

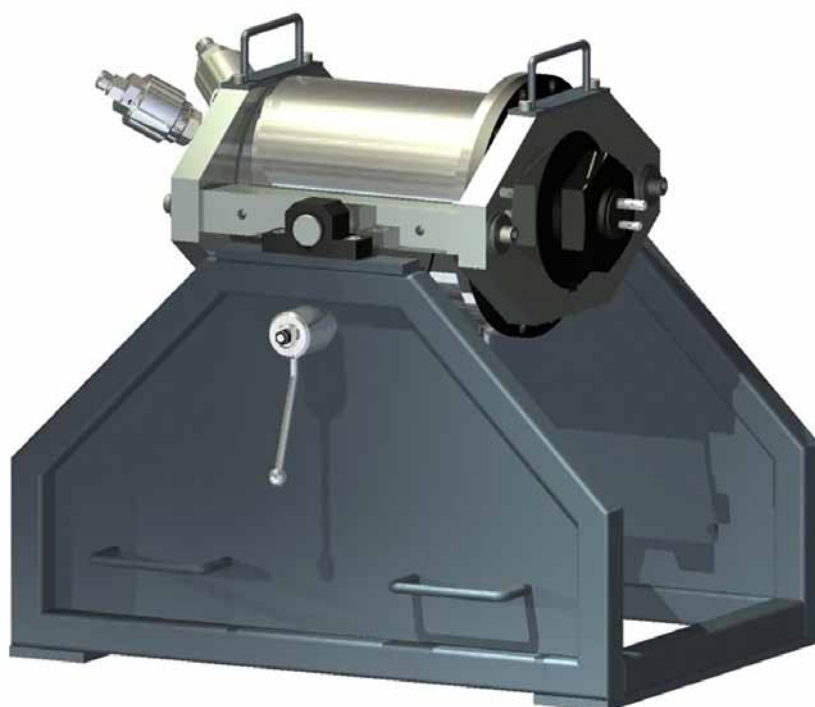
CLOSED VESSEL BB 400 MEASUREMENT OF BALLISTIC PARAMETERS OF PROPELLANT

Product Datasheet

Closed vessel **BB 400** is a part of pyrostatic testing measuring workplace. In combination with piezo-electrical pressure transducer it is used for measuring of pressure increase curve during burning of different propellant types in constant volume. From the values measured it is possible to obtain other information (force, quickness, etc) about the tested propellant using recording and evaluation device with special software. Data obtained from tests in closed vessel can be used at the development of new propellants and at the checking of regular powder types, too.

DEVICE DESCRIPTION

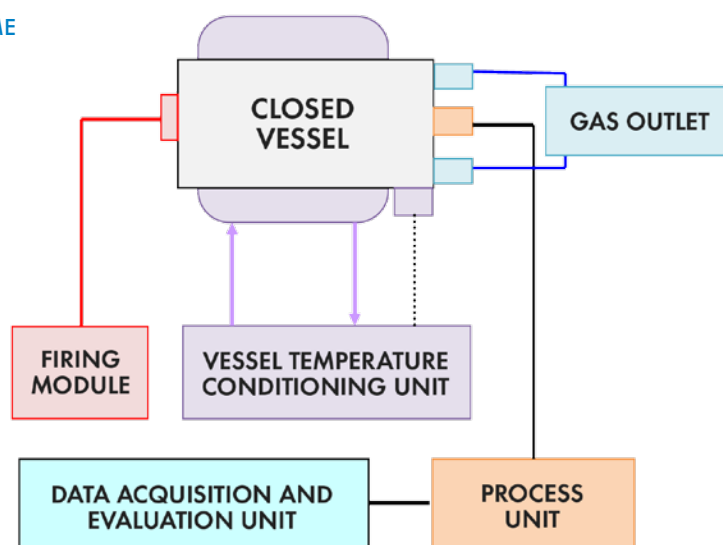
BB 400 is high pressure closed vessel constructed from high strength steel with cooling jacket on the outer surface. It is equipped with temperature sensor, piezo-electrical pressure transducer, two outlet valves and specially-sealed breech screw. The breech screw is equipped by ignition device – either electrical or mechanical – providing possibility of both types of ignition. Closed vessel is supported by a stand, which allows position change and fixation in the range of 180°. Stand is fixed on mobile chassis with antistatic modification.



DEVICE MAIN PARAMETERS

Volume	400 ccm
Working pressure	up to 500 MPa (5000 bar)
Testing pressure	600 MPa (6000 bar)
Material	high strength steel
Loading density	usually 0.1 - 0.25 according to STANAG 4115
Ignition	electrical - for pressure up to 500 MPa (5000 bar) mechanical - for pressure up to 300 MPa (3000 bar)
Cooling jacket	
Piezo-electrical transducer reduction	

SCHEME

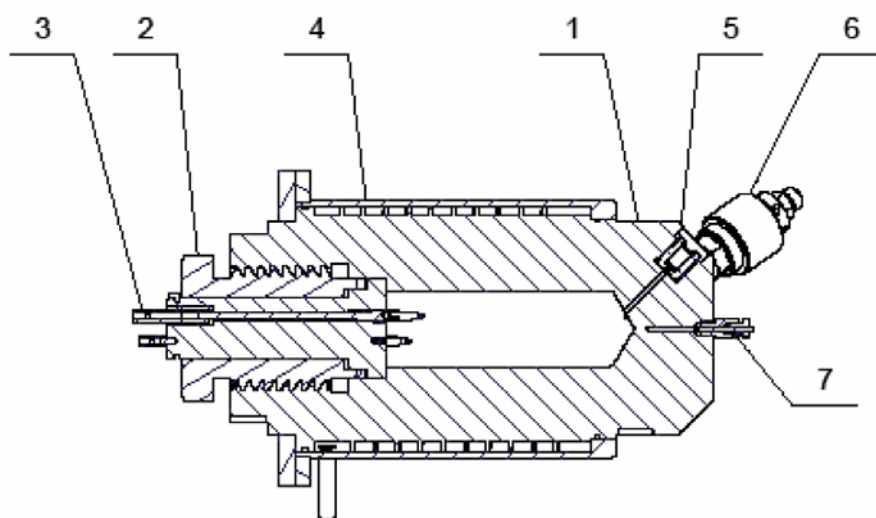


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LONGITUDINAL SECTION



1. Pressure vessel 2. Breech screw 3. Electrical ignition 4. Water cooling jacket
5. Pressure transducer 6. Outlet valves 7. Temperature sensor

EVALUATION PROCEDURE

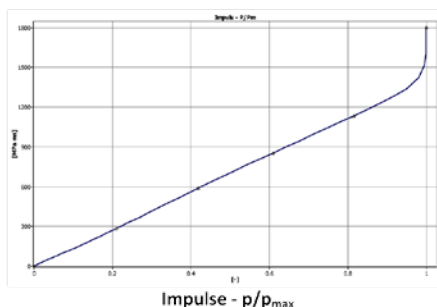
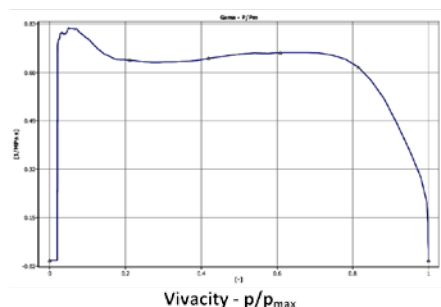
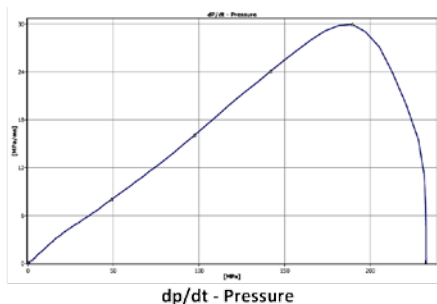
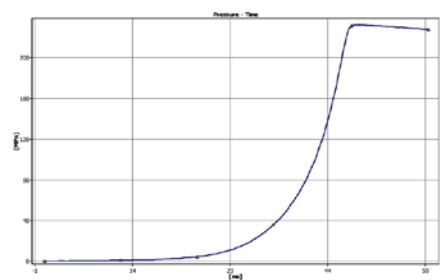
Propellant characteristics calculated from measured values via MIL-STD-286 or STANAG 4115 procedure:

- pressure $p = f(t)$
p_{max}
- time of burning t
- vivacity $L = f(p/p_{max})$
average L
- pressure gradient $dp/dt = f(p)$
average dp/dt
max. dp/dt
- impulse
- force
- covolume
- burn rate

MEASUREMENT

Pressure range up to 500 MPa (5000 bar)
Accuracy 1 %
Samples tested all propellant types

GRAPHS



CONDITION OF DELIVERY

- Delivery consists of complete closed vessel with stand, spare parts, set of tools and all consumables needed.
- Other accessories - measuring device, evaluation software, PC, cooling unit - are optional.
- Other versions of closed vessels with combustion chamber volumes 40, 80, 400 and 500 ccm are also available.

SHIPPING DATA

Package dimensions (W x L x H):	TBD
Package gross weight:	TBD
Custom code:	9031 20 00

EXPORT LICENSE

Export of CLOSED VESSEL instrument is subject to export license for military goods from the Czech Republic. The apparatus can only be exported after having received the approval of the licensing authority concerned. To apply for the valid export license, international import certificate or end-user certificate is required.

CLOSED VESSEL BB 400

MEASUREMENT OF BALLISTIC PARAMETERS OF PROPELLANT

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STANDARD INSTRUMENT PARTS

BB-RB400	Closed vessel BB400 - pressure vessel 400 ccm, max.working pressure 5000 bar - breach screw with el. ignition - pressure transducer fitting - gas release valve - cooling jacket - stand - starting set of consumables - equipment and tools for assembling
BB-CISS	Current ignition unit with safety switch inputs and remote control including leading and control cables
BB-MWCC	Mobile working table with chiller for cooling jacket
BB-MDPU	Measurement and data processing unit - high speed DAQ - PC communication - pressure transducer conditioner - leading and measurement cables - thermometer
BB-PPK6000	Pressure transducer Kistler 6213B 6000 Bar
BB-APPT	Accessories set for pressure transducer (installation kit, cables, silicon paste, transport box)
DAEU-17	Data acquisition and evaluation unit (notebook with this minimum configuration or higher: 17" display, 2 GHz processor, 1.8 GB RAM, DVD-RW, HDD 250 GB, WLAN, BT, LAN, USB, Win 7)
BB-ABSW2	Ballistic software ABSW-2 - SW for measurement and data acquisition - SW for results evaluation (according to STANAG 4115)
BB-MK	Maintenance kit for closed vessels - cleaning set - lubricant and conservant

CONSUMABLES

BB-EP	Spare electrode
BB-RV	Spare release valve
BB-EIBS400	Spare breach screw with electrical ignition (according MIL-STD-286)
BB-IAPT	Spare interchangeable adapter for piezo electric transducer including each one copper sealing
BB-TA	Thermometer accessories

OPTIONAL ACCESSORIES

gauges

BB-MECH400	Set for mechanical ignition (pressure up to 3200 bars ~ 0.2 g/ccm): breach screw with mechanical ignition, O-rings, joints and cartridges covers 1000 rounds, accelerometer
BB-PRCAL	Pressure calibrator set (range up to 500 MPa)

INSTALLATION REQUIREMENTS

Space requirements: W x L x H: min 150 x 150 x 160 cm; Net weight: 150 kg
Space requirements (Data acquisition unit): W x L x H: 41 x 32 x 32 cm; Net weight: 3.5 kg
Stable electric power source: 230 V / 50 Hz, 2500 W
Tap water source
Fume hood or local exhaust
Source of pressurized air (min. 6 Bar, 30 l/min)
Bunker or fragment impact resistant structure equipped by safety door (21 °C +/-5 °C, RH 30 - 70%)
The instrument must be placed on a safe place and controlled remotely to protect the operator
Measurement room for operators (21 °C +/-5 °C, RH 30 - 70 %) max. 5 m away from bunker, with tables, chairs and light
Laboratory for sample preparation (21 °C +/-2 °C, RH 30 - 70 %) with measuring equipments for weight and dimensions measurement of samples and with sample processing capability by cutting, drilling
Laboratory for sample temperature conditioning - protected room with temperature chambers for required temperature range, max. 10 m away from testing bunker
Measurement of barometric pressure, laboratory humidity and temperature
Pressure calibration (source and measurement, range 25 - 500 MPa, min. accur. 0.5 % FS)
Digital multimeter set for service maintenance (min. 600 V, 5 A, 5 MOhm, etc)
Two operators trained in basic ballistics with knowledge of on-site laws