

## AKSU RIVER DIVERSION CANAL REINFORCEMENT AKSU HPP, MURGAB VILLAGE, TAJIKISTAN

### HYDRAULIC WORKS, EROSION CONTROL

#### Products: Reno mattresses®

##### Site Description

Aksu HPP in the Murghab district of Tajikistan was built over 50 years ago. Its design capacity was 600 kW to supply Murgab district. After the collapse of the USSR, the HPP fell into decay and its capacity nearly halved.

In recent years, repair of HPP units at the station was ineffective, and in the region the electrical shortage of the Murghab district was the most acute.

Within the agreement between the governments of Tajikistan and Germany, the hydroelectric power plant reconstruction was started. The German company Fichtner has developed a project for the hydropower plant reconstruction. According to the project, an increase in the capacity of each of the two units to 800 kW is provided. One of the main tasks was to strengthen the 2,200 m long diversion canal that diverts water from the Aksu river bed to the HPP building for electricity production.

##### Problem

During the construction of the diversion canal, it was necessary to take into account many specific factors.

The HPP is located at an altitude of 3,600 m above sea level, so the temperatures range from -50 in winter to +40 °C in summer.

Such climate has a special effect on the channel soil condition, affect the properties of water – its infiltration and freezing. In the district center Murghab, the soil contains more moisture and freezes quickly with the cold weather. During the summer, on the contrary, water infiltration into the ground increases.

##### Client:

PAMIR ENERGY COMPANY

##### Designer:

HYDROTECH LLC

##### General Contractor:

PAMIR ENERGY COMPANY

##### Consultant:

MACCAFERRI GABIONS CIS LLC

##### Applied products:

RENO MATTRESSES® 3x2x0.23 PVC – 4,200 PCS.  
RENO MATTRESSES® 6.5x2x0.23 PVC – 3,035 PCS.  
LASHING WIRE – 13,000 KG.

##### Construction period:

START OF THE CONSTRUCTION – MAY 2018  
END OF THE CONSTRUCTION – SEPTEMBER 2018



Aksu HPP in Murgab village, Tajikistan



River diversion canal of Aksu HPP before reconstruction



Laying of Reno mattresses® on canal slopes and bottom



Diversion canal of Aksu HPP reinforced with Reno mattresses®

To reliably reinforce the diversion canal, it was necessary to take into account all measures to avoid freezing and loss of water using modern technologies.

#### Solution

For the diversion canal facing, the project company Hydrotech LLC, in cooperation with the technical specialists of MACCAFERRI GABIONS CIS, LLC, developed a project to protect the channel with Reno mattresses®. In addition to Reno mattresses, an anti-filtration membrane was applied, laid on the bottom and channel walls between the geotextiles.

The canal facing with Reno mattresses® allows to reinforce the slopes reliably and protect them from ice loads. At the same time, the design concept takes into account that structures impact the icing conditions leading to specific porosity and strength of rock and ice masses.

Reno mattresses® reliably protect the geomembrane from mechanical damage. This fact was certified by Fichtner basing on the "crash test" – when the 20 t tracked excavator passed the test section.

The feasibility of gabion structures usage in the project was justified not only from a technical point of view, but also from an economic one. The transportation of traditional building materials, for example, reinforced concrete slabs, to the construction area of the hydroelectric power station would be very expensive. The use of local rock material to fill Reno mattresses® reduced the cost of construction and installation works.



Diversion canal filled with ware from Aksu river

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