Heat Treatment:
Refinement and Sintering of Materials and Components

PVA Industrial Vacuum Systems GmbH

PVA TePla

COV

Vacuum - Heat Treatment and Sintering Furnaces COV

COV furnaces are graphite-heated systems, designed for heat treatment in vacuum. The variety with respect to design, usable space, vacuum level and working temperature is extremely wide. As a consequence, COV furnaces can be used for numerous applications. Typical fields of application are sintering (including dewaxing), soldering, degassing, heat treatment, purification, CVD-coating, etc.

Application examples

Maximum working temperature	**Applications**
1,100 °C	Heat treatment, soldering, degassing, dewaxing, chemical reduction
1,350 °C	Heat treatment, soldering, degassing, dewaxing, sintering, CVD-coating
1,600 °C	Dewaxing and sintering of hardmetals, crystal growth, purification, CVD-coating
1,800 °C	Sintering of non-oxide ceramics
2,000 °C	Pyrolyze processes, degassing and purification, sintering
2,200 °C	Degassing, purification, sintering of SiC, graphitizing of composites

Characteristics

COV furnace units contain a double-walled vessel which is watercooled. The vessel can be made of mild steel or stainless steel, respectively, depending upon the process requirements. The general design can be horizontally or vertically. The number of controlled heating zones can be up to 8 (or even more). By adjusting the number and the arrangement of these control zones, an excellent temperature homogeneity can be achieved, which is in some cases better than ± 2°C.

A closed graphite box is installed in the hot zone, whenever a superior temperature homogeneity is required or if the process includes a dewaxing / debinding step.

With the possibility to flow in a large number of reactive gases, a chemical treatment of the products can be done.

For the evacuation, a large number of pumping units of different types and from all market-leading brands can be used. Depending upon the process demands, pressures from 0.1 mbar (10 Pa) down to $1 \cdot 10^{-5}$ mbar ($1 \cdot 10^{-3}$ Pa) can be achieved.

A micro processor controlled program sequence ensures a fully automatic and reproducible process and a uniform product quality. PC-operating and related data handling comply with today's demands on a responsible quality assurance.

Vacuum furnaces type COV consist of the following subassemblies: Furnace vessel, current feedthrough, heating insert, temperature measurement, cooling water distribution, vacuum pumping unit, electrical power and control system (if applicable: dewaxing unit and gas-treatment device).

The basic equipment can be extended with a variety of additions, like closed loop water recooling system, a charge loading system, bottom- or top-loading units, etc.

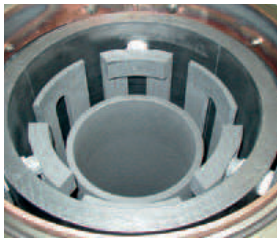
Specialities

- Maximum operating temperature 2,200°C
- Usable space from 4.5 L up to 13 m^3 (even more, upon customer's request)
- Heating of the hot zone, using several independent heaters
- Eexcellent temperature homogeneity within the usable space down to ±2 K
- Vacuum range down to $1 \cdot 10^{-5}$ mbar ($1 \cdot 10^{-3}$ Pa)
- Efficient dewaxing systems for molded and extruded parts
- Safe and reliable operation with inflammable gases
- Fully automatic control of the entire process
- Operation of the plant by PC including data logging and -storage

Benefits for users

- High reliability by mature technology and a world-wide market presence
- Highest product quality by excellent temperature homogeneity in vacuum and during process gas operation
- Well elaborated technical safety philosophy for the reliable and full automatic furnace operation
- Quick availability of the furnace due to a fully pre-tested and pre-adjusted furnace in the works of PVA TePla AG, incl. a heating cycle
- Lowest „Total Costs of Ownership" due to high reliability, process reproducibility and a long lifetime
- **Rapid „Return of Invest"**

Design versions (examples):

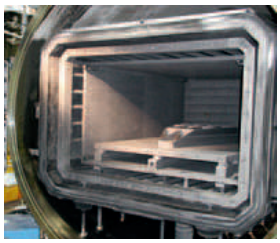


Furnace type:	**COV 131 R**
Usable space (Ø x H):	Ø 150 x 250 mm
Usable volume:	4.5 l
max. Temperature:	1,600 °C
installed heating power:	20 kVA

Furnace type:	**COV 231 R**
Usable space (Ø x H):	Ø 200 x 300 mm
Usable volume:	9.5 l
max. Temperature:	1,600 °C
installed heating power:	25 kVA

Furnace type:	**COV 633 R**
Usable space (WxHxL):	450 x 450 x 900 mm
Usable volume:	180 l
max. Temperature:	1,600 °C
installed heating power:	120 kVA

Furnace type:	**COV 942 R**
Usable space (Ø x H):	1500 x 2500 mm
Usable volume:	4,400 l
max. Temperature:	1,800 °C
installed heating power:	500 kVA



Furnace type:	**COV 1263 R**
Usable space (WxHxL):	1400 x 800 x 2000 mm
Usable volume:	2,250 l
max. Temperature:	2,200 °C
installed heating power:	800 kVA

PVA Industrial Vacuum Systems GmbH

PVA Industrial Vacuum Systems GmbH is an internationally established supplier of systems and facilities for developing, producing, treating and refining sophisticated industrial materials using:

Vacuum	High temperature	Plasma

PVA Industrial Vacuum Systems GmbH is a subsidiary of PVA TePla AG. The Wettenberg-based company is a leading manufacturer of highly innovative vacuum systems. With more than 1,000 plants on the market and 50 years of experience in the high-temperature field, PVA Industrial Vacuum Systems GmbH builds and markets thermal process plants and systems for the development, manufacture and treatment of high-quality materials at high temperatures.

In conjunction with its own Application & Innovation Lab, PVA Industrial Vacuum Systems GmbH also supports its customers with individual system and application developments - right up to series production.

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