

# TECHNICAL SPECIFICATION

## CVD/CVI REACTOR FOR SiC, C AND BN TYPE HT3242

The HT 3242 is designed for the CVD/CVI of silicon carbide and boron nitride. It has a rotating platform to permit the overall coating of parts weighing up to 300 Kg in a single cycle. A PLC control system runs the cycle without any operator intervention. The all carbon, working zone is suitable for operation up to 1,600°C at pressures between 1 and 1000mbar.

The CVD/CVI system HT3242 has a graphite working chamber of 32"DIA x 42" high. This is surrounded by 3 independent graphite resistance heaters controlled by thermocouples. Thermal insulation is provided by ceramic fibre, all contained in a stainless steel water-cooled vacuum vessel. The main axis of the chamber is vertical and is accessed from the bottom. A screw jack system lifts the reactor bottom head and work into the chamber. The same screw jacks permit the chamber to be removed for maintenance of the heaters.

The reactor is evacuated by a liquid ring pump and two mechanical boosters. The booster pumps both have bypass valves so that a number of different pump combinations can be used.

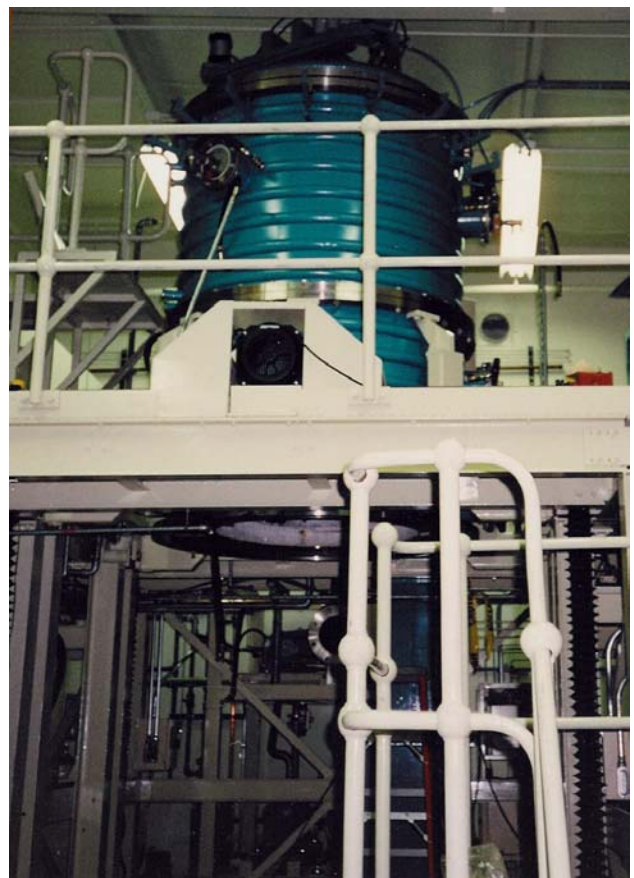
It has a scrubbing system that ensures a clean effluent gas.

The gas delivery system is from the top and will handle four permanent gas flows (H<sub>2</sub>, N<sub>2</sub>, BCl<sub>3</sub>, NH<sub>3</sub>) and one gas flow from a liquid source evaporator for MTS. There are two feed lines to the reactor to permit delayed mixing of the reactants - necessary for BN.

The control system is supervised by a PC, which will run complete cycles without any operator intervention. All process parameters are displayed and monitored and any variation beyond chosen limits initiates a safe shutdown.

The machine is supplied with two jib cranes to assist in the assembly and disassembly of the unit for maintenance and replacement of parts.

Another feature is an integral pneumatically actuated lifting jig to enable the top of the reactor (pre-heater zone) to be easily accessed.



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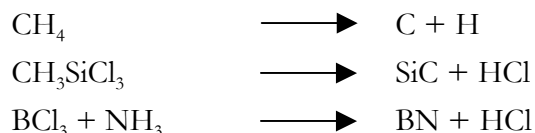
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## Specification for CVD/CVI Reactor HT3242

Reactor overall dimensions:	8 x 7 x 6m high.
Working zone:	813 diameter x 1066mm bottom loading
Temperature range:	750-1300°C
Temperature control:	3 independent heaters – PID controlled
Temperature measurement:	Thermocouples (2 per zone)
Pressure range:	0.1-30 Torr (0.13 – 40 mbar)
Pressure measurement:	Absolute pressure transducer
Feed gases:	H <sub>2</sub> , Ar, CH <sub>4</sub> , NH <sub>3</sub> , BCl <sub>3</sub>
Feed liquids:	CH <sub>3</sub> SiCl <sub>3</sub> or SiCl <sub>4</sub>
Flow control:	Mass flow controllers
Vacuum pumps:	Liquid ring vacuum pump - 350m <sup>3</sup> /hr Mechanical booster pump 1 – 1,250m <sup>3</sup> /hr Mechanical booster pump 2 – 5,000m <sup>3</sup> /hr Automatic pressure control by servo controlled line valve.
Materials of Construction:	Vacuum vessel - 316 stainless steel Heaters - graphite Reactor inner chamber - graphite Thermal insulation – ceramic or carbon fibre
Electricity:	190 KVA (3-phase)
Cooling water:	40 L/min (35°C or less)
Chilled water:	25KVA capacity
Compressed air:	100 p.s.i. small amount for actuators
Effluent Scrubber:	Wet scrubbing column with 2,000L tank. Continuous pH monitoring & control.

### CVD/CVI processes normally operated in the HT3242:



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