

Fatigue Treatment of Non-Return Valves

Key words

Fatigue testing, safety device, non-return valve, acetylene

Fields of application

Safety assessments of non-return valves for high pressure acetylene. The fatigue treatment is conducted in connection with a functional test for safety against reverse gas flow after subjection to a 2000 cycle fatigue treatment. Testing is carried out according to EN ISO 15615 "Gas welding equipment – Acetylene manifold systems for welding, cutting and allied processes – Safety requirements in high-pressure devices".

Methodology and instrumentation

The test assembly consists of a mechanically-operated and a computer-operated part. The mechanically-operated part includes the mounting device for the test sample and three magnetic valves connected by tubes according to the specifications in the standard. Impact by abrupt gas return is controlled electronically by different turn-on and turn-off times of the three magnetic valves thus generating a pressure surge or a pressure relief. Recording of the test cycles including pressure data and ensuring data traceability are realised by an in-house developed computer software. The test pressures, the number of pressure cycles and acceptable leakage rates are specified in EN ISO 15615.

Items tested

Non-return valves for high pressure acetylene

Quantities / characteristics tested

Fatigue treatment is conducted in connection with a functional test for safety against reverse gas flow. After passing the reverse flow test the non-return valve is fatigued by 2000 cycles of an abrupt pressure surge and pressure relief. The requirement for passing the type test is that after the fatigue treatment the valve has to pass the functional test again.

Uncertainty / reliability of results

The validity of the realisation of the fatigue treatment is ensured by alignment of the measurement equipment used for the electronic control with calibrated measurement devices before the fatigue treatment. During the test cycles the pressure is monitored and the measured data are recorded.

Qualification and quality assurance

To our knowledge there is no other organisation within Germany which is able to carry out the complete fatigue treatment of non-return valves for functional testing. The specific challenge in setting up this test assembly is given by the realisation of the test routine consisting of 2000 cycles of the fatigue treatment each with an abrupt pressure surge within less than 100 ms.

Contact:	Uwe Schulze Dennis Grasse	Phone:	+49 30 8104 4448 +49 30 8104-3491
E-mail:	uwe.schulze@bam.de dennis.grasse@bam.de	Fax:	+49 30 8104-1217
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Further information

Assembly of fatigue treatment of non-return valves

