



## Screening Test Equipments

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### MP-1 Burning Test

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This test is designed to determine the ignitability and the combustibility of a dried solid according to the following criteria:

- Can the product be ignited at all?
- Does the flame propagate?
- Is there a fire or flameless reaction?
- What is the propagation velocity of the deflagration?

The tests are carried out at room temperature and at elevated temperature (e.g. 100°C). An electrically heated platinum wire is shortly dipped into the test substance and the reaction of the compound is observed.

- According VDI 2263: Dust fires and dust explosions; hazards, assessment, protective measures; test methods for the determination of the safety characteristic of dusts

### MP-3 Falling Hammer

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For processes involving mechanical impact on the product, like grinding high speed mixing or drying in paddle driers, the sensitivity of a product to shock has to be determined.

100 mg samples of milled and dried product are exposed to an impact energy which can be varied by changing the falling height of the hammer.

Additional parts are available for testing liquids according to BAM and OECD standards.

- According VDI 2263: Dust fires and dust explosions; hazards, assessment, protective measures; test methods for the determination of the safety characteristic of dusts.
- UN Recommendations on the Transport of Dangerous Goods

## Lütolf-Oven

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### Test for Exothermic Reaction in an Open Cup



According VDI 2263: Dust fires and dust explosions; hazards, assessment, protective measures; test methods for the determination of the safety characteristic of dusts.

This test is designed to determine the lowest temperature at which a substance shows an exothermic reaction under defined oxygen-lean conditions. It is applied to products, which are exposed to an elevated temperature over long periods, closed off from fresh air (e.g. in vacuum ovens, fluid-bed drier etc.).

With this test, the maximum permissible process temperature can be derived.

The substances to be tested and a reference substance are heated up at a constant rate of 2.4°C/min. (dynamic test). The temperatures of the samples are recorded. An exothermic reaction is considered to have occurred if the temperature curve of the test sample rises above the reference sample temperature.

Alternatively, isoperibolic tests can be carried out, in which the test substance is kept at a constant temperature over a defined period of time.

The test set consists of:

- Heating block with 6 holes to receive 1 reference and 5 test samples
- Thermometer probe for controller
- Sipcon data acquisition system
- Thermocouple controller 6mm dia. x 250mm (1pc)
- Thermocouple measurement 1.5mm dia. x 250mm (6pc)
- Test tubes (glass) 15.75 x 70 mm
- Test tubes (glass) 15.75 x 160 mm
- Tubes (glass) for thermocouples 4.25 x 200 mm

## Grewer-Oven

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### Test for Exothermic Reaction in an Air Stream



This test is designed to determine the relative auto ignition temperature of a product in a hot air-steam. It is applied to products, which are to be processed at elevated temperatures in the presence of air (e.g. spray drier, circulating air tray drier etc).

With this test, the maximum safe process temperature can be derived.

The auto ignition of the product tested occurs by reaction with the oxygen in the air and/or by exothermic decomposition. The same test may be done in a nitrogen-stream instead of an air-stream. If both results are compared, the influence of oxygen can be identified.

According VDI 2263: Dust fires and dust explosions; hazards, assessment, protective measures; test methods for the determination of the safety characteristic of dusts.

The test set consists of:

- Grewer Oven with 6 holes to receive 1 reference and 5 test samples
- Thermometer probe for the controller
- Sipcon data acquisition system
- Thermocouple controller 6mm dia. x 250mm (1pc)
- Thermocouples measurement 1,5 mm dia. x 250 mm (6 pcs)
- Glass tubes 4,25 x 200 mm
- Wire baskets

## Mini-Autoclave

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### Test for Exothermic Reaction and Pressure Increase



This test is designed to determine the lowest temperature at which a substance or reaction mixture shows an exothermic reaction under defined isochoric conditions, while pressure is measured.

The test is applied to products or reaction mixtures with low boiling points in order to suppress evaporation effects in the temperature range of interest.

The equipment allows screening for explosive properties according to M. W. Whitmore at a closed pressure vessel test (CPVT) screen for explosive properties of energetic organic compounds, J. Loss. Prev. Proc. Ind., 20 (2007), 1-6

The test set consists of:

- Mini Autoclaves (2 pcs)
- Reference Autoclave
- 2-zone heating block with holes to receive 2 Mini Autoclaves and 1 Reference Autoclave
- Sipcon data acquisition system
- Dual pressure measuring system
- Thermocouple controller 6mm dia. x 250mm (1pc)
- Thermocouples measurement 1,5 mm dia. x 250 mm (3 pcs)
- Capillary tube
- Test glass tubes (15.75 x 45 mm)
- Protection glass tubes for thermocouples (5.75 x 38 mm)
- Thermometer probe for the controller

## Special Oven

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This oven may be used for a variety of thermal exposure tests up to sample volumes of 3 Liters.

Typical applications include self-heating and self-ignition tests of powders in wire baskets and heat accumulation tests on Dewar vessels.

The oven may be connected to a gas supply line to control the atmosphere inside.

According VDI 2263: Dust fires and dust explosions; hazards, assessment, protective measures; test methods for the determination of the safety characteristic of dusts.

## BAM Oven

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### Ignition Test for Airborne Dust



This test is designed to determine the ignition temperature of airborne dust on a hot surface. The ignition temperature is relevant for the specification of electrical equipment and installations in Ex-Zones.

In a heated chamber, the dust sample is blown onto a hot surface having a defined temperature. The reaction (explosion) is observed visually.

ISO /IEC 80079-20-2:2016; Explosive atmospheres; Material characteristics; Combustible dusts test methods

The test set consists of:

- BAM Oven
- Sipcon temperature controller (0-600°C)
- Thermocouples 1.5 mm dia. x 250 mm (2 pcs)

## Modified Hartmann – Apparatus

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This test is designed as a qualitative pre-test for the explosion behavior of a dust/air mixture. The product, which is milled down to a particle size of 63  $\mu\text{m}$ , is whirled up in a vertical Pyrex glass tube by pressurized air.

Depending on the reaction of the dust/air mixture, i.e. explosion violence, the lid is opened to a varying extent and the opening angle is then displayed digitally in three stages via inductive transmitters.

ISO /IEC 80079-20-2:2016; Explosive atmospheres; Material characteristics; Combustible dusts test methods

### **SQ25 Hot wire control unit for the modified Hartmann Tube**

Hot wires may be used as alternative ignition sources in the modified Hartmann Tube.

SQ25 is a power supply and control unit for these ignition sources. It allows the adjustment of the wire temperature by manually controlling the current (voltage max. 30 VAC).

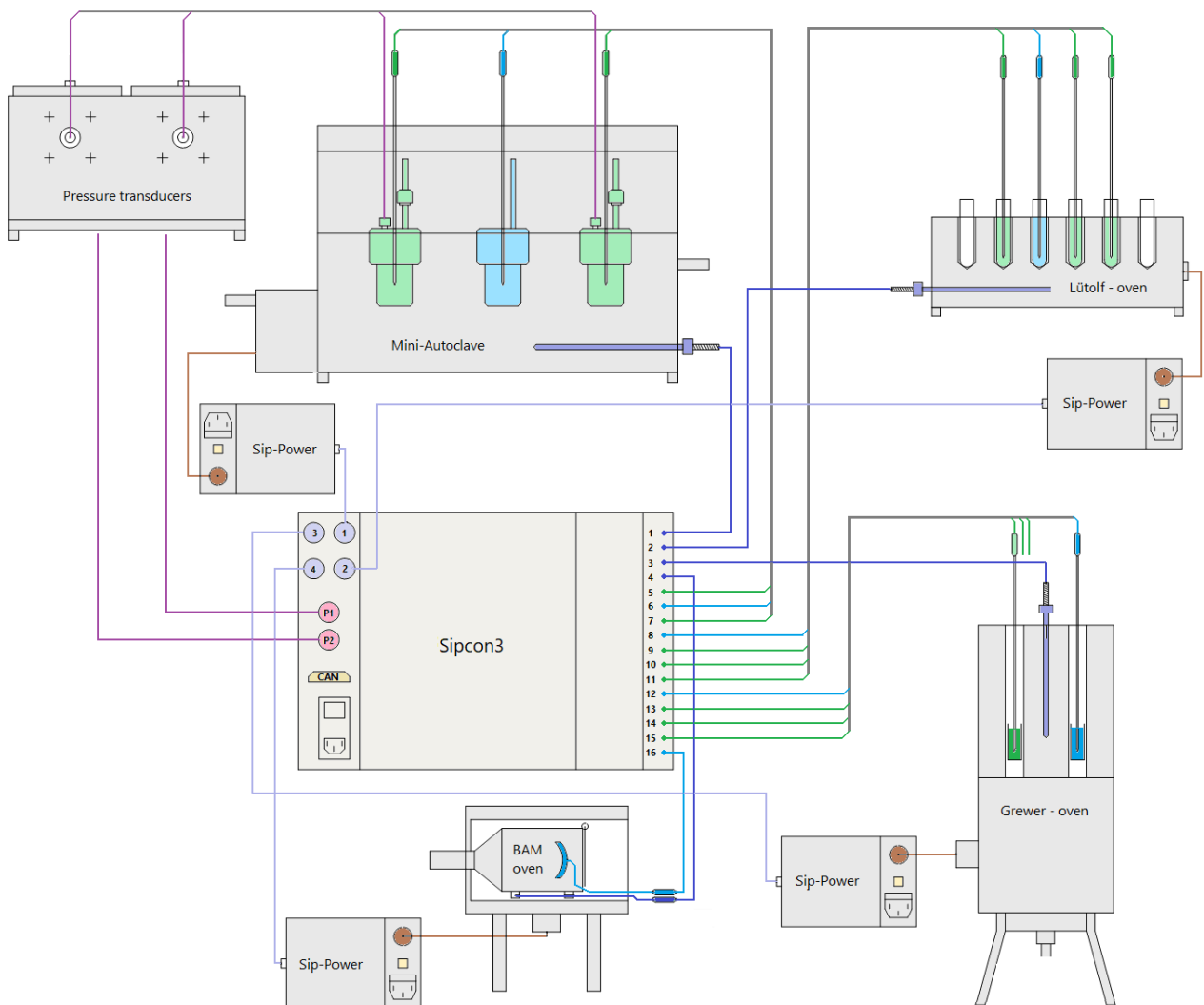
## Sipcon

Data Acquisition and Control System for



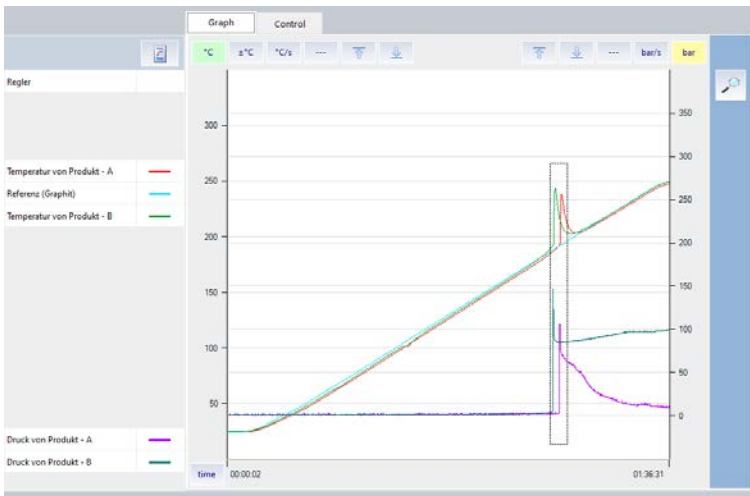
- Lutolf Oven,
- Grewer Oven,
- Mini Autoclave,
- BAM Oven,
- Special Oven

Up to 4 software controllers, each with a quasi-continuous power output for direct control of heating circuits, are provided for this purpose. Each SIPCON unit contains 16 signal channels for free assignment of control, reference or general measuring input.

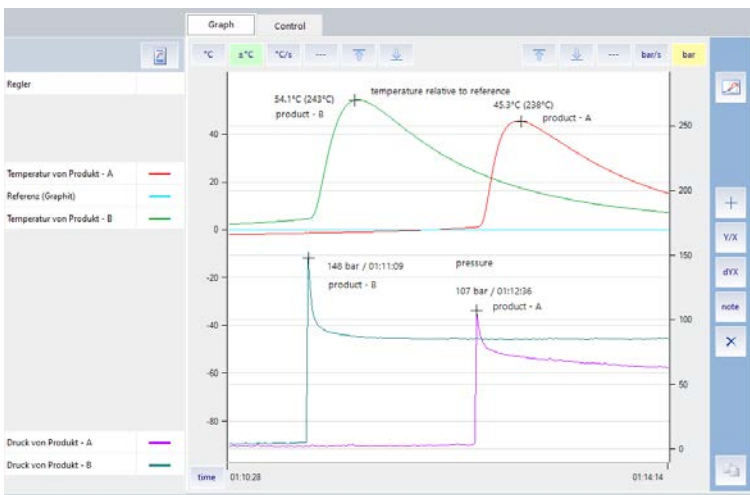


Results can be displayed and printed numerically and graphically.

Example: Linear heating, overview, absolute



Example: linear heating, relative to reference



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