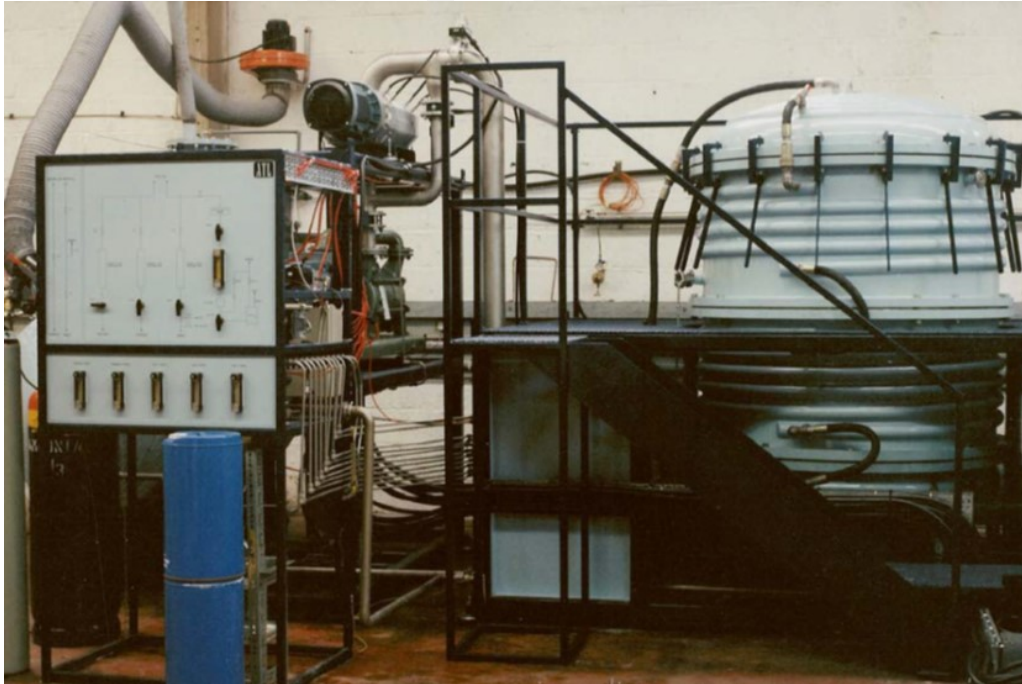




Technical Specification of CVD Machines—HT2031

Laboratory Scale Reactor for CVD/CVI

The HT2031 is a CVD reactor suitable for SiC, TiC, B₄C, Si₃N₄, TiN, BN, and related materials. It is a top loading reactor with a working zone 540mm diameter by 960mm high. The work assembly is carried on a rotating platform.



Overview

The HT2031 is a complete system consisting of a stainless steel CVD reactor with an all-graphite reaction chamber and furnace, supporting steelwork, gas supply system, vacuum pumps and effluent scrubber, and control system.

The CVD reactor has two forms:

- Maximum operating temperature 1600oC for SiC, TiC, B₄C, Si₃N₄, TiN.
- Maximum operating temperature 2200oC for BN and pyrolytic graphite in addition to those in 1.

A pyrometer is used to control the temperature of the reactor. The process pressure is controlled automatically in the range 10-100mbar.

The gas control system supplies 3 permanent gas flows and one flow from a liquid source evaporator.

All gas flows have mass flow controllers. The reactive gases are controlled by air-actuated ball valves to avoid ignition sources in the gas control system and to ensure a fail-safe situation in the event of an electrical power failure.

A liquid ring pump, combined with a mechanical booster, is used to pump the reactor. The effluent from the pumps is passed to a wet scrubbing system, which uses an alkaline solution to absorb the acid by-products of the CVD process.

The control system is housed in a single cabinet, which can be placed remotely from the rest of the plant. All normal operations can be carried out by push-button operation from the front panel. The controls are interlocked for safety.

Specification

Criteria	Specification
Reactor Overall Dimensions	4 x 3 x 2.9m(high) + height above for loading
Reactor Working Zone	540 diameter x 960mm top loading
Overall Space Required	10 x 6 x 4.5m high
Temperature Range	900-1600°C or 2,200°C
Temperature Measurement	2-colour pyrometer
Pressure Range	10-100mbar (standard control range)
Pressure Measurement	Absolute pressure transducer
Feed Gases	H ₂ , Ar, CH ₄
Feed Liquids	SiCl ₄ , CH ₃ , SiCl ₃
Flow Control	Mass flow controllers
Vacuum Pumps	Liquid ring vacuum pump - 520m ³ /hr Mechanical booster pump - 2000m ³ /hr Automatic pressure control by servo controlled line valve.
Materials of Construction	Vacuum vessel - 316 stainless steel Heater - graphite Reactor inner chamber - graphite Thermal insulation - carbon fibre
Electricity	150KVA (3-phase)
Cooling Water	50litre/min (20°C or less preferred)
Compressed Air	100-150 p.s.i. small amount for actuators

CVD / CVI Processes

