

Title	MULTIPLE BLOWDOWN PIPE EXPERIMENTS WITH THE PPOOLEX FACILITY
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Abstract This report summarizes the results of the experiments with two steel blowdown pipes carried out with the scaled down PPOOLEX test facility designed and constructed at Lappeenranta University of Technology. Steam was blown into the dry well compartment and from there through the blowdown pipes to the condensation pool.

The main purpose of the experiment series was to study chugging phenomena (rapid condensation) while steam is discharged through two parallel blowdown pipes into the condensation pool filled with sub-cooled water. Particularly, the aim was to study if the pipe material (polycarbonate) used in the earlier experiment series with two blowdown pipes has had an effect on the general chugging behaviour and measured loads.

In the experiments the initial temperature of the pool water was 20 °C. The steam flow rate ranged from 220 g/s to 2 350 g/s and the temperature of incoming steam from 148 °C to 207 °C.

The formation and collapse of steam bubbles and the movement of the steam/water interface inside the pipes was non-synchronous. There could be even a 70 ms time difference between the occurrences of steam bubble collapses at the outlets of the two pipes. There was no clear pattern in which pipe the steam bubble first starts to collapse. Several successive bubbles could collapse first in either pipe but then the order changed for a single or several cycles.

High pressure loads were measured inside the blowdown pipes due to rapid condensation of the steam volumes in the pipes and resulting water hammer effects. The loads seemed to be higher in pipe 1 than in pipe 2. An explanation for this could be a possible unequal distribution of steam flow between the two pipes.

The pipe material has an effect on the condensation phenomena inside the blowdown pipes. A huge difference in the measured pressure curves inside the pipes could be observed compared to the experiments with the polycarbonate pipes. With the same test conditions the amplitude of the pressure pulses caused by water hammer was considerably larger in the steel pipe experiments. It seemed like the flow mode was different with the polycarbonate pipes from that with the steel pipes. Due to minimal heat conduction through the polycarbonate pipe wall condensation tended to happen at the pipe outlet and therefore no high pressure loads due to water hammer were experienced inside the pipe.

Key words condensation pool, steam/air blowdown, chugging, dynamic loading