

River Litz Hydroelectric Power Station, Austria

Reliable under pressure and in difficult terrain Montafonerbahn AG had set high standards with their ambitious Litz hydroelectric power station project in Vorarlberg's Silbertal. The pressure pipeline, which was completed in February 1997, therefore had to meet these standards in spite of exacting specifications for the route.



After only 16 months' construction, the first of three generators started producing electricity in the new powerhouse on the River Litz in Silbertal (Vorarlberg). Shortly afterwards, in May 1998, the whole hydroelectric plant went into operation. Construction costs totaling just over 11 million euros and annual power generation of around 22 million kWh make Litz one of the most cost-effective hydroelectric plants in Austria (51 cents/kWh). Some 4,400 homes in the outer Montafon region have since been supplied with electricity from Silbertal.



Difficult terrain

Naturally the best hydroelectric power station is no use without equally efficient penstocks. The new Litz power station exploits the river's fall from the area above Höllbrücke to Tobelmühle on the outskirts of Schruns, feeding water over

a total distance of 1,655 meters and height of 90 meters to the turbines at a rate of 8 m³/sec. Here 1,290 meters were laid using the HOBAS CC-GRP Pressure Pipe Systems. The route over steep terrain for the penstocks with an inside diameter of 1.6 m however constituted a considerable challenge for both the planners and contractors. Extremely confined space beside the suspension bridge piers, partly on a critical slope with loose soil above the river and numerous other constraints could only be overcome by selecting the right pipe system and installing it with due care.

Without concrete bends for the first time

Following intensive study and discussion with the contractors Gabriel-Wucher, the power station planners Vorarlberger Illwerke AG decided on CC-GRP Pipe Systems made by HOBAS. In hydraulic terms the advantages lay in a directly buried pipeline without gaping joints at the bends, which can divert the forces occurring at the turns gently and evenly into the ground. The engineers therefore chose shorter pipes, some of which were beveled at the joint to produce the radii required in the difficult terrain. Only then could they install angled sections with a radius of 57 meters - at a pipe diameter of 1.6 meters. The results were something to be proud of: for the first time a pressure pipeline of the required radii was laid without any concrete bends. As turns were required both in the X and Y-axis, special bends were installed, for example under the river. During planning, the coordinates of every joint therefore had to be given and the pipes then laid accordingly. Cover depth varied from impressive 7.5 m beside the power station to 0.4 m along the river. The trench did not have to be lined.



'Open and shut' method

Because of the limited space and the loose soil on the slope, the pipes were buried using the 'open and shut' method. The low weight of the HOBAS CC-GRP Pipe Systems again proved to be an asset, allowing them to be stored on a suspension bridge on the Silbertal road and lowered down to the trench. Easy to handle, all the pipes were laid and joined with a normal excavator. The newly installed penstock shows that a difficult task can easily be mastered with the right

material. And HOBAS have proved yet again that also in the case of pressure pipelines they can stand any pressure.

Overview	
Year of Construction	1997
Duration	16 months
Pressure Class	PN 6 – 13
Diameter	DN 1600
Stiffness Class	SN 10000 – 26000
Installation Method	Direct bury
Application	WaterLine®
Client	Montafonerbahn AG
Contractor	Gabriel-Wucher
Advantages	High gradient, Limited space, Low cover, Easy installation, 2 m, 3 m and 6 m pipe lengths with bevel cuts of up to 2 degrees