

## Renovation of the Silvretta retaining wall (Austria)

### Deployment of Leister at 2000 metres above sea-level.

The alps can be considered as the "moated castle" of Europe. Nowhere is the force of water used more intensively than here. The construction of new reservoirs is no longer possible. For this reason, the existing reservoirs are being extended to increase their storage capacity. Or they are being renovated in order to ensure long-term use. One of these projects is on the Austrian side of the border with Switzerland, at the Silvretta reservoir. Here the water-side faces of two of the three aged retaining walls, the main wall and the side wall, are being renovated.

#### Sealing in stages

The main wall is 80 metres high. The width at the top of the wall is 432 metres. The smaller side wall is 32 metres high and 140 metres wide. The lake extends over an area of 1.31 km<sup>2</sup> and contains almost 38.6 million m<sup>3</sup> of water. Both retaining walls will be equipped with a new sealing system to provide protection for the concrete walls which were built in 1938. The smaller side walls and two thirds of the main wall have already been sealed. The sealing system for the main wall is being completed in two stages. The lower third will be finished next spring after the Silvretta lake has been drained.



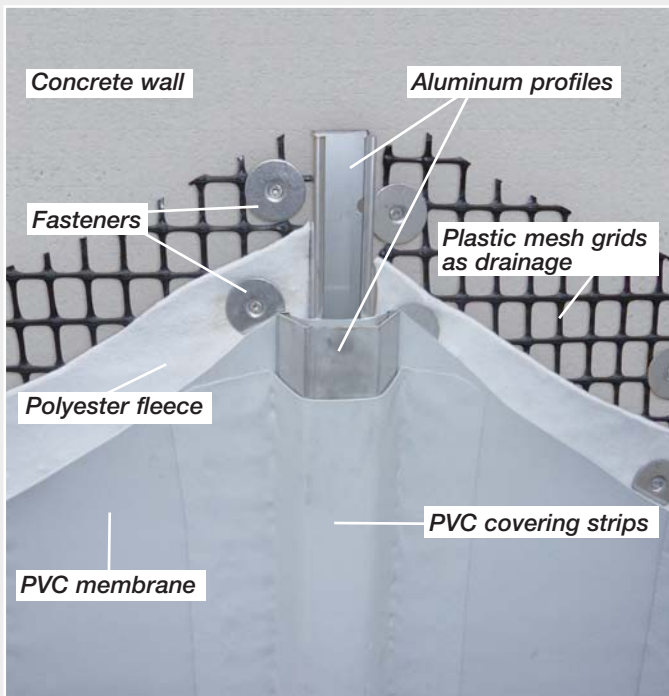
*Working on the side wall. The individual strips are welded in parallel.*



*The sealed main wall. The work on the lower third will be completed next spring when the lake has been drained.*

### Project with system

The project is being planned and managed by the experienced global company "CARPI TECH S.A." from Chiasso (Switzerland). Their three-layer sealing system is as simple as it is effective: A plastic mesh grid is bolted directly onto the concrete wall using fasteners to act as a drainage layer. They then fix a polyester fleece to equalize out any unevenness, which again is attached to the vertical concrete wall. The actual sealing layer is then welded on as a 2.5 mm thick PVC membrane. These 2.20 metre wide PVC panels are unrolled from the top of the retaining wall. In order to hold the entire assembly together, they fit two-piece aluminum profiles every four metres over the drainage layer, polyester fleece and PVC membrane. The bottom profile is drilled into the concrete and the top profile above is bolted to the bottom profile. It provides for clamping the plastic sealing strips. Then the aluminium profiles are covered with 2.5 mm thick PVC strips which are welded to the membrane. The three layer system ensures complete waterproofing.



*The three layer sealing system.*

### Challenges for man and material

No question: To install a sealing system of this order of magnitude at a height of 2030 metres presents a considerable challenge both to the members of staff of the laying company and the equipment they use to weld the sealing strips. The individual strips were processed by "PK Aquaservices" exclusively using hand welders. Failure of the equipment would have meant a delay in meeting the deadline. The company carrying out the work, as usual, chose to use the reliable TRIAC S from Leister. This meant that work was carried out in all weather - except for 10 days of snowfall in June (!). The TRIAC S units, as expected, proved to be up to the task at hand under the most extreme of conditions.

### In use throughout the world

Two operators welded the individual strips in parallel. They stood on suspended platforms lowered down from the top of the wall. Using this strategy, four teams processed approximately 18,000 metres of welds within a few weeks. Up to ten TRIAC S units were in use at any one time. None of the hand welders failed during the course of the project. The TRIAC S is the hand welder of choice for professional users and has been deployed hundreds of thousands of times around the world in countless applications. In addition to its high level of reliability, the professionals are particularly impressed by its ease of use and the wide range of accessories that are available. Alongside the TRIAC S Leister offers the TRIAC PID, a hand welder which features a digital display PID electronic control system. This ensures that the temperature is precisely regulated in a stepless manner, independent of the line voltage or ambient temperature.



*All the plastic sealing strips were overlap welded using the reliable TRIAC S hand tool.*

**The client with a long-term view**

The client for this 30 million Euro construction project takes the long term view: The Voralberger Ilwerke AG intends to secure the energy business at lake Silvretta for many decades to come with its investment in a new sealing system for the dam surface. The TRIAC S hand tool from Leister played a small but important role in ensuring the ongoing successful utilization of precious glacier water to continue to generate energy at this site.



*Bird's eye view of lake Silvretta. Bottom right – the 80 m high main wall, above it the 31 m high ancillary wall.*

**Project planning and management:** CARPI TECH S.A., 6830 Chiasso, Switzerland, [www.carpitech.com](http://www.carpitech.com)

**Installers:** PK Aquaservices, 47506 Neukirchen-Vluyn, Germany, [www.pk-aquaservices.de](http://www.pk-aquaservices.de)

**Material supplier:** FLAG (membrane, covering strips)

**Device supplier:** Leister Process Technologies, 6056 Kaegiswil, Switzerland, [www.leister.com](http://www.leister.com)

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