



Photo: Alain Herzog / EPFL

Thermal lake water system Lausanne, Switzerland

Client: Swiss Federal Institute of Technology Lausanne
(EPFL)

University of Lausanne (UNIL)

2023

Replacement of the valve in the main inlet of
Switzerland's largest lake water heat pump



Inside the new pumping station on the shores of Lake Geneva



Initial situation

The EPFL campus is a pioneer in the use of thermal lake energy. The university buildings have been cooled with lake water since 1978.

Today, heating energy is also generated sustainably. At a depth of 75 m, water is drawn in from Lake Geneva and initially used to cool the university buildings and the in-house data center. In winter, the waste heat captured in the process is further increased with heat pumps and used to heat the EPFL. The cooled water flows back into the lake. The valve on the main inlet is to be replaced by a Wey knife gate valve as part of the overhaul of the system.

Share of heating & cooling in the total energy requirement of the EPFL campus

54%

Number of heat pumps

4

Max. seawater flow rate

2 700 l/s

Total thermal output of all heat pumps

24 MW

Special challenges

The invasive quagga mussel has been spreading in Lake Geneva for several years. Pipes leading into the lake must be regularly cleaned of deposits by pigging. The installed valves must therefore be passable for these pigs.

Underwater installation of the DN 1200 knife gate valve – without actuator for the time being



Approach

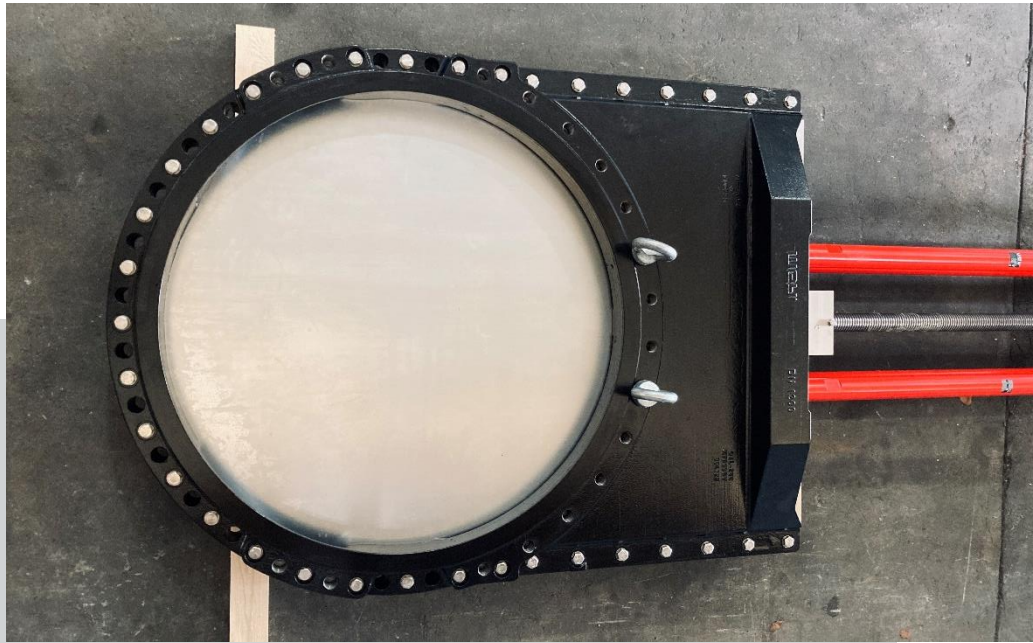
In order to enable the special cleaning operation of the main inlet, a special knife gate valve with a full bore design is manufactured.

The Sistag engineering team worked closely with the plant manufacturer Bouygues E&S / Equans and the plant operator on the project. A customized valve body was designed exactly according to the requirements of the system and our own measurements on site. The full bore passage allows all known pig types to pass through. Scrapers in the chest area clean the gate every time it is opened. The main pipe can only be shut off and the lake water kept out using the valve. Until then, the antechamber of the system is flooded. Installation must, therefore, be carried out by a diver under water. The electric actuator is not installed until the chamber has been drained again.

In the original Wey knife gate valve design, the gate guide protrudes into the passage on the left and right. The gate and chest area can thus be kept particularly short. Normal cleaning methods are usually still possible.

In the Full Bore Design, the gate guide is positioned outside the passage and included into the body. The valve passage is, therefore, circular, and corresponds exactly to the nominal diameter of the pipeline. The gate and chest area are slightly longer and wider.

Special design: Knife gate valve MF
in Full Bore Design



Category

Knife gate valve

Product range

MF

Nominal size

1200

Actuator

Electric

Number of valves

1

Body material

Cast iron

Maximum pressure

1.6 bar

Sealing type

NBR

Special design

Full Bore

Full passage by moving the gate guides into the body

A scraper in the chest area removes deposits from the gate each time it is opened

A custom-made adapter piece matches the nominal diameter of the old lake pipe to that of the new pipe in the pumping station

"Our special knife gate valve design was convincing: The pig fits through and the lake stays outside."

Claudio Darpin
Sistag AG Project Responsible

Commissioning
2023

Expected service life
> 30 years

Next steps

The second lake pipeline is to be renewed in the coming year. A second Wey knife gate valve in the same design has already been ordered for this purpose.

The full bore knife gate valve reliably seals the main inlet of the thermal lake water system and thus enables safe inspection work. Cleaning with a pig has been tested several times and is possible without any problems. Thanks to the long-term availability of spare parts and a local service partner, the valve is likely to remain operational for decades.



The electric actuator was only installed after the chamber had been largely pumped dry

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