



N₂ Ar

2-6 bar

HIGH VACUUM 10⁻², 10⁻⁵, 10⁻⁶, 10⁻⁷ mbar VACUUM FURNACES VP and VVP(EH) DESIGN

- ● ● ● Solution heat treating ● Annealing ● Stress relieving ● Quench hardening ● Brazing
- ● ● ● and heat treating ● Degassing ● Tempering ● Homogenizing ● Ageing
- ● ● ● Vacuum Carburizing FineCarb[®]
- ● ● ● Carbon steel and low alloy steel ● Iron base corrosion resistant steel
- ● ● ● Nickel and cobalt base alloy ● Titanium and titanium alloy ● Light alloy
- ● ● ● Other processes/adaptations



ADVANTAGES OF SECO/WARWICK VACUUM FURNACES VP, VVP

- Shorter cycle times, increased output and precise monitoring of the process.
- Available with horizontal and vertical loading configuration.
- Graphite or all metal heating chamber insulation, other combinations also available.
- Compact design with internal gas cooling system:
 - reduces installation and start up time,
 - requires minimal plant floor space,
 - reduces power and gas consumption.
- Cylindrical heating chamber enables treatment of oversized loads.



- Graphite or molybdenum (MoLa) heating elements encircling the load from all sides, light and flat, providing for fast and uniform heating of the batch.
- Temperature uniformity according to AMS 2750D is better than $\pm 5^{\circ}\text{C}$ (or $\pm 3^{\circ}\text{C}$ at austenitization temperature); the furnace is equipped with test ports to fit the thermocouples to monitor temperature distribution. The furnace satisfies the SAT and TUS requirements, as defined by AMS 2750D and is ready for relevant testing.
- Efficient (RADIAL) cooling system with specially shaped nozzles.
- Optional ConFlap™ system enhances convection heating and provides a 40% time savings when heating densely packed loads in the 800°C temperature range (available with graphite heating chamber).



- **Optional ConFlap™ system** together with patented convection heating system with pneumatically powered gas nozzle covers, enables different cooling patterns. Depending on the load configuration, it can be quenched with gas flow from all nozzles, or directionally from top and bottom, or from sides only. Pneumatically driven covers assure smooth operation of the system under sublimate contaminated work environment.
- **Automatic pressure door closing system** with a third clamp and lip seal designed for increased service life. Pumping systems optionally based on mechanical (10^{-2} mbar) and diffusion (10^{-4} - 10^{-6} mbar) pumps or turbomolecular/cryogenic pumps (for 10^{-7} mbar).
- **Superior quenching rate and uniform gas flow** through the load in 2 or 6 bar furnaces.
- **Universal furnace with maximum range of applicable technologies**; enabling heat treatment of steel and alloys, as well as hard brazing, in accordance with SAE AMS 2769, 2759/..., 2773, 2801, MIL-B-9972B norms meets requirements of the aircraft and power generation industry.
- **Vacuum carburising technology FineCarb®** also available .
- **The furnace meets European and US safety standards.**



● CONTROL SYSTEM FEATURES

- Fully automatic furnace operation performed via PLC (Programmable Logic Controller) and IPC (Industrial Personal Computer).
- LCD touch screen visually presents all technological parameters of heat treatment processes.
- Large capacity of a hard disc (HDD) enables to record unlimited number of recipes. It eliminates mistakes resulting from creating new recipes by a furnace operator.
- All process data are recorded as a diagram on a separate screen and can be saved on HDD or a CD.
- Possibility to export historical and alarm data outside the system for further analysis (e.g. to *.csv).
- Easily integrateable with any data base.
- The furnace is equipped with the internal network of the "Ethernet" type, or a telecommunication modem, enabling remote furnace service.
- Special software installed on the IPC enables remote monitoring and controlling of furnace operation, as well as optionally alarming via telephone or e-mail.
- Optionally the control system may be equipped with reporting and advanced analyzing program of historical data, via Word and Excel ready-made templates.
- A separate diagnostic screen reminds of necessity to service particular elements of the furnace.



● TECHNICAL DATA

- Operating temperature 500-1350°C (option 150-1350°C)
- Convection heating 150-800°C , 3 bar max. - option
- Temperature uniformity ± 5 °C (± 3 °C)
- Maximum cooling pressure 1,5 (EU region) or 2 (ASME region) to 6 bar
- Operating vacuum level range 10^{-4} (option 10^{-5} - 10^{-6} - 10^{-7}) mbar
- Heating velocity 20-40 °K/min

Horizontal VP								
Uniform zone (WxHxL)	mm in	400x400x600 16x16x24	600x400x600 24x16x24	600x600x900 24x24x36	900x800x1200 36x32x48	1000x1000x1500 40x40x60	1200x1200x1800 48x48x72	1500x1500x1800 60x60x72
Max. load	kg	200	400	600	1200	2500	3000	3500
Heating element	kW	70	90	150	240	375	420	540

Vertical VVP- EH					
Uniform zone (WxHxL)	mm in	1250/1250 48/48	1500/1500 60/60	1800/1800 72/72	Other sizes and parameters also available
Max. load	kg	1500	2000	2500	
Heating element	kW	270	375	440	

We also offer:

- High Pressure Quench furnaces 2, 6, 10, 12, 15, 25 bar - VPT type
- CVD retort furnaces and for FIC process
- Retort tempering furnaces and gas nitriding ZeroFlow™ - VTR type



● ADDRESS

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The latest design, materials and equipment specifications should be obtained from the company before any reliance is placed on the enclosed since changes may occur due to product improvement.

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