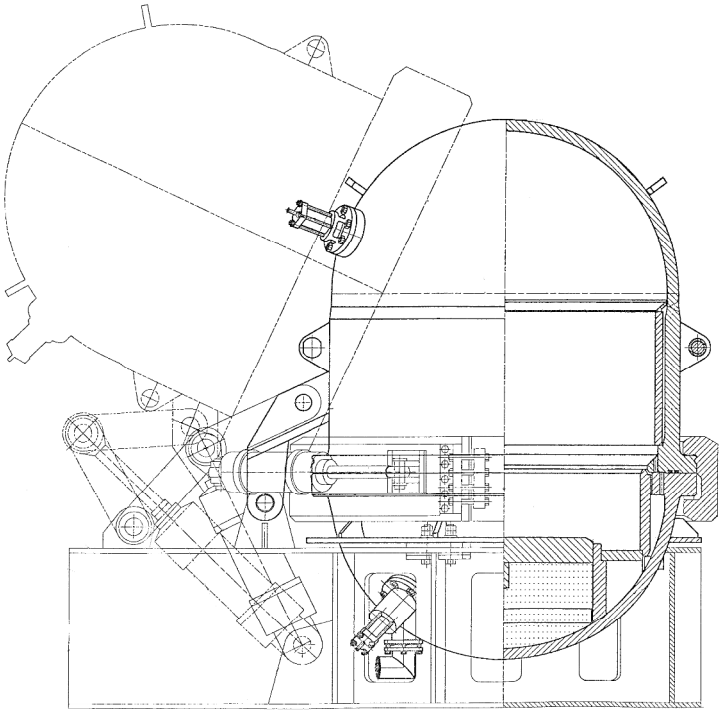
VERTICAL DETONATION CHAMBERS

Vertical detonation chambers are automated industrial machinery resistant against repeated detonations of charges not exceeding 2 kg (KV-2) or 5 kg (KV-5) TNT equivalent in a single shot. Design of the vertical detonation chambers is identical and the only design differences between the types are in their capacity, weight and dimensions.



Vertical detonation chambers consist of two main structural parts: a **platform with lower hemisphere** and a **back-folding** upper hemisphere (**copula**) serving as a lid of the chamber. In a closed state, the both parts are gas-tightly joined by a **rotating circular bayonet lock** with rubber O-rings attached to an upper hemisphere. Movement of a bayonet lock and back-fold opening of the copula are carried out by **hydraulic cylinders** pressurized from a **hydraulic unit**. Limiting positions of the circular lock and the back-folding lid are detected by **proximity limit switches** mounted on the platform.

The explosive charge is placed on a steel **working table** fixed in the lower hemisphere of the detonation chamber. The working table is filled with steel grit which along with the chamber and platform body **absorbs shock loading on the foundations**. Entries for insulated contacts of electric firing circuit are located alongside the working table. Firing circuit is held open until the chamber is completely closed, using a **mechanical interrupter.** Other independent electrical and software safety locks against premature firing are included in the control panel. **Gas-tight hydraulic valves** in the upper and bottom hemispheres serve for ventilation of the chambers. Ventilating fan is connected to a pipeline leading to both the valves and is used for evacuation of the postexplosion gases to the outside atmosphere or to off-gas treatment unit (where required). Source of compressed gases can be connected to the upper valve for flushing the chamber before/after explosion.

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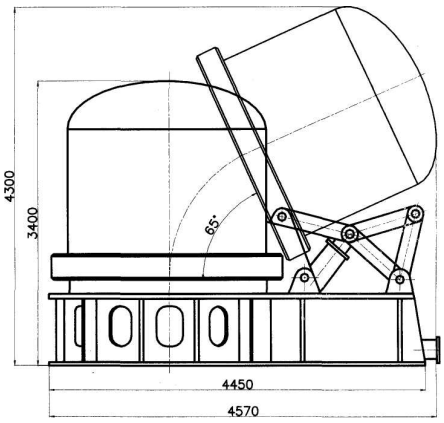
KV-2

KV-2



KV-5

Design of the chambers is variable according to their intended application. For **scientific or R&D applications**, vertical detonation chambers are typically equipped with several windows covered by steel or Plexiglas discs for optical (X-ray, high speed cameras) or electrical (detonation velocity, pressure, temperature etc.) measurements of detonations.

The **working cycle** of vertical detonation chambers consists of a series of operations – **installation of the charge** into the open chamber on its working table, **closing the chamber** (copula, bayonet lock, hydraulic valves), electric **firing** of the charge, regulated **releasing the post-explosion gases** into exhaust pipeline, **flushing** the chamber with compressed air via open valves and a fan, **opening the chamber** (bayonet lock, copula) after evacuation of post-explosion gases, **removal of solid residues** after explosion. The typical working cycle period is 10 – 20 minutes, according to ventilation fan power.

After explosion, the shock wave and explosion heat are rapidly absorbed by the steel chamber body weighing several tons and only stabilized post-explosion gases are steadily released to the exhaust pipeline. Explosion noise and vibration are also attenuated by the chamber body to values not exceeding limits for normal working environment, if operated from a separate room. An interchangeable armor ring is located around the working table providing additional safety against fragments from the explosive charge. Additional fragment shield is attached to the upper hemisphere.

Detonation chamber	KV-2	KV-5
Nominal capacity [g TNT]	2 000	5 000
Maximum length [mm]	2 600	4 570
Maximum width [mm]	1 800	2 800
Maximum height in open state [mm]	2 600	4 300
Maximum height in closed state [mm]	2 000	3 400
Angle of the copula opening [°]	65	65
Chamber internal diameter [mm]	1080 – 1290	2 000
Diameter of working table [mm]	700	1 000
Maximum weight [tons]	10	60