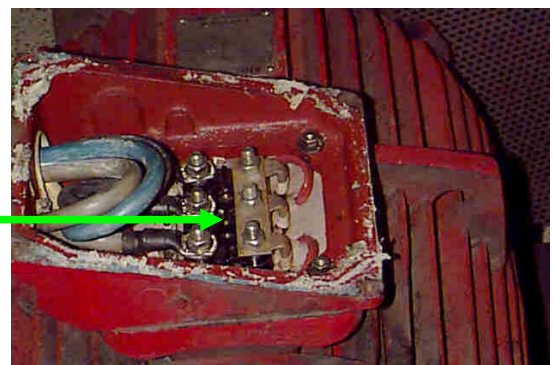
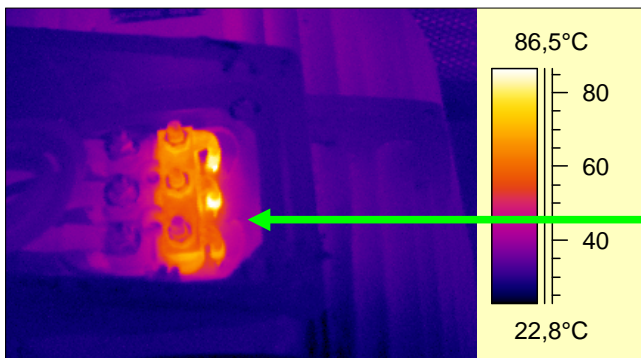
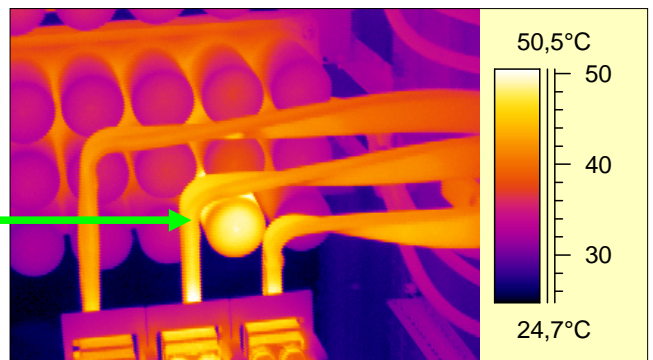
ON ONE OF THE LOOPS YOU CAN SEE THAT THE STRENGTH'S TRANSFORMER IS HEATING ABNORMALLY.

BADLY CARRIED OUT SETTING ON THE LEFT PHASE.



EXCESSIVE HEATING ON SOME POLES OF THIS CUTOUT.

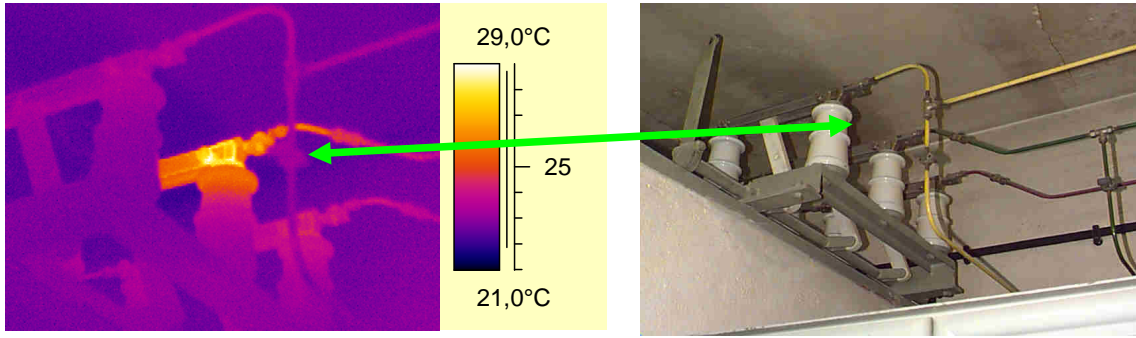
A CONDENSER OF THIS BATTERY SHOWS AN ABNORMAL TEMPERATURE INCREASING.



SETTING DEFECT ON SOME WINDINGS OF THIS MOTOR.

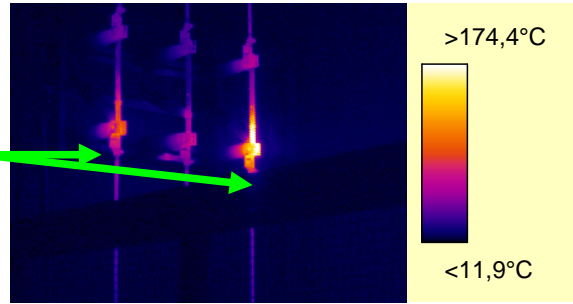


**DEFECTS DISCOVERED ON HIGH TENSION FITTINGS... DIAGTECH**

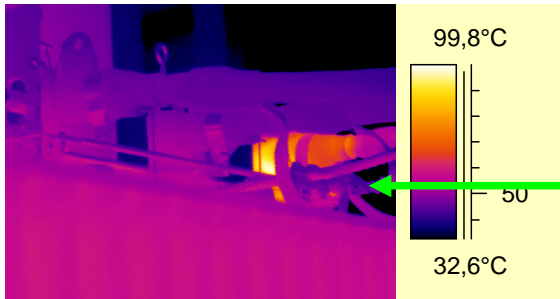


CONNECTION PROBLEMS ON THE MIDDLE PHASE.

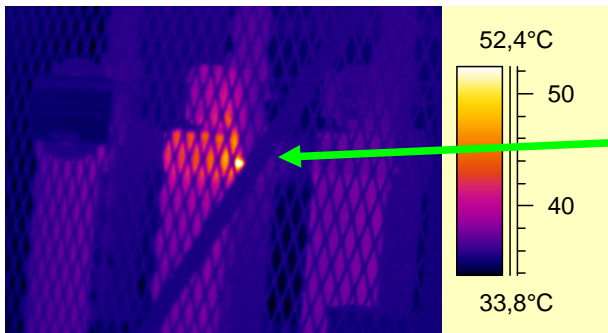
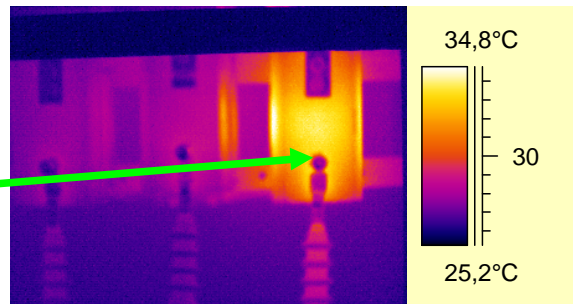
SIGNIFICANT TEMPERATURE INCREASING ON THE RIGHT AND LEFT PHASES, OF THE LOWER PART OF THIS SWITCH.



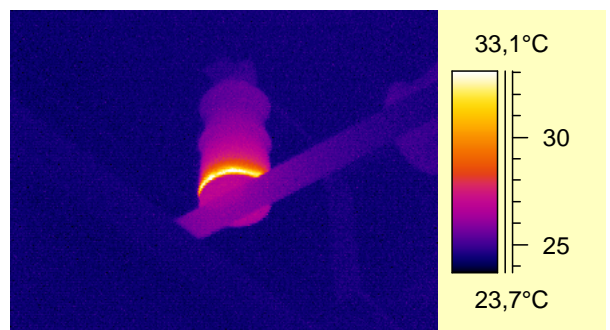
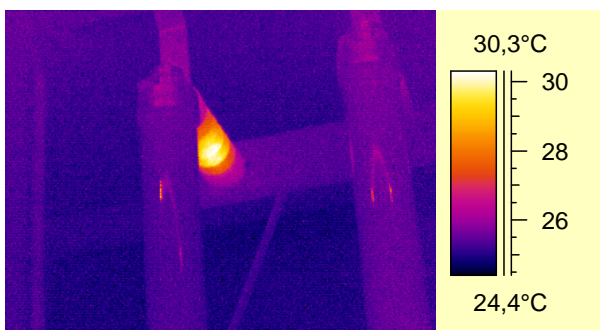
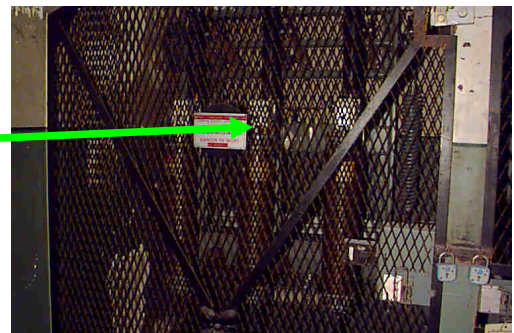
CONNECTION PROBLEM AT THE CABLE HEAD ON THE RIGHT PHASE OF THIS TRANSFORMER



INTERNAL HEATING OF THIS STRENGTH'S TRANSFORMER EVEN THOUGH THE LOAD IS BALANCED ON THE THREE PHASES.

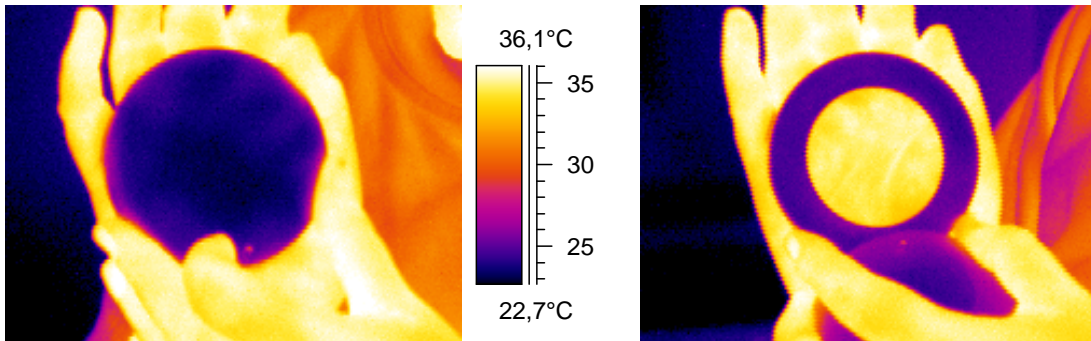


HEATING OF THE UPPER CONNECTION OF THE CENTRAL FUSE.



ABNORMAL HEATING OF BOTH INSULATORS !

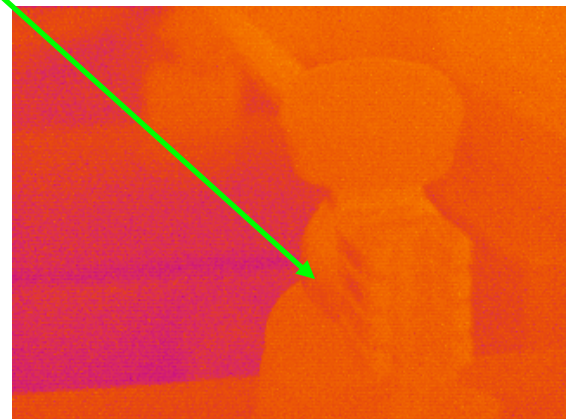
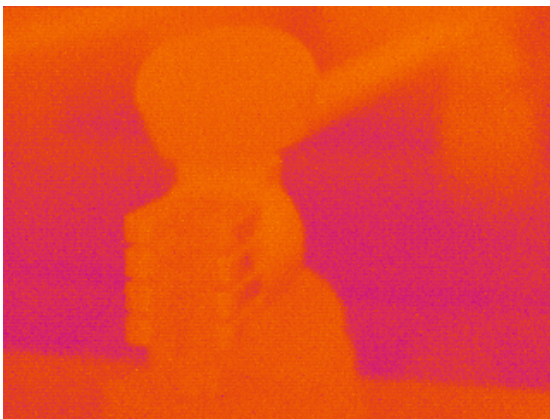
**WE ALSO PROPOSE THE SUPPLYING  
AND THE SETTING OF SIGHT GLASSES  
ADAPTED TO THE NEEDS OF TEMPERATURE  
MEASURING THROUGH A PARTITION SURFACE.**



**THIS SIGHT GLASS IS FITTED WITH :**

- A metallic frame with an external transparent resisting protective glass which can be swivelled by means of a magnetic lock
- A crystal which has an infrared transmission rate of 94%

**INSTALLATION EXAMPLE OF A SIGHT GLASS ON THE SIDE OF A HIGH TENSION CELLS SET.**



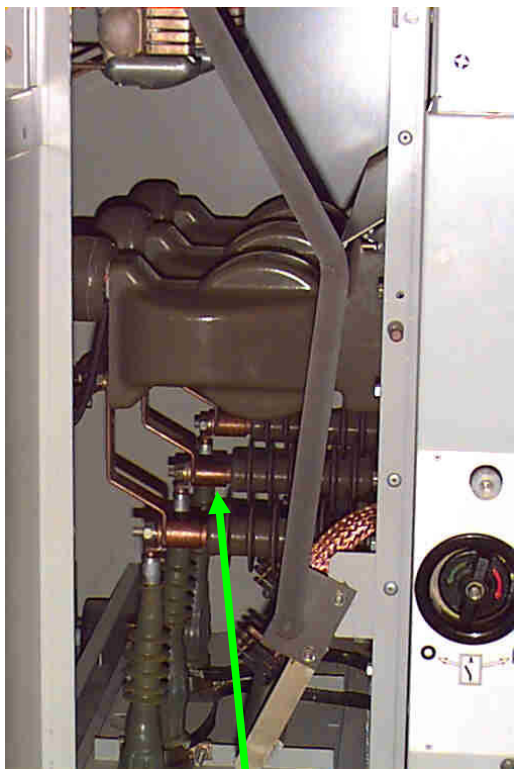
Thermograms recorded through the sight glass, the high tension cells being on charge.  
As you can see, there are no defects.  
The periodic thermal supervision of the most sensitive zones through a sight glass is the best guarantee to discover a malfunction at its beginning.

**SETTING OF TWO SIGHT GLASSES ON A CIRCUIT BREAKER CELL.**



**IT'S NOT POSSIBLE TO SCAN THE SET OF CONNECTIONS WITH ONLY ONE SIGHT GLASS. THE PHOTO OF THE INSIDE OF THE CELL SHOWS THAT THE DOUBLE INSTALLATION IS ESSENTIAL. SIGHT GLASS DIAMETERS ARE ADAPTED TO THE NEED OF MEASURING.**

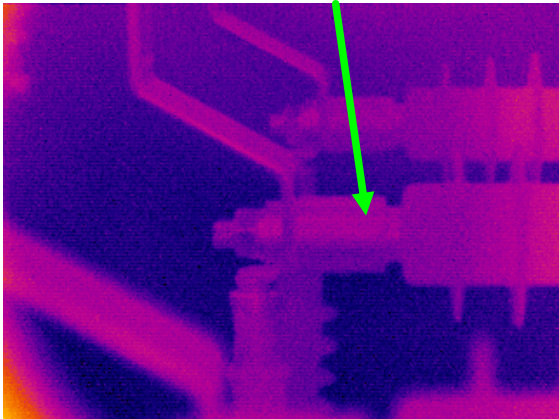
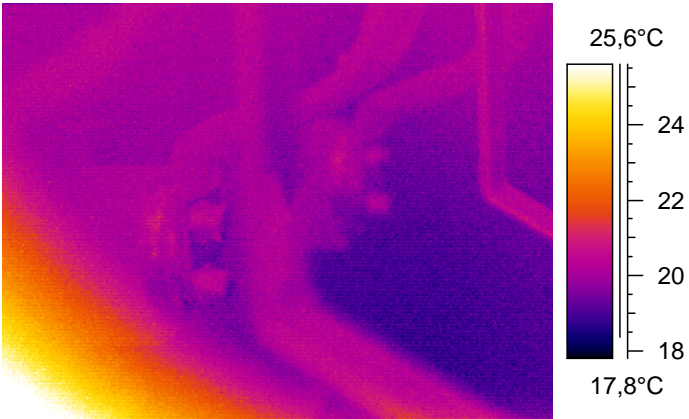
**ONE OF OUR TECHNICIANS IS RECORDING THERMOGRAMS OF A CLOSED CELL FITTED WITH SIGHT GLASSES.**



**JUST BELOW, THERMOGRAMS HAVE BEEN OBTAINED THANKS TO THE SIGHT GLASS SET ABOVE THE CELL.**

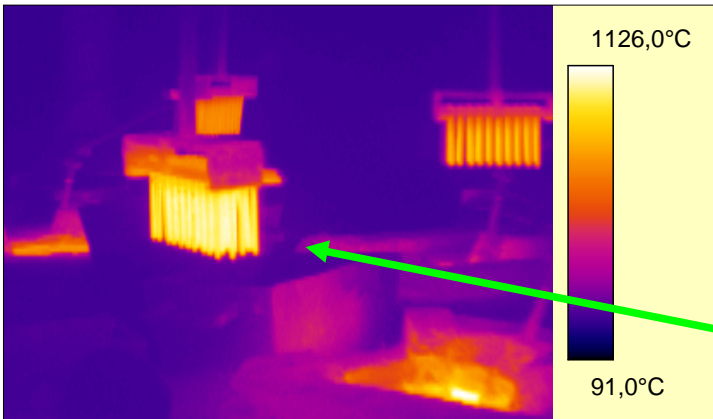
Connections on the left lower part of the circuit breaker.

Cable connections on the lower part of the cell.



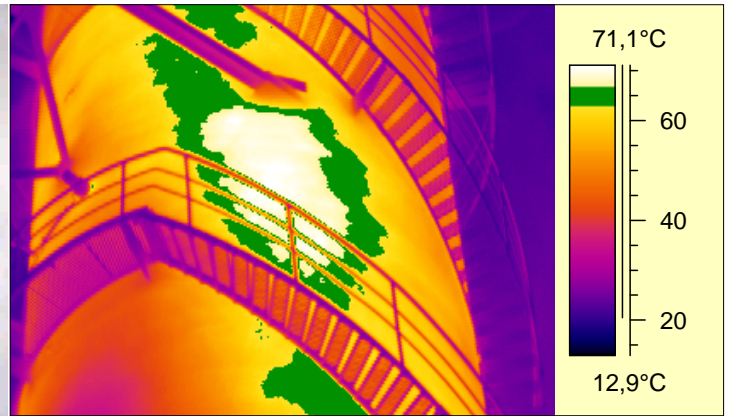
**WE CAN SCAN THERMAL PICTURES OF MACHINES,  
STRUCTURES,  
MANUFACTURING PROCESSES...**

**DIAGTECH**

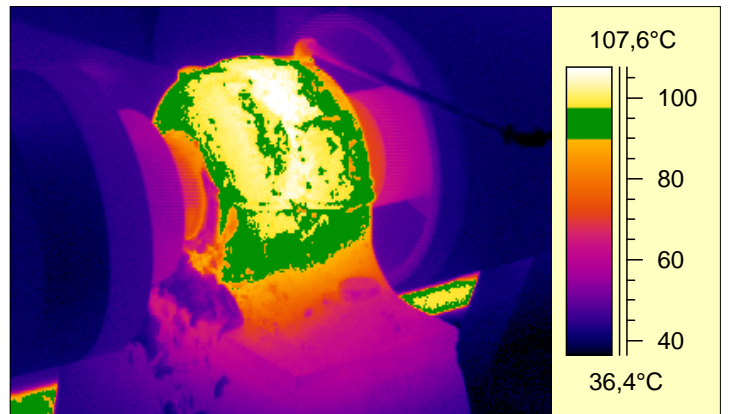


**OUR MEASURING  
RANGE RUNS FROM  
-40°C TO +2000°C.**

**MEASURING  
EXAMPLE : MORE  
THAN +1000°C**



**WE HAVE SEVERAL  
LENSES AT OUR DISPOSAL  
TO RESTORE TO YOU  
THE BEST PICTURE  
IN ANY CASE.**



**THEY ARE MANY MECHANICAL APPLICATIONS...**

