Detonation calorimeters DCA25 and DCA100

Product Datasheet

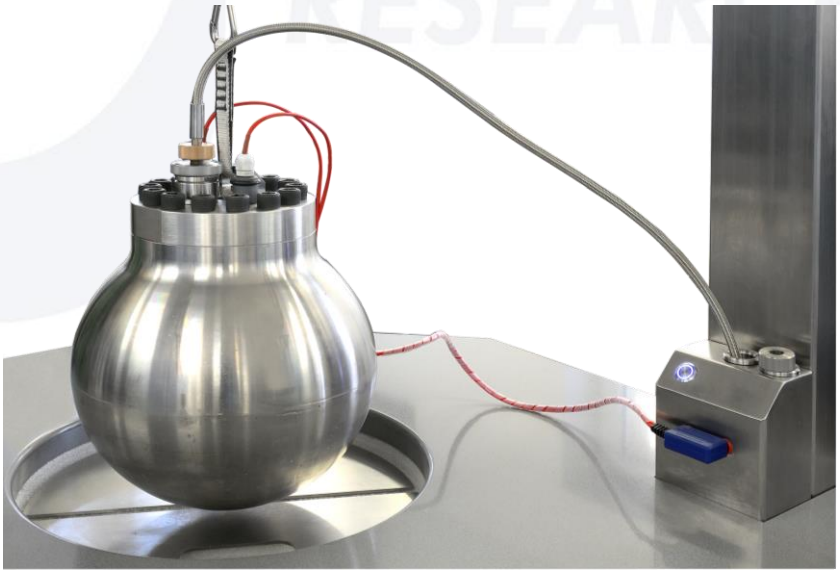
Detonation calorimeters in general determine the heat produced by the detonation of energetic materials. OZM Research DCA series utilize the classical constant volume arrangement combined with OZM Research's durable bomb design.

APPLICATION

Typical application of DCA 25 and DCA 100 is in research, development and quality control assurance in civil and military institutions such as universities, academies, research laboratories, production companies and others. Testing vessels with volume 5.3 and 32.0 liters provides excellent option for investigation of all energetic materials except materials capable to damage stainless steel vessel after initiation (thermites etc.).

FEATURES

- Superb resolution of thermometers as low as 0.00001K
- Superb reproducibility of calorimetric results as low as 0.1%
- Built-in dynamic pressure sensors according to customers demand
- High strength stainless steel detonation chamber for testing in vacuum, air, nitrogen, argon, oxygen
- Fully automatic operation, data acquisition and results evaluation
- Built-in bomb manipulator and detachable cart for easy positioning



Parameter	DCA25	DCA100	Unit
Temperature resolution:	0.00001	0.00001	K
Calorific value measurement accuracy	≤1 (up to 0.1)	≤1 (up to 0.1)	%
Low frequency (≥100 kH) pressure measurement **range**	≤50	≤50	MPa
Low frequency (≥100 kH) pressure measurement **sample rate**	≤800	≤800	kS/s
Low frequency (≥100 kH) pressure measurement **Non-Linearity**	≤0.5	≤0.5	% FS
Low frequency (≥100 kH) pressure measurement **resolution**	16	16	bits
High frequency (≥500 kH) pressure measurement **range**	103	103	MPa
High frequency (≥500 kH) pressure measurement **sample rate**	≤2000	≤2000	kS/s
High frequency (≥500 kH) pressure measurement **Non-Linearity**	≤0.5	≤0.5	% FS
High frequency (≥500 kH) pressure measurement **resolution** (sensor/DAQ)	0.28/16	0.28/16	kPa/bits
Pressure vessel weight	Approx 60	Approx 200	kg
Pressure vessel inner volume	5.3	32	dm^3
Maximum charge weight	25	100	g of TNT eq.
Maximum measured energy	160	300	kJ
Working atmosphere	Vaccum, Air, Innert gases, oxygen	Vaccum, Air, Innert gases, oxygen	
Maximum initial pressure	3.0	3.0	MPa
Initiation source (max voltage/current)	24/10	24/10	V/A
Routine measurement period	Approx 2.5	Approx 4	hours
Shipping			
Dimensions	Approx 1x1.5x2.5	N/A	m
Weight	Approx 700	N/A	kg

DCA25 - Installation requirements

Basic requirements:

- A testing room where blasting in a confined space is allowed according to local regulations
- Forklift for unloading the instrument from a truck and unboxing
- Common pallet truck for moving the instrument
- Testing room door dimensions: W x H at least 110 x 200 cm
  (Instrument dimensions W x L x H 166 x 99 x 217 cm; weight approx. 850 kg)
- Testing room dimensions: W x L x H approx. 400 x 400 x 240 cm, the instrument should preferably be placed in the center of the room.
- Flat concrete floor (flatness of 2 mm in 1000 mm maximum) which allows transport of the bomb by hand operated carriage.
- Window or ventilation
- Conditions: 18°C - 30°C, RH 20 - 90% non-condensing. Preferred temperature range for fast measurements is 20-28°C with maximum temperature change 1°C/hour.
- Stable electric power source: 230 V / 50 Hz, 2500 W, 2-3 power sockets, separate breaker.
- Supply of pure compressed gases from high pressure cylinders (150-300 bar) with pressure regulators up to 30 bar, connection thread G1/4" or SuperLock tubing OD 6mm:
  - Oxygen (preferably better than 99.99%)
  - Nitrogen (preferably better than 99.99%)

For on-site training:

- 25 l bucket of demineralized water for filling the inner reservoir.
- Detonator sensitive pressed or plastic explosive charges (3 pcs) with TNT equivalent of less than 25 g TNT.
- Electric detonators (5 pcs) with copper shell with the initiation current of 8 A (maximum).

Recommended:

- Laboratory scales (0.001 g resolution) for weighing the charges.
- Vacuum cleaner for removing solid residues (soot, detonator fragments) from the bomb.

DCA100 - Installation requirements TBD