

# FIRST POLYETHYLENE DEEP-WATER OUTLET WITH A DIAMETER OF 1600 MM

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In the summer of 2011, POLYPLASTIC Group began producing PE pipes up to 1600 mm in diameter at the Klimovsk Pipe plant. The first large-scale project involving these 1600 mm pipes was the Olympic facility in Sochi.

As part of the construction of the Olympic facilities, reconstruction of the Bzugu sewage treatment facility began. This project involved building a pumping station, collector and deep-water outlet in the Black Sea.

The deep-water outlet for the Bzugu sewage treatment facility was designed by specialists from the Lengiproinzhpromekt State Unitary Enterprise (design and survey, renovation and construction), a St. Petersburg based company, requested by the Department for Construction of Krasnodar Region.

A 2 km land based pipeline and a 2.2 km outlet pipeline on the seabed were required. The outlet pipeline was made of PE 100 pipes, SDR 26, D=1600 mm and large T-joints used as diffusers. The renovation of the sewage treatment facilities will increase sewage capacity from 32,000 to 140,000 thousand cubic metres.

According to the National Auditing Chamber data, the situation with Sochi's sewage waste disposal is critical. The existing outlet is 250 metres away from the coastline, despite the fact that the legislation requires a minimum of 2 km. However, once complete, the Bzugu project will fully satisfy the needs of central Sochi and will mean the shutdown of the Navaginsk purification facility near the Krasnodar circular traffic interchange.





There were a number of problems with project implementation due to the fact that use of 1600 mm PE pipes is quite rare – both in Russia and Europe. There were only a few companies providing welding of this kind and only three welding machines for 1600 mm diameter pipes in Russia at the time. One of these welding machines was used for bespoke requirements at the Klimovsk Pipe Plant; the other was used by POLYPLASTIC Group. One of the conditions of pipe supply for this project was the availability of the welding machine on-site.

The Lengiproinzhprouekt Design Institute and PRiSS, General Contractor of the Sochi facilities, asked for assistance in designing a PE headwall with a diameter of 1600 mm. According to the technical design specification, the headwall had to have fixed branch pipes of 630 mm in diameter at exact intervals and positioning (perpendicular to the main pipe) with further reductions to 315 mm. The problems faced by the specialists from the POLYPLASTIC Group related to inertial impact force on the headwall when submerged. The headwall had to be fixed to prevent emersion



and tilting, and branch pipes had to be stiffened to withstand jet thrust load.

The following measures were taken to compensate for these effects:

- set-on concrete weights were applied;
- clamping wires were fixed to the concrete plates to protect them from emersion;
- stabilising legs (made of 225 mm and 160 mm pipes) were welded to the lower part of the main pipe to protect against tilting;
- additional webbing was attached.

There has never been a project like this in Russia therefore all potential options were carefully analysed based on Western experience and calculations by the specialists. The Klimovsk Pipe Plant produced eight headwalls which were delivered to Imereti Bay, near Veseloe.

Welding works began in November. Although the speed was slow in the beginning with only one welded joint per day, co-operation with the crane operators eventually helped to speed up the process to three joints per day. A specially built shelter at the site allowed welding to continue despite difficult weather conditions. There were some problems with the welding machine but in spite of the poor weather, equipment breakdown and other difficulties, installation was complete on time. The last joint was welded on 23 January.

There were two pipelines welded during the installation: one of 600 m and the other of 90 m. The short pipeline featured diffusers (headwalls). Concrete loads were connected to the pipelines; flanged ends were sealed; and the pipelines were floated and towed to Hostinsk Bay. They were then con-



nected and lowered onto the seabed (to a depth of 34 metres). The unique pipeline lowering operation was successful and the pipes and connections demonstrated excellent strength and flexibility by withstanding significant bending loads during the installation.

The deep-water outlet is still under construction and is expected to be completed by the time the sewage treatment facility is commissioned. From then onwards, the water front of Olympic Sochi will be much cleaner.

