



Technical Specification of CVD Machines—Aluvap440

CVD Aluminising

The Aluvap440 is designed for the CVD aluminising of gas turbine components. The CVD process can be applied to both the external and internal surfaces of the components. The concentration of the aluminium can be controlled in the aluminide layer. The total permitted work load of work and fittings is 600kg.



Overview

CVD aluminising is a process which uses a flow of aluminium trichloride vapour, generated externally to the main reactor, to convert the surface a nickel alloy component into a diffusion layer of nickel aluminide. This layer has excellent resistance to oxidation and sulphidation. The flow of aluminium trichloride is passed over an aluminium source inside the reactor to increase the concentration of aluminium monochloride.

The reactive vapour stream is either passed directly into the reactor in order to treat external surfaces, or it is directed through the cooling passages of the parts in order to aluminise the internal surfaces. The Aluvap 440 has 2 external generators at each working base so that external and internal coating can be carried out simultaneously. It also has the possibility to clean components with HF, and add dopant gases to the aluminizing process. The Aluvap 440 can be used to make both low and high activity aluminide coatings.

CVD aluminising has a number of advantages over out-of pack aluminising:

- The ability to coat long and complex internal passages.
- Better control over composition and thickness of coatings
- Single phase platinum aluminide layers
- No powder to be dumped.

The Aluvap 440 has two working retorts and bases. There is one bell furnace which is shared between the retorts. There is a single pumping system and effluent disposal system. The furnace is a vacuum furnace which is pumped separately from the retort. The pressure in the furnace is controlled to be the same as the pressure in the retort in order to minimise the pressure differential across the hot wall of the retort. The operating temperature is in the range 900 - 1160°C. The operating pressure is in the range 50-300mBar. As soon as the cycle in one retort is finished, the furnace can be transferred to the next base.



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Specification

Criteria	Specification
Reactor Overall Dimensions	800 dia. x 1800mm
Reactor Working Zone	750 dia. x 1100mm
Footprint	12 x 8 x 6m (high)
Temperature Range	900-1160°C
Temperature Measurement	S-Type Pt/Rh thermocouples in each zone
Temperature Control	3 zones with PID control
Pressure Range	50-300mBar
Pressure Measurement	Absolute pressure transducer
Pressure Control	Motorised line valve
Liquid Ring Pump	The furnace case is pumped independently by a separate liquid ring pump
Gas Control	Ar, H ₂ , HCl, HF controlled by mass flow controller
Materials of Construction	Furnace shell: Carbon steel Retort: Inconel 601 Heaters: Kanthal Vacuum Lines: Stainless steel
Electricity	130KW

