

Use of WLM sensors in the City of Tallinn

(Peter Martinek's article in *Water 21* magazine)

There are more than 900 km of water pipes in Tallinn. The total number of residents in the service area is 400,000. There are 21,500 water consumption customers, whereby one apartment building equals one customer. Approximately $\frac{3}{4}$ of the sold water is consumed by the populace. Average water consumption per person is 104 to 109 litres per day. Mostly there are no pressure boosters in apartment buildings and with the street water network pressure, the upper floors are also fed with water. Water pipes are 1.8 meters deep, just below the freezing zone of the ground.

Tallinn Water started to use a correlator for locating leakages in 1994. At that time the water loss percentage was 32-34%. Tallinn Water also started to monitor the pumping stations' minimum night flow in 1994. An analysis made in 2001 did prove that for the further decrease of water loss, it was necessary to reduce the lifetime of the leakage. For the previous acoustic and large territory zone monitoring, there was a need to find an alternative.

The only alternative was the continuous formation of minor zones and monitoring these. We gave up conventional methods of flow metering because of the cost of construction and lack of universality. The basis of our ideology was not metering exact quantities, but continuous comparison of minimum night flow. Discovering the increase in minimum night flow was more important than measurement accuracy.

In our opinion, there are several advantages of the WLM sensors compared to conventional methods:

- 3 in 1 – flow, pressure and leakage noise metering within the same sensor
- Universality of the sensors related to pipe diameter – 1 sensor for all pipe diameters
- Reliability of flow metering in small velocities as well (1 cm/s is easily measurable for zone monitoring).
- WLM sensors are bi-directional and measure also backflow.
- On-line data communications via GSM network

For the pilot project we did choose two zones with the length of pipeline from 60 to 65 km. In these zones pipe material is mostly cast iron and the appearance of large leakages is quite frequent. These pipes are installed on sets of trenches in the slate rock face. It is possible that leakages as large as 100 m³/h do not come out to the surface and zoning in winter conditions is complicated.

In our two zones we used 6 and 7 sensors accordingly. As a result of the pilot project we managed to reduce the lifetime of the leakages to a fifth or a sixth of what it was, on average to 1.8 days. The total expenditure for the purchase of the sensors (cost for sensors and mounting) paid for itself within the first winter. The second pilot project with a higher population density is one of the best areas in terms of water loss percentage (mostly 4 to 5%).

We currently use 45 WLM sensors in Tallinn. We have a plan to use in total 100 to 110 sensors. Our priority today is to divide the largest (total length of pipelines 350 km) zone into minor zones with WLM sensors.

We, as a customer and continuous user of the WLM system, appreciate that there is constant development of the sensors and its software. The new development of the automatic minor zone total flow calculation, which simplifies zones forming on round piping systems, is highly rated.

Tallinn Water provides water supply and wastewater services in the City of Tallinn and its surrounding areas.

Shareholders of AS Tallinn Vesi /AS Tallinn Water/ are United Utilities (Tallinn) B.V. (35.30%), the City of Tallinn (34.70%), Nordea Bank Finland PLC Non-Resident Legal Entities (8.78%), Morgan Stanley + Co International PLC/MSIL IPB Client Account (6.81%) and Other Shareholders (14.41%). 30% of A-shares are in free-floating shares on the Tallinn Stock Exchange. The relationship between AS Tallinn Water and the City of Tallinn is regulated by a contract, which states 97 quality criteria. Water loss is an essential criterion.

Mr Arvo Saare

Manager of Water Network