

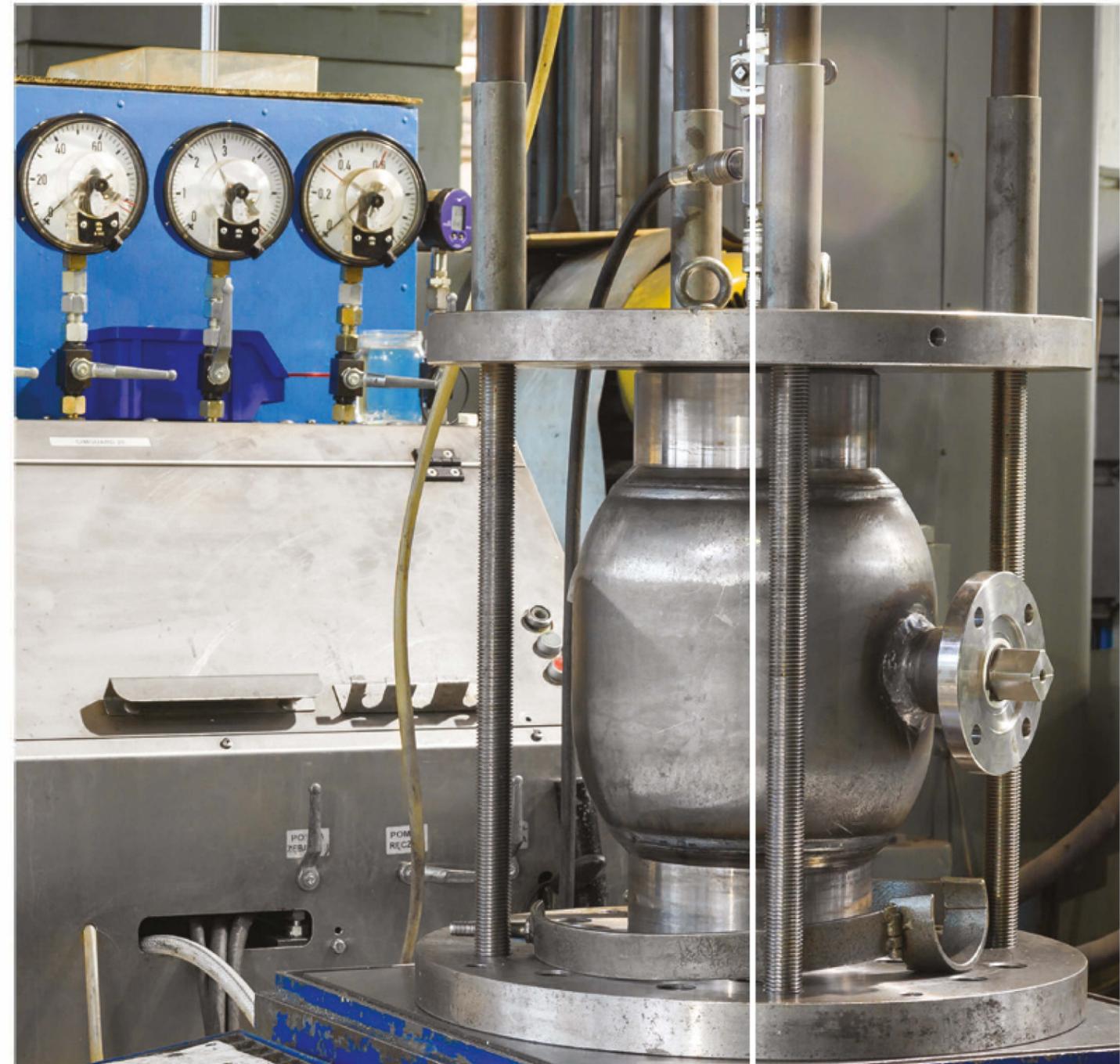
We would like to share our experience regarding contaminated gas. Let us work together to find best solutions for conditions in your gas pipeline system. The answers to following questions are important: what contaminants are usually found in your gas pipeline system?, what damages occur?, what are most common actions you have to take when leakage caused by contaminated gas occurs?

We will help you avoid such circumstances and related problems.

Our technical staff is ready to make analysis of problems occurring in your region and choose best solution from broad range of our sealing systems. We will test it and show you results to confirm our choice.

BROEN OIL & GAS

Stara Droga 8, 62-002 Suchy Las, POLAND
contact@broen.com, www.broen.com



CONTAMINANTS IN PIPELINE GAS
INTERNAL TESTS
EXTERNAL CERTIFICATION

BROEN
VALVE TECHNOLOGIES



CONTAMINANTS IN PIPELINE GAS

Media contaminants present in pipelines are classified as:

- Chemical contaminants, i.e. moisture, solvents, and/or various chemical compounds (e.g. petroleum fractions) generated during mining or processing of crude materials.
- Mechanical contaminants, i.e. sand, glass, rust, welding particulates, electrode residues, etc., which are generally solid contaminants introduced into the pipelines during installation of fittings.

When not choosing the right sealing system contaminants will result in quick loss of valve closure tightness by damaging either the seal system or the ball. That is why BROEN is testing the mechanical contaminants at its own research laboratory in its attempt to replicate the operating conditions of ball valves exposed to solid contaminants.

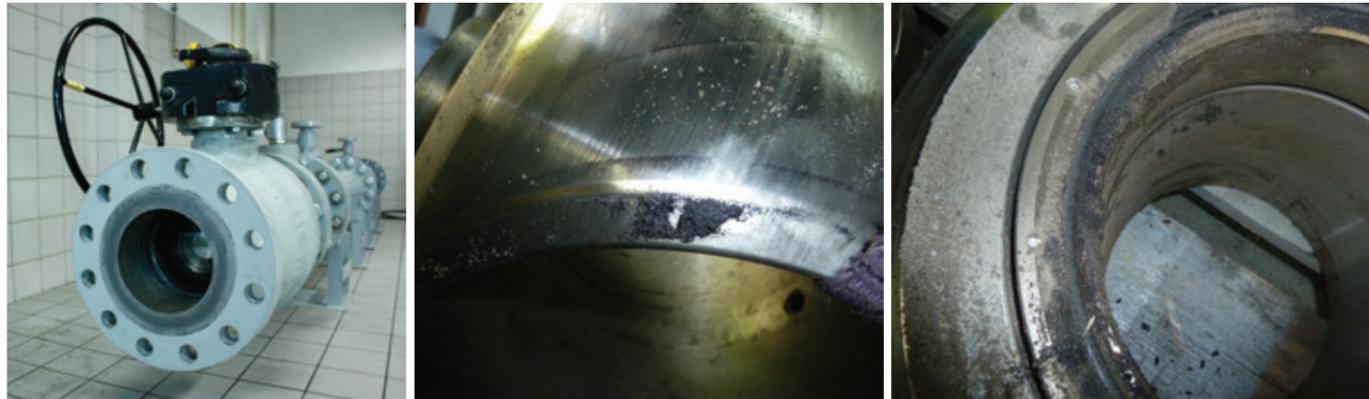


BROEN INTERNAL TESTS

The work at BROEN is aimed at reproducing the natural operating conditions of ball valves exposed to mechanical contaminated media at full valve opening and pressure differential. A contamination composition including sand, shot and steel swarf from welding and grinding is being used during the testing.

The internal tests carried out at the company's state-of-the-art laboratory exceed the tightness testing requirements of EN 14141, where the standard provides for 20 full open-close cycles with a gas medium complemented by contaminants of up to 2.5 mm in size. Our laboratory tests use pressure values of over 100 bar and contaminants of up to 4 mm in diameter.

We carry out more than 500 tests each year and have tested over 150 sealing system types. This has allowed us to develop various valve sealing systems and adapt our valves for operation with many contaminated media types used in the pipelines of our customers to assure long and reliable performance.



BALL WITH CONTAMINANTS

SEAT WITH CONTAMINANTS

EXTERNAL CERTIFICATION – ITIS B.V.

Broen valves have been externally tested and certified at the ITIS B.V. (Industrial Testing & Inspection Services) laboratories in the Netherlands. Ball valves were tested with contaminated nitrogen in 25 full open-close cycles, following the EN 14141 standard. The very positive test results confirm the high quality of BROEN solutions, which assure tight seal even in rugged conditions. We have recently, under supervision of independent surveyors from ITIS B.V. conducted tests with helium in 1000 mechanical open-close cycles in room temperature with 100 bar applied pressure. These test were conducted according to ISO 15848-1:2006 standard. Results of tests confirm that Broen valves meet all fugitive emission requirements stated in industry standards.



EXTERNAL CERTIFICATION – SARATOV

BROEN ball valves have been externally certified at the GAZPROM Institute of Science in Saratov, Russia.

The tests at the Saratov Institute laboratories follow strictly defined requirements:

- Test operating pressure: 8 MPa maximum
- Mechanical contaminants with the maximum size of 1 mm – each composition of mechanical contaminants with sand and welding particulates includes one solid body of up to 3 mm in size and 20 mm of length (a welding electrode splinter) are added to the gas media every 50 (for DN50 valves) or 100 (for > DN200 valves) open-close cycles
- The valve tightness is tested with sensors boasting the accuracy class of 1.5, installed at the valve inlet and outlet

DN 300 PN 100 and DN 50 PN 100 ball valves were tested with contaminated natural gas. The fittings were exposed to 4000 cycles of operation with the contaminated medium. The positive test results confirm the efficiency and strength of our sealing systems.

