Backfire Test of Acetylene Cylinders

Key words

Acetylene cylinder, porous material, backfire test

Fields of application

Type testing of acetylene cylinders with porous material according to
EN 1800 "Transportable gas cylinders - Acetylene cylinders - Basic requirements and definitions" and
ISO 3807-1 "Cylinders for acetylene - Basic requirements - Part 1: Cylinders without fusible plugs", respectively.

These standards are referred to in the Dangerous Goods Regulations (Annex A of ADR and RID) for the approval of acetylene cylinders and therefore are also applicable for the conformity assessment according to Directive 1999/36/EC (TPED).

Methodology and instrumentation

Acetylene cylinders are filled entirely with a porous material which must be able to stop the propagation of an acetylene decomposition within the cylinder initiated e.g. by a backfire or external heating of the acetylene cylinder. Type testing includes subjection of the acetylene cylinder to a drop procedure by dropping it ten times from a height of 0.7 m onto a concrete plate. Afterwards the porous material shall not be modified even if cracks or crumbling in the porous material have arisen. For the following backfire test the acetylene cylinder is fitted with an explosion tube and filled with acetylene including an overfilling of 5 %. After heating the cylinder to 35 °C the actual backfire test is carried out by initiating an acetylene decomposition in the cylinder through the explosion tube.

Items tested

Acetylene cylinders with porous material

Quantities / characteristics tested

The acetylene cylinder shall not burst or be deformed by the backfire, there shall not be any escape of gas from the cylinder and after 24 h the overpressure within the cylinder shall have decreased to less than 30 bar.

Uncertainty / reliability of results

The validity of the qualitative test results is ensured by control with calibrated measurement equipment and by a functional check of the test assembly before the test.

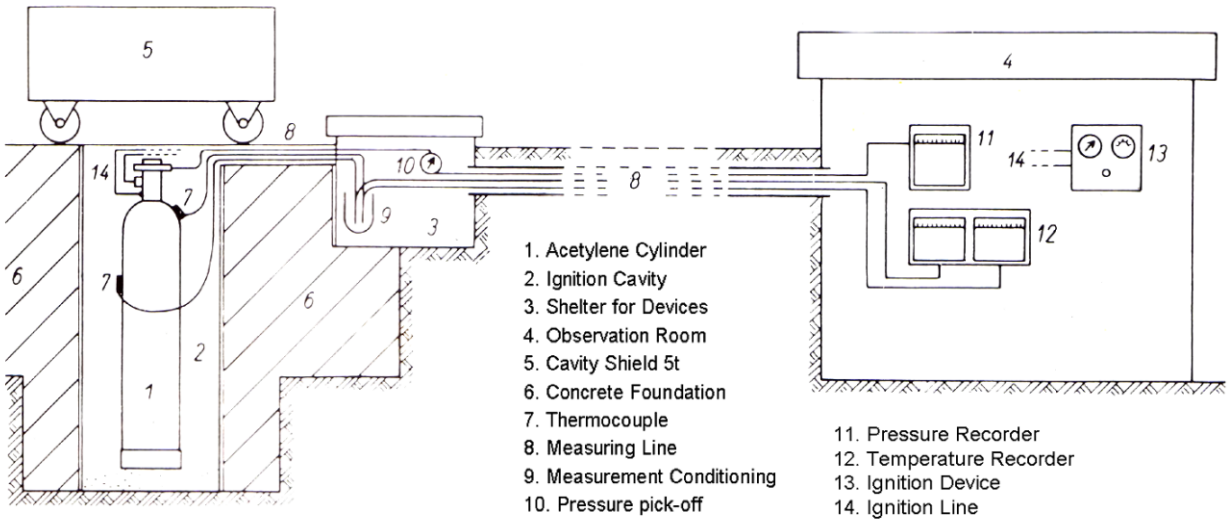
Qualification and quality assurance

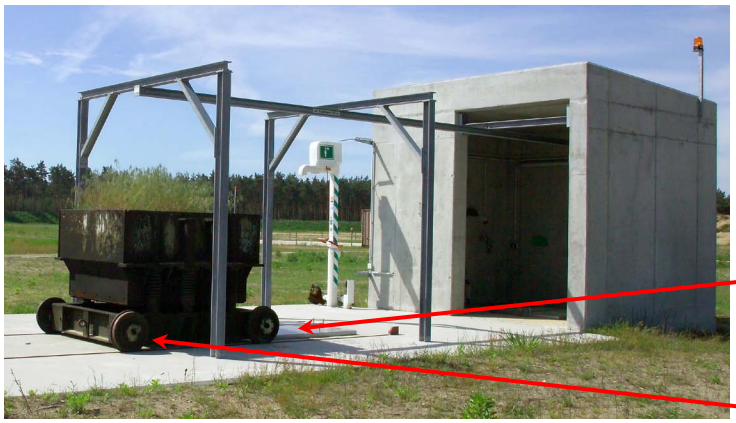
To our knowledge within Europe only one other institute is able to carry out backfire tests of acetylene cylinders according to EN 1800 and ISO 3807-1.

Contact:	Christina Hensel Dr. Kai Holtappels	**Phone:**	+49 30 8104-3494 +49 30 8104-3436
E-mail:	christina.hensel@bam.de kai.holtappels@bam.de	**Fax:**	+49 30 8104-1217
Division 2.1 - Gases, Gas Plants			back to Catalogue of Unique Test Facilities

Further information

Assembly of the backfire test





In case the acetylene cylinder fails during the backfire test, bursting of the cylinder with a 25 m to 30 m fireball is possible within 24 hours after ignition. Therefore the backfire test is carried out in a cavity, covered with a wagon weighing 5 t.

Ignition cavity with lid

Cover wagon

The right figure shows cross-sections through acetylene cylinders, the left one before the backfire test with the ignition valve and the right one after successful passing the backfire test. In the right cylinder the soot which was formed by the acetylene decomposition is visible, thus showing how deep the acetylene decomposition proceeded into the porous material.