

THERMOGRAPHY MONITORING OF LARGE HYDROELECTRIC POWER PLANTS

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Introduction

- In Serbia the several large hydroelectric power plants are successfully operating
- Largest electricity sources from renewable resources in Serbia (Djerdap I and II, Drina Hydroelectric Power Plants, Zvornik and Pirot).
- For economics, preventive maintenance and safety, highly important to introduce the new technologies in hydroelectric power plants' control
- This includes ICT and thermography



Equipment for infrared thermography measurements and monitoring

- Infrared camera measures and images the emitted infrared radiation from an object.
- Radiation is a function of object surface temperature, possible to calculate and display this temperature
- Measured radiation is also a function of the emissivity.
- Radiation also originates from the surroundings and it is reflected in the object.
- To measure temperature accurately, it is necessary to compensate the effects of a number of different radiation sources.
- Hand IR camera FLIR E6 have been used.

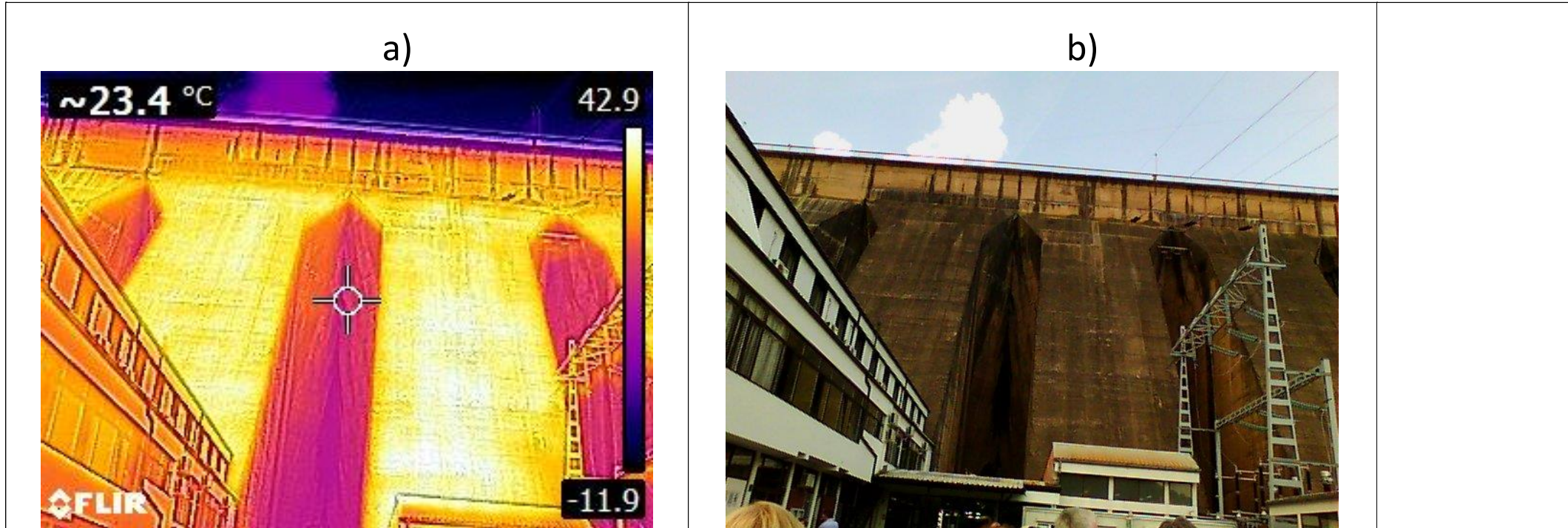


Monitoring the state of equipment

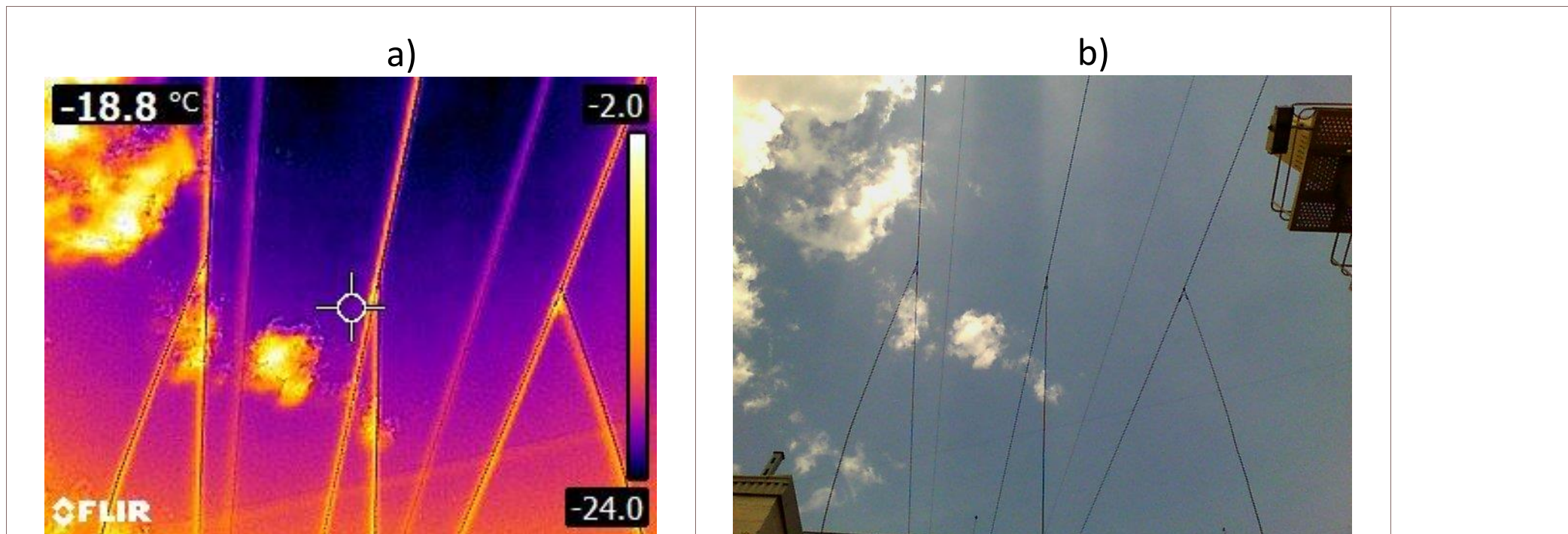
- Monitoring of the hydroelectric power plants Bajina Bašta i Đerdap
- Typical examples are shown in next pictures, where a) refers to the thermogram, and b) to the image in the visible part of the spectrum (photography).



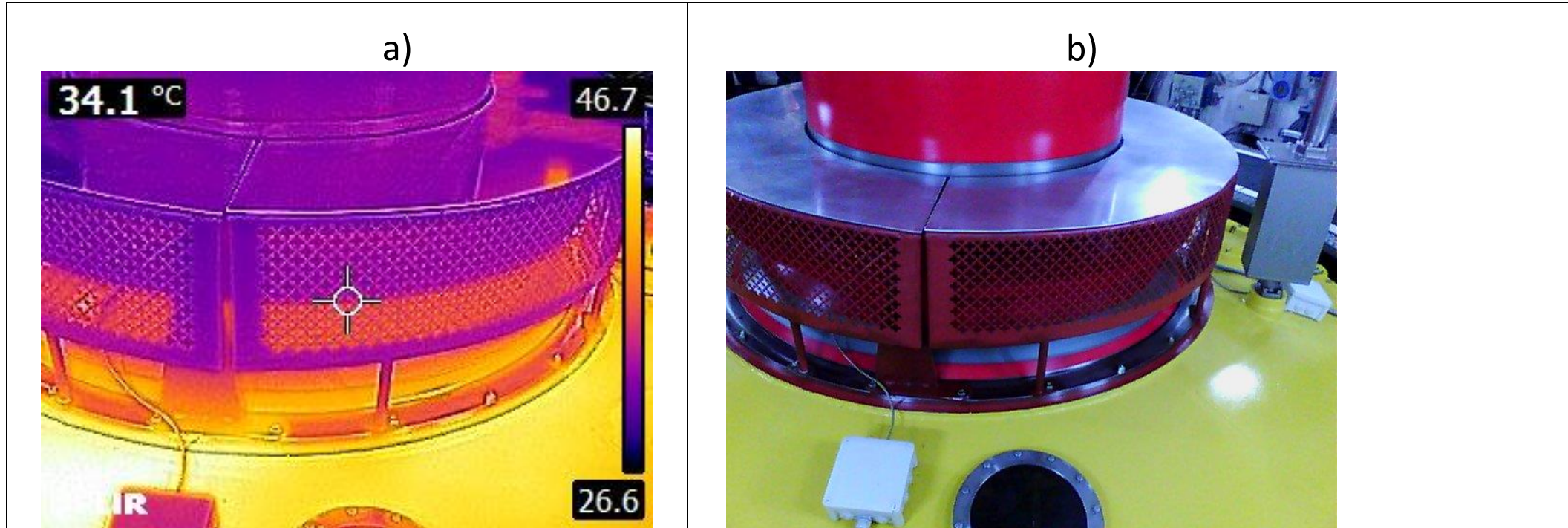
Water gate HPP BB



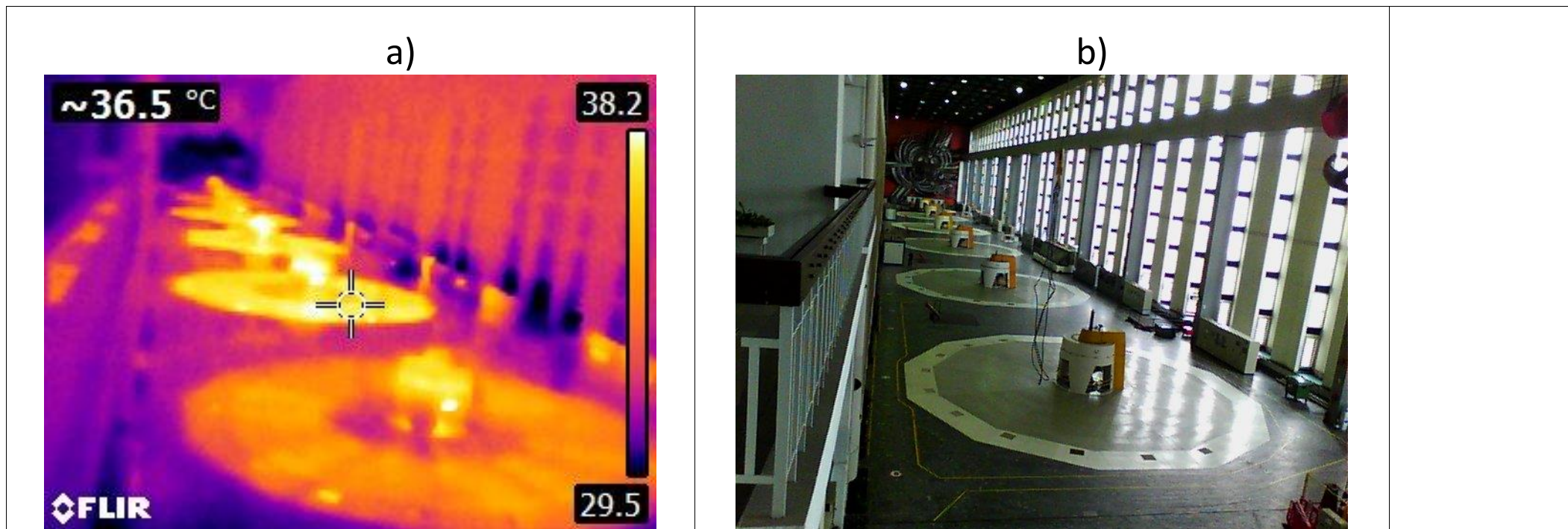
Connections of the HV lines at HPP BB



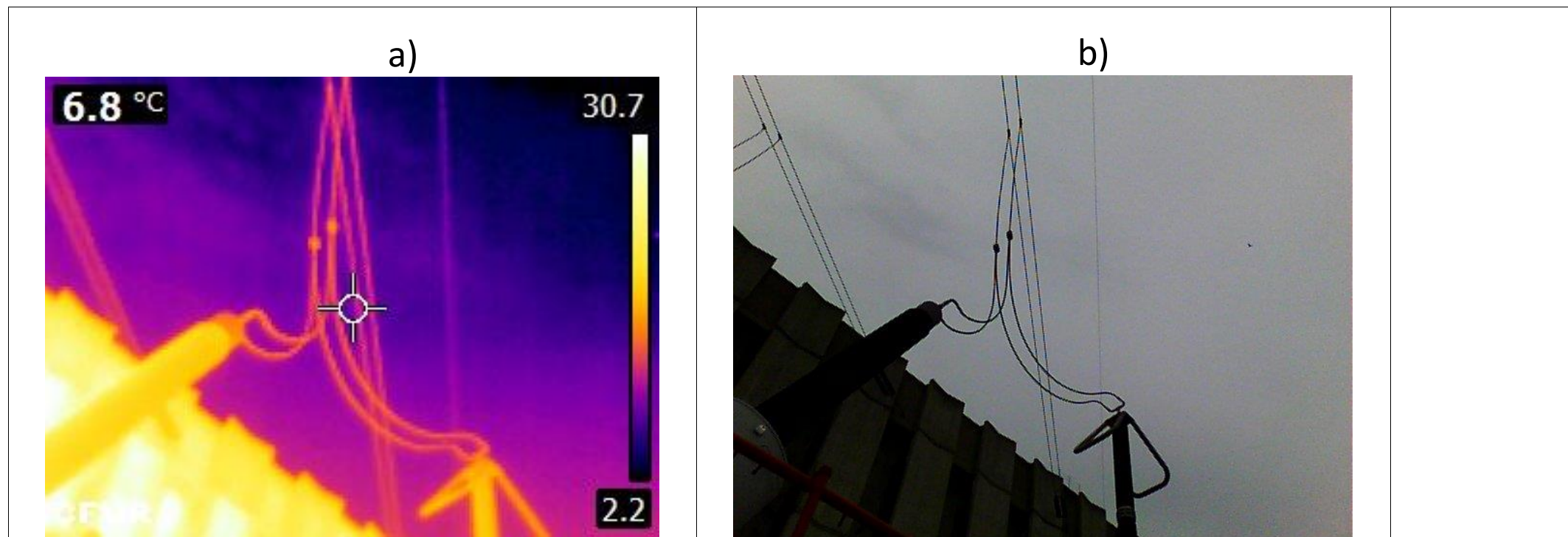
Contacts of the generator at HPP BB



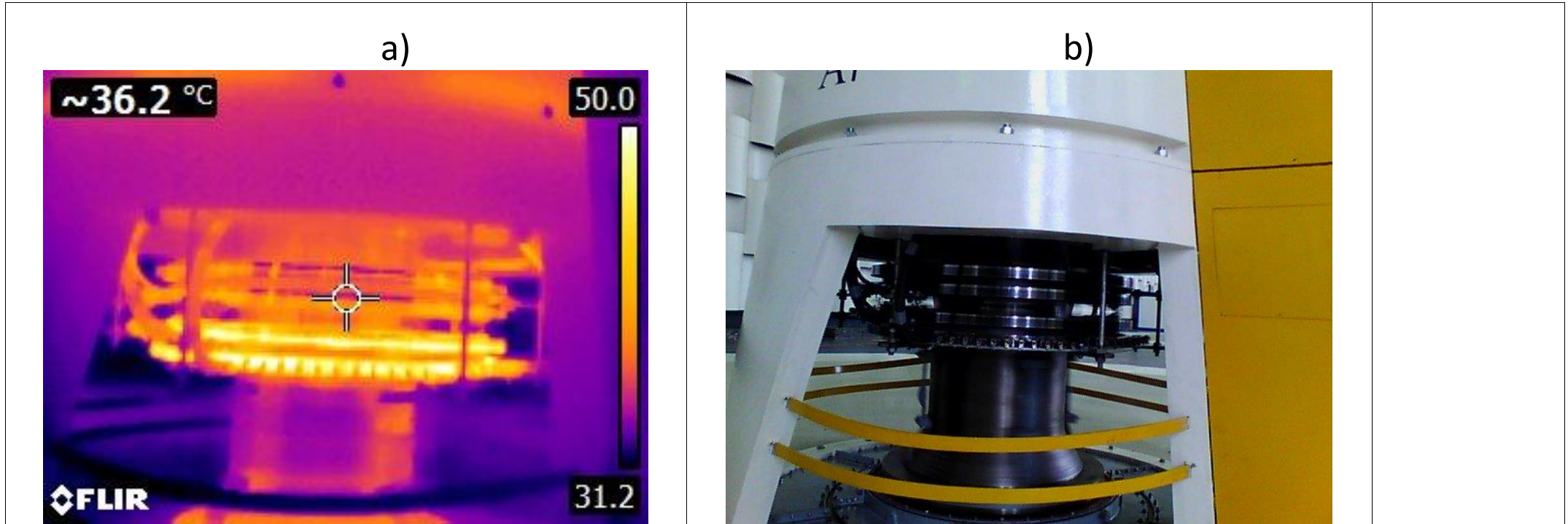
Generator hall at HPP Djerdap I



Connections of the HV lines at HPP Djerdap I



Contacts of the generator at HPP Djerdap I



Conclusion

- Thermography, contactless method of thermal testing, highly recommended in the preventive maintenance of inaccessible or hard-to-reach objects without disturbing their operation.
- Among many known methods for remote testing devices, thermography is considered the best.
- Almost every device running at low or medium voltage can be monitored and diagnosed with the current state.
- Due to the great importance of the large hydropower plants, it is necessary to introduce permanent thermography monitoring with automatic analytics in addition to the occasional IR monitoring.

