BeJUNK12 - Bergmann-Junk Tester

MODERNIZED STABILITY TESTER FOR BERGMANN-JUNK METHODS

Bergmann-Junk and Bergmann-Junk-Siebert tests are traditional methods for determination of chemical stability of nitrocellulose, single and double based smokeless powders, rocket fuels and nitro compounds. Testing apparatus is provided as a modular solution for easy setup for required testing standard.

Application

Chemical stability of energetic materials is an essential quality parameter for reliable risk and safety management. Bergmann-Junk Test was developed in 1904 as a response to severe problems with stability of nitrocellulose (NC) and NC based powders. It was significantly modified in 1942 by Siebert and further presented as different test method Bergmann-Junk-Siebert Test. These methods were implemented in several variations by most of the stability testing guidelines and national authorities for standardization.

Bergmann-Junk Tests are reliable quantitative methods with high reproducibility. These tests are fast, affordable and require no additional laboratory skills. Standard consumable materials further extend its accessibility by eliminating expensive, standard test papers

Principle

Unstable behavior of nitrocellulose and NC based energetic materials is associated with the liberation of heat and gaseous decomposition products, which also contain nitrogen oxides (NO_x). Exposition of the sample to a higher temperature increases its decomposition rate. Bergmann-Junk based testing methods were developed to evolve NO_x in defined conditions and to absorb it in exact apparatus. Further quantitative analysis provides reliable and reproducible values of nitrogen oxides in decomposition gases. Further consideration of these values provides an overview of material stability and their lifetime.

Bergmann-Junk method is usually combined with Heat test (Methyl Violet Test), Abel Heat Test, Vacuum Thermal Stability Test and HPLC. The result of Bergmann-Junk Test is presented as a volume (in ml) of titration agent of given concentration per gram of the sample or as weight (in mg) of nitrogen per gram of the sample.

Compliance

STANAG 4178 (5A, 5B, 5C), TL: 1376-0589, TL: 1376-0600
ČOS 137602, UK M28/89

Legal restrictions

BeJUNK12 and **BeJUNK18** is not listed as military or dual use goods. It is widely applicable in civilian supply chain and principle of used methods is commonly known.

Specifications

Bergmann-Junk Tester BeJUNK12	
Sample positions	12
Hole size (diameter x depth)	20 x 200 mm
Touch screen LCD interaface	Yes
Temperature limit	+ 200°C
Temperature accuracy	± 0.1°C
Predefined temperatures	115, 120, 132 °C
Predefined test times	2, 8 and 16 hours
User- defined temperature	Yes
User defined testing time	Yes
External calibration	Yes
Independent temperature limiting	Yes
Light and sound check cycle alarm	Yes
Easy firmware update (SD card)	Yes
Weight	60 kg / 59 kg
Size (WxDxH)	42x45x41 cm
Block heating rate	2 °C/min
Block cooling rate	4 °C/h
Power (220 - 240 VAC, 50-60 Hz)	1500 W
USB connector - remote operation	Yes

Energetic Materials
Stability & Compatibility
Heating Blocks

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Description

BeJunk12 testing apparatus presents stand-alone and compact unit which consists of an MMI interface, controlling electronics and massive aluminium heating block.

The aluminium heating block has 12 precise holes for glass tubes, heating elements, and 2 independent PT1000 (4 wires) temperature sensors. Heating elements are controlled by means of precise PID electronics and independent overheating protection. The heating block is efficiently insulated for excellent energy efficiency.

MMI Interface has 4.3" colour LCD touch screen, SD card slot, and two signal LEDs. **Rear connector Interface** has
- 3 inputs for connecting of temperature sensors or ENVI sensors
- 2 CAN bus connectors for connecting of intelligent peripherals
- 1 port for remote disconnecting of the heating circuit
- 1 USB connector for PC
- 1 RJ45 connector for LAN server

Colour LCD touchscreen interface includes count down timer for total testing time and testing temperature. Total time and temperature can be programmed by the operator. **BeJUNK12** is modular and allows easy conversion between 150 and 200 hole depth.

Variability

BeJUNK 12 covers all primary Bergmann-Junk based methods in one. Overview of covered standards is listed below.

Bergmann-Junk Test **STANAG 4178 5A - non chalked material** **STANAG 4178 5B - chalked material** **UK M28/89**	
Tube Diameter x Length	19±0.5 x 350 mm
Absorber type	Cylinder cap with cap
Hole depth / diameter	150 mm / 20 mm
Absorbing medium	Water

Bergmann-Junk-Siebert Test **STANAG 4178 5C - non chalked material** **TL 1376-0589 (1376-0600) - non chalked material**	
Tube Diameter x Length	19±0.5 x 270 mm
Absorber type	Globe cap
Hole depth / diameter	200 mm / 20 mm
Absorbing medium	Hydrogen peroxide

Advantageous features

Standalone device with colour LCD touch screen interface
General test timer on the LCD screen
Sound and light reminder of experiment finish
Accurate temperature controlling
Independent overheating protection
User-defined testing procedures (self-programming)
External calibration
Remote operation via USB/LAN
Firmware update via SD card
Rigid stands for sample preparation and cooling
Permanently marked glassware

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