

HYDRAULIC MEASUREMENTS AS SUPPORT TO LOCK COMMISSIONING: THE EXPERIENCE OF IVOZ-RAMET AND LANAYE LOCKS, BELGIUM

by

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When commissioning a newly built lock, numerous items have to be controlled and approved. This encompasses obviously all structural and electro-mechanical parts, in terms of quality of the components, assemblies and settings. Usual and exceptional operations have to be validated to comply with the safety and efficiency requirements fixed by the owner' specifications. Amongst different investigation and control method, in-situ hydraulic measurements offer a large potential and should be systematically performed.

The Hydraulic Research Laboratory of the Service Public de Wallonie was recently involved in the commissioning procedures of two new locks on the Walloon waterways network in Belgium. The lock of Ivoz-Ramet is located on River Meuse, just upstream of the city of Liège. It is an ECMT Class VIb lock, with a 225 m long and 25 m wide chamber, and a drop of 4.45 m. It was opened to the navigation in May 2015. The lock of Lanaye is located between the Albert Canal and the Meuse, downstream of Liège. It is also an ECMT Class VIb lock, with the same chamber size and a drop of 14 m. It was opened to the navigation in October 2015. Both locks are levelled through 2 longitudinal culverts with side ports.

At Ivoz-Ramet, the main purpose of the measurements was to control the lock levelling process. Temporary level sensors were installed in the lock chamber to record the levelling curve and compute the filling or emptying discharge. Water surface slope could also be computed from the level measurements and compared to the admissible mooring force criteria. Levels were recorded in the upstream and downstream reach to check the levelling wave amplitude; and in the lock culverts to control the head loss values. Additional measurements were obtained, notably for the valves position.

All measurements confirmed a good behaviour of the new lock. Levelling duration and generated forces were found almost in agreement with predictions. The emptying duration was slightly longer than expected, but this could be explained by a slower opening of the valves. Some unusual operations were also tested like levelling through only one valve (asymmetric filling), or emergency stop of the filling. Lastly, water level recording with all gates and valves closed enabled the control of the good water tightness of the new seals.

Similar investigations and controls were performed at Lanaye. Unexpected vibrations and cavitation risks required further on-site levelling optimisation. Different valve opening schedules were compared to minimize the troubles. Asymmetric filling using only one valve required particular attention due to the significant lateral forces encountered by the vessels in the lock chamber.

The hydraulic performance investigations done at Ivoz-Ramet and Lanaye covered most of the criteria usually expected in such project specifications: levelling duration, mooring forces, levelling waves propagation, cavitation risk, water tightness, in both usual and unusual operation.

The present building works were not design-and-build projects. The contractor liability in terms of hydraulic performances was limited as the design was done by the waterways administration. However, these two commissioning experiences highlighted some possible improvements for further lock building specifications. Notably, the requirements of the hydraulic tests should be better planned in terms of delays, required access, interaction with contractor staff for electro-mechanical equipment settings, etc. Procedure and criteria for water tightness testing should also be fixed at an earlier stage.

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