References

Penstock for hydro power plant



Uponor involvement

- Weholite pipes PE DN2200 mm, SN4 - 510 m. Special T-way fitting DN 2200/2xDN1600 mm

Penstock for hydro power plant

Weholite technology was used for the construction of a penstock (water transmission pipeline) for a new small hydro power plant in the city of Cieszyn.

Hydropower is the most popular renewable energy resource in the world with a 16 percent share in the global energy output and counting. In recent years Poland has seen a rise in the number of hydroelectric projects, mainly small power plants, which utilize local watercourses for the production of clean, cheap energy. Recently, for the first time in Poland, Weholite technology was used for the construction of a penstock (water transmission pipeline) for a new small hydro power plant in the city of Cieszyn.

Project Facts:

Location
Cieszyn, Poland

Completion
2012

Building Type
Industrial

Product systems
Tailor made constructions, Industrial pipes

Project Type
New building

Partners

Investor:
MEW S.A. Warszawa

The investment project, worth an estimated 1,2 million euros, included the construction of a small hydro power plant with a capacity of 0,56 MW, utilizing the drop of the Olza river. Typically, a power plant pipeline or canal is introduced at river curve shortcutting the river's flow, which results is greater water drop than would be achievable at a weir. In Poland pipelines are used at large hydroelectric facilities while smaller plants depend on open channels. The key factor for choosing a pipeline for the Cieszyn project was the plant's location in a city park. The city's authorities demanded that the design take into consideration and preserve the park's functionality and esthetics.

The investor carefully considered the choice of material for the pipeline. The technical design listed glassfibre reinforced plastic pipes as the material of choice, however MEW S.A.'s final decision was to use PE-HD Weholite DN 2200 mm piping. The decision was based on the high quality of Weholite technology, flexible terms of service offered by Uponor Infra's as well as the company's extensive global experience in hydroelectric projects. Durable, leak-proof and lightweight, Weholite pipes proved the ideal solution to the challenges of the Cieszyn project. Their low weight as compared to pipes made from traditional materials such as steel, cast iron or concrete, made for easy transportation and installation in a challenging terrain of the city park. Among Weholite's other qualities one should mention resistance to corrosion, chemicals and damage caused by differential soil settlement. These properties assure exceptional reliability and long-life of an underground pipeline, as well as near zero operating costs.

MEW S.A. also greatly appreciated the smoothness of the pipeline's inner surface. Thanks to a low roughness coefficient "k" and monolithic joints of the penstock, as well as forgoing segment bends, energy losses caused by water friction inside the pipeline are reduced to a minimum, which translates into greater energy efficiency of the power plant and greater return on investment.

Construction started in October 2010 when trenches were made for both the powerhouse and the pipeline. The pipes were manufactured in 12,5 m lengths and transported from Uponor Infra's production plant in Kleszczów to Cieszyn using truck tractors. In all, between November 2010 and September 2011 Uponor Infra delivered 42 shipments of pipes of total length of 510 m.

The pipes were laid out on ground level in 50 to 100 m sections and joined by means of extrusion welding. The joined sections were then lowered into the trench and welded together by the Uponor Infra service team, which was responsible for all of the welding work. Extrusion welding provided for a leak-proof and monolithic pipeline and proved very well suited to the demands of winter installation. Weholite's built-in flexibility also proved extremely useful as it allowed for gentle bending of the pipeline, which made its handling much easier and provided a cost- and time-effective alternative to using segment bends and thrust blocks.

Another great property of Weholite piping is the possibility of prefabricating compound fittings. The final section of the penstock, a tee DN 2200 mm designed to divide the water flow into two streams, one for each of the two turbines, was produced at the Uponor Infra plant and delivered to project site with the assistance of a pilot car. In May 2011, after intensive construction work the pipeline was secured in the ground and covered with soil. Work on the powerhouse was completed in June 2011 and in September 2011 collars for joining the pipeline with the turbines were delivered. Hydro power plant started its commercial operation in January 2012.

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