

Gaseous Oxygen Impact Tester (Pneumatic Impact Tester)

Key words

Adiabatic compression, valves, fittings, oxygen, burn-out safety, seals, pneumatic impact

Fields of application

Test of nonmetallic liquid, pasty or solid materials for ignition sensitivity to gaseous oxygen impacts at pressures up to 300 bar and different pressure ratios and at temperatures ≥ 60 °C

Burn-out testing of valves, fittings, hoses and other components on gaseous oxygen impacts at pressures up to 450 bar

Methodology and instrumentation

By opening of a quick-opening valve the samples are exposed to gaseous oxygen impacts. The pressure rise time is 15 ms to 20 ms.

The test cycles may differ in time and number.

Items tested

Nonmetallic materials and components for oxygen service.

Quantities / characteristics tested

Determination of max. working pressure of nonmetallic materials and components for oxygen service at operating temperature. The test result is a qualitative yes/no statement: materials shall not exhibit a significantly steeper temperature rise than in a corresponding blind test. In valves, etc., oxygen wetted seals must not show any indications of charring.

Uncertainty / reliability of results

Pressure, pressure rise time and temperature are measured by calibrated thermocouples and pressure transducers. Temperature: ± 1 K (manufacturer's specification for type K thermocouples, calibration protocol), pressure: ± 1 bar (manufacturer's specification, calibration protocol). The measurement uncertainty is considerably lower than the permissible measurement error according to relevant standards. Materials are investigated in 2 series of 5 replicate tests. 3 samples are tested for each component.

Qualification and quality assurance

The test method has been developed at BAM and it is mandatory in European and international standards. In Germany, only BAM working group "Safe handling of oxygen", can carry out such tests. In Europe, component tests are carried out by less than 5 institutes. In Europe, component testing up to 450 bar is only available at BAM.

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Further information

Methodology and instrumentation

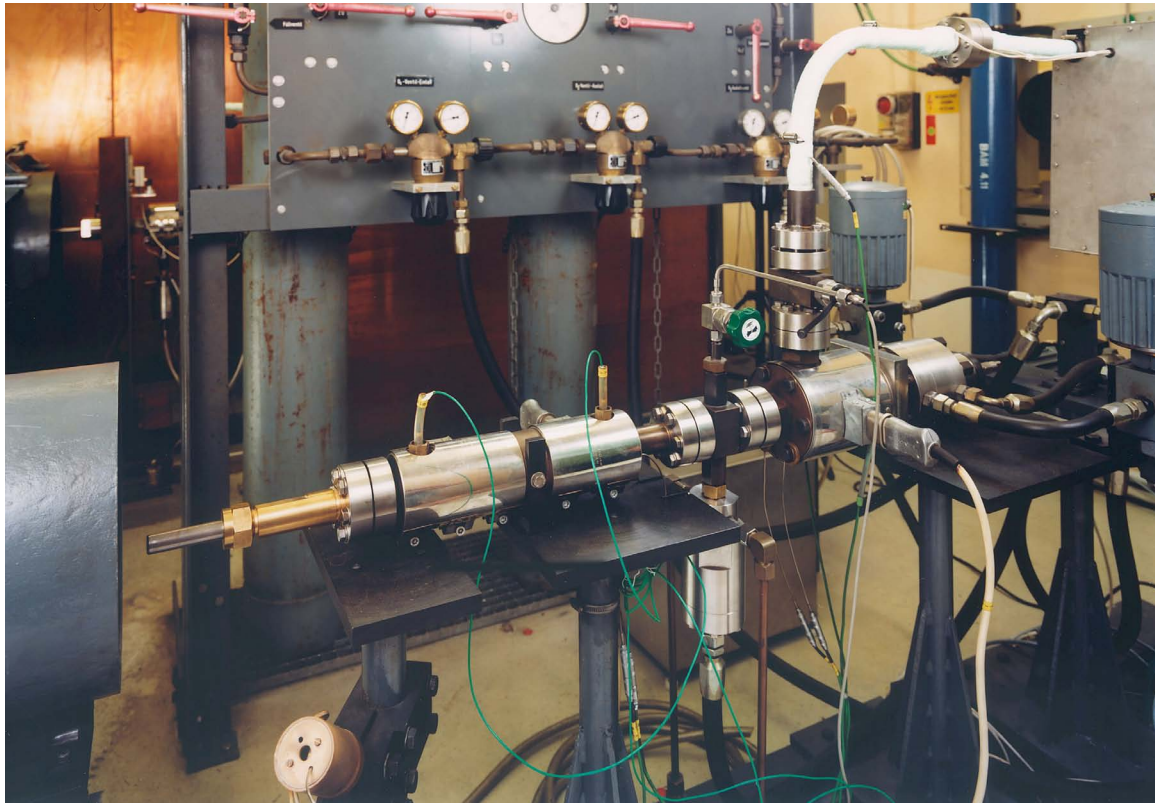
The pneumatic impact test for fittings for oxygen service is described in European and international standards. Components for oxygen service such as cylinder valves and regulators shall be tested by this method.

The pneumatic impact test for nonmetallic materials is described in the annex of "Liste der nichtmetallischen Materialien, die von der BAM Bundesanstalt für Materialforschung und -prüfung zum Einsatz in Anlageteilen für Sauerstoff als geeignet befunden worden sind" published by BAM in connection with the safety rule B 7 „Sauerstoff“ (Oxygen) of the „Berufsgenossenschaft der chemischen Industrie“ (Employers liability insurance association of the chemical industry).

Quantities / characteristics tested

In oxygen plants, gaseous oxygen impacts may occur by abrupt opening of components. In this case, high temperatures are produced and it is possible that nonmetallic materials ignite. This test simulates such a situation and allows evaluation of the burn-out safety of components and the oxygen compatibility of particular nonmetallic materials.

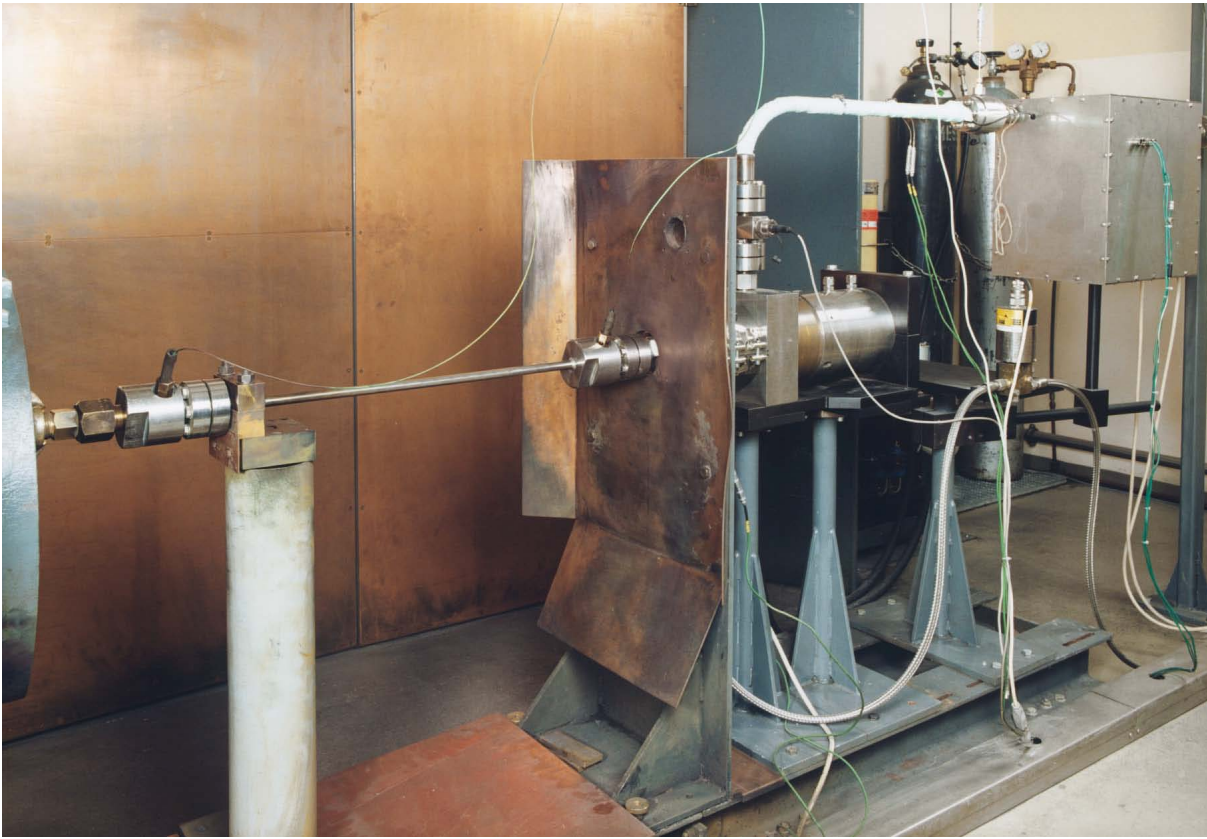
Gaseous oxygen impact tester for nonmetallic materials



Technical data:

Max. test pressure	300 bar
Max. test temperature	300 °C
Pressure rise time	20 ms

500-bar-Oxygen Impact Tester for Components



Technical data:

Max. test pressure	450 bar
Max. test temperature of sample	250 °C
Pressure rise time	15 ms to 20 ms
Connecting tube with an inner diameter of 5 mm and a length of 1000 mm	
Connecting tube with an inner diameter of 14 mm and a length of 750 mm	
Connecting tube with an inner diameter of 20 mm and a length of 750 mm	