

Spray Form Test Bench

# SFB 1000



## Special features:

- **Stand-alone test bench (explosion-proof design)**
- **Used for gasoline high pressure injection valves or suction pipe valves**
- **Two dimensional measurement of injection spray**
- **Spray pattern investigations using the axially transmitted light process**
- **Measurements correlate to Bosch production measuring technology**
- **Test bench control using MOEHWALD Prisma NT software**
- **Pattern evaluation with the help of Optimas image processing software**
- **Simple to use**
- **Easy to adapt to suit different test samples**
- **Compact design**
- **Control electronics on 19" sub-rack system**
- **High reliability**
- **Suitable for use in a harsh production environment**

### General

The SFB 1000 test bench is used for injection spray form investigations at high pressure injection valves (HPIV) and suction pipe valves to determine their characteristic spray parameters. The emerging direct gasoline injection technology demands ever-increasing precision of measurement in injection spray shape tests.

The test bench is designed to Bosch standards in order to maintain correlation with existing Bosch test benches. It is therefore especially suitable for use in connection with quality assurance and development.

The interchangeability of the parts of the modular test sample insert allows a wide range of samples to be accommodated.

### Principles of the test

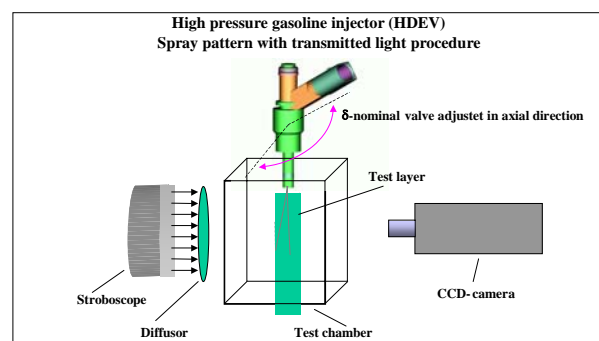
Gasoline injection valves operate under a preset medium pressure and are controlled by means of an adjustable frequency. The injection takes place in a counterpressure chamber, which allows the spray created to be illuminated and captured in a sequence of photographs. These images are measured and evaluated using the accompanying software.

### Setup

*The test bench is designed to be explosion-proof for Zone 1 (EEx-II 2G).*

It consists of the following main components:

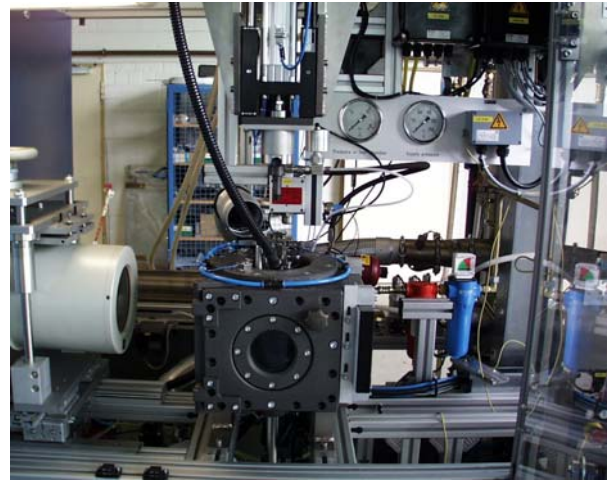
- Support frame with hydraulic unit and pressure generator
- Test room protected with transparent panels in the upper frame with glazed counterpressure chamber, stroboscopic light field, camera in positive pressure encapsulated housing.
- Positive pressure encapsulated operating cabinet with computer, various measuring instruments and controls.
- Control cabinet, which is not explosion-proof and therefore must be set up outside the explosion-proof area.
- Software:
  - ◆ Prisma NT – test bench control software
  - ◆ Optimas – image processing software



Test setup

## Test procedure

- The test sample is placed by hand into the reception of the injection chamber
- The electrical connections are made manually and the test bench door closed
- The gasoline feed is automatically energised
- Test sample type is input into the computer and test parameters called up
- The test sample is flushed, taking the flushing medium through a funnel directly back into the tank in order to avoid dirtying the test chamber panes
- The boundary conditions of the operating point are set and the chamber pressure controlled by the computer
- The Optimas software is activated for the measurement and evaluation of the injection spray
- The injection frequency is switched on
- Image representation drawn and evaluated
- The test sample and the feed lines are flushed and the chamber fully blow out
- Pressure relieved in the chamber
- The safety door is released after the specified time
- The test sample is removed



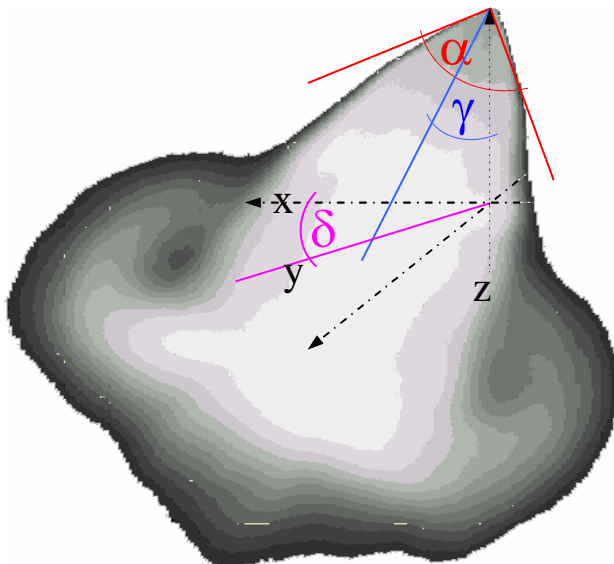
test chamber with Stroboscope

## Evaluation

The shape of the spray is evaluated by the Optimas image processing software on the basis of the obtained image matrix. The optical axis of the camera is aligned with respect to the longitudinal axis of the valve. For valves without spray angle  $\gamma$ , the camera axis is on the longitudinal axis. For valves with spray angle  $\gamma$ , the image is adjusted by shifting the position of the camera. The depth of focus is set on the centre plane of the valve. The transformation of the image pixel units is performed using calibration parts.

The spray test comprises the measurement and evaluation of::

- **Spray cone angle  $\alpha$**
- **Spray direction angle  $\gamma$**
- **Spray layer angle  $\delta$**
- **Main spray penetration  $L$**
- **Pre-jet penetration  $L_v$**
- **Customer specific variable**



Geometry of the spray profile

## Technical data:

Testing medium	n-heptane
Samples	High pressure injection valves or suction valves
Supply pressure	20 – 150 bar (alternative pressure generation up to 300 bar)
Camera	e.g. 1376 x 1040 pixels possible, exposure 500 ns – 1000s, can be changed in consultation with the customer
Medium temperature	20 °C
Image recording frequency	1 – 8 Hz
Electrical supply	Mains voltage: 3 x 400V / 50 Hz Max. fusing 3 x 35A Rated power: 20kVA Control voltage 24 VDC Optional: modification for different mains networks
Dimensions:	2900 x 1200 x 2620 (l x w x h in mm)
Weight	2950 kg

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