



High Vacuum

VACUUM FURNACES

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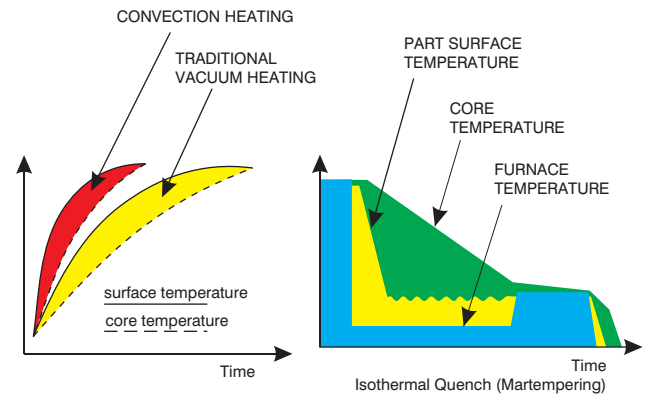


up to 10^{-5} mbar and more

Type VP - horizontal loading or VVP(EH) - vertical

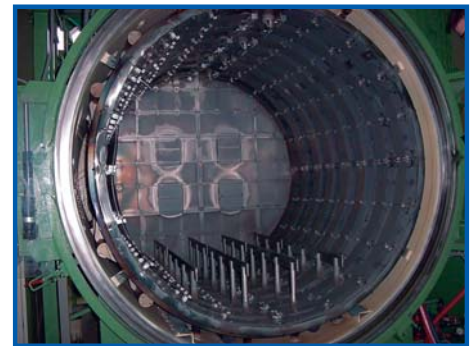
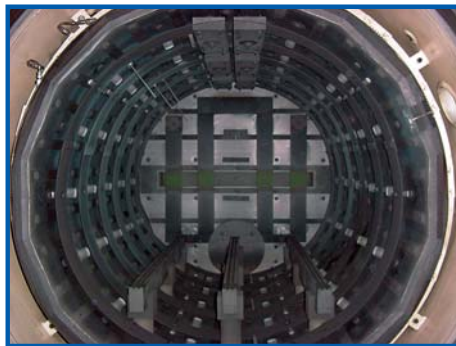
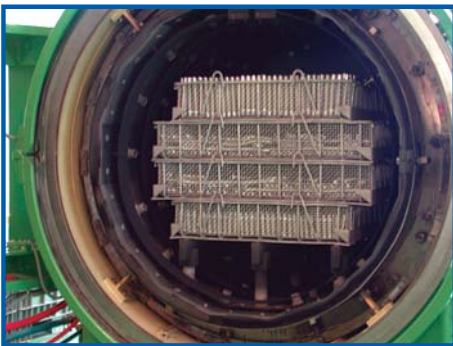
VACUUM FURNACE

SECO/WARWICK FURNACES HAVE A COMPACT DESIGN REQUIRING MINIMUM OF FLOOR SPACE, EASY SERVICE, LOW ENERGY AND COOLING GAS CONSUMPTION AS WELL AS HIGH EFFICIENCY WITH A MINIMUM EXPENDITURE OF MAINTENANCE AND SERVICE.



SECO/WARWICK uses wide, lightweight heating elements assembled from curved graphite slats to form continuous 360 bands around the workload. This design provides for:

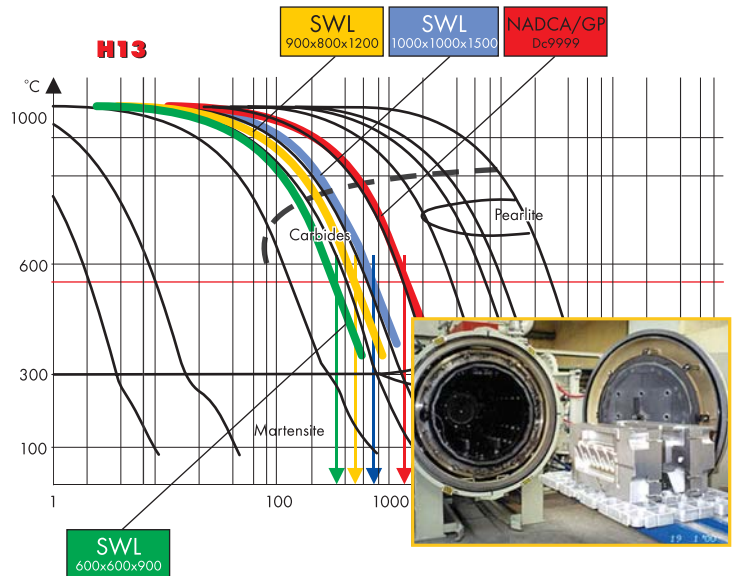
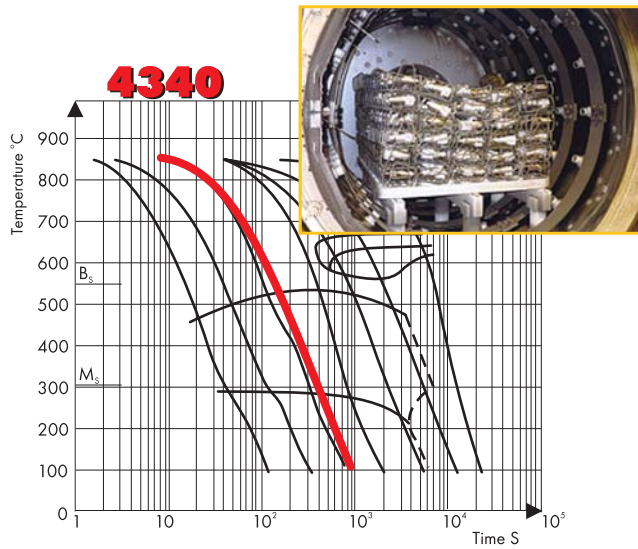
- Optimum temperature uniformity and system accuracy according to AMS 2750
- Uniform vacuum heating of workloads in various configurations and with complex cross-sections and packing density
- Minimized workload distortions at high heating rates
- Shorter heating and cooling time of the workloads due to low thermal capacity of the lightweight heating elements.



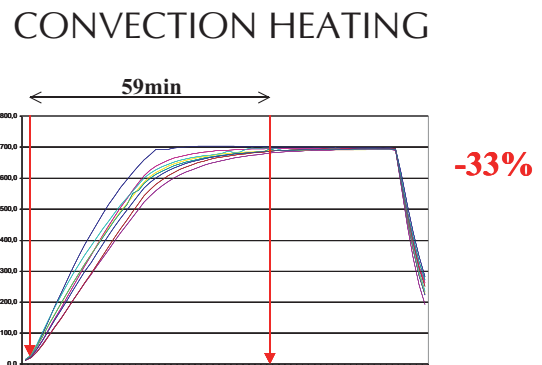
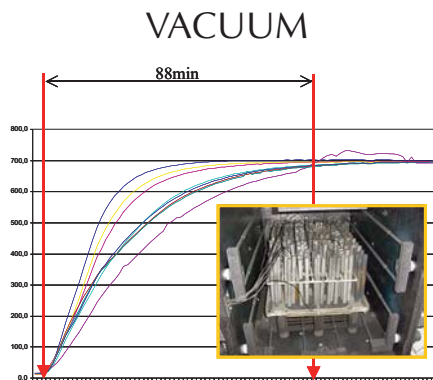
Metal [M] and graphite[G] insulation of the heating chamber has been used in the vacuum furnaces:

- Heating chamber with metal insulation has typical multi shields isolation, consisting of Mo and SS screens. Heating elements are fabricated from wide, stiffened moly - MoLa - bands resistant to recrystallization during operational use.
- Graphite insulation of the heating chamber [G] is the multi shields isolation consisting of soft graphite felt and hard graphite plates covered from the hot side with the graphite foil or composite material. Curved heating elements are fabricated from graphite.

SWL furnaces are equipped with nozzle cooling system with profiled injection nozzles arranged 360° around the load space and heating chamber door. Hot gases escape the hot zone through a gas outlet bung in the rear wall. This advanced and innovative system design produces the best combination of cooling rate and uniformity. This system is successfully used for hardening e.g. 4340 and H13 steel.

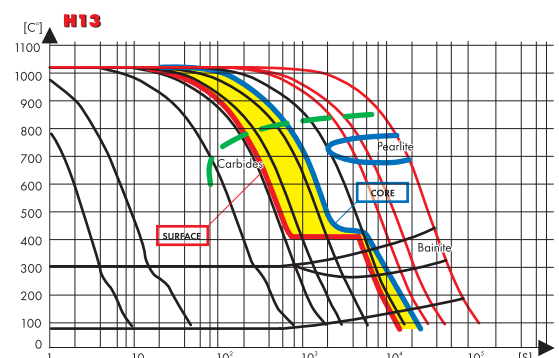


Superior cooling performance makes the furnaces excellent tool for vacuum carburizing with subsequent gas quenching in FineCarb® technology. This technology is successfully applied for such critical steels like 1.6587 (DIN), 23MnCrMo5 (Jamasco®), Ovake277, etc.



SECO/WARWICK's innovative ConFlap® convection heating system used from over 10 years can reduce heat-up time of a densely packed load at temperatures by up to 40%. It enables low temperature processes including bright annealing, isothermal quench with bainitic strength. Patented anti-convection flaps arranged in cold area of heating chamber eliminate a problem with system reliability caused by deposits built on anti-convection barriers designed alternatively on hot side of heating chamber.

Isothermal quench (martempering) is particularly required in heat treatment of large dies and moulds is an automatic cycle and together with convection heating enables to keep the load in the range of bainitic change. Process minimizes distortions and achieves optimal metallographic structures.



SECO/WARWICK furnaces are operator-friendly and designed to minimize maintenance operations and downtimes.

■ Water system

Water system is ready for operation with the customer closed-loop water system. Each water cooling circuit includes control valve, flow monitor, thermometer. Each main circuit has electronic flow sensor to control cooling in automatic cycle of the furnace operation. Outlet and inlet manifolds placement allows easy supervision and service.

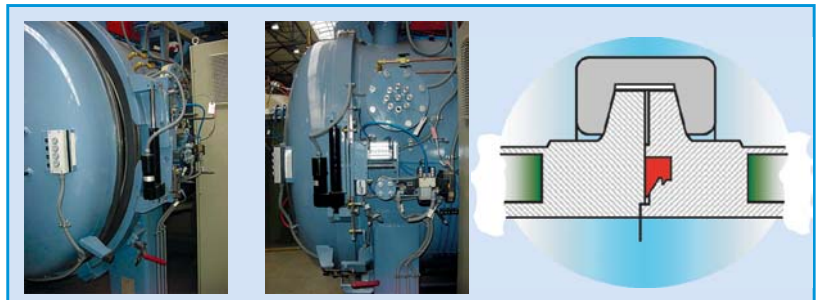


Pumpingsystem

Pumping system has special design in order to minimize installation area and to enable easy access to the furnace.

■ Doorlocking mechanism

Door locking mechanism with third clamping ring prolongs service life of door lip seal and provides easy access for maintenance purposes.



The Furnace Control System contains standard Programmable Logic Controller (PLC) and Industrial Computer (IPC).

Furnace operation sequence is controlled from PLC.

An IPC is used for process set-up, data storage, exchange and transmission.

Colour Touch Screen operator panel allows for fast and precise control of the furnace operation.



Built-in equipment for interconnections with an external communication network (LAN) and telephone line for data exchange, remote monitoring and diagnostics

The IPC computer is equipped with standard components like Processor, HDD, RAM, CD-ROM, FDD and colour printer for recorded data, trends and report printing.

Multilevel access protects the furnace from unauthorized operation.

The control system presented above is not only easy in use, reliable, open and flexible, but it enables also real-time data logging, data exchange and processing, and may be customised according to local requirements and the Customer's needs.

STANDARD FURNANCES

TECHNICAL DETAILS

(other sizes also available)

Typ VP 40		G	G	G/M	G/M	G/M	G/M	G/M
		20/24	25/24	35/36	50/48	56/60	66/72	85/72
Uniform Zone Size	mm	400/400/600	600/400/600	600/600/900	900/800/1200	1000/1000/1500	1200/1200/1800	1500/1500/1800
W/H/L	inch	16/16/24	24/16/24	24/24/36	36/32/48	40/40/60	48/48/72	60/60/72
Heat Capacity	kg	200	400	600	1200	2500	3000	3500
Operating temperature	°C	1350						
Max. Colling Pressure	bar	2-6-10						
Max. Vacuum Level	mbar	10 ⁻⁶						
Operating Vacuum	mbar	10 ⁻⁴ /10 ⁻⁵						
Furnace Size	m	2.5/2.5/4	2.6/3/4	3.2/3.6/5.5	3.5/4/7	5/4/8	5.5/4.5/9	6/4.5/10
W/H/L								

G - hot zone Graphit M - hot zone Metal (multi-shields)



20/24 G



35/36 G



50/48 M



50/48 G



66/72 G



85/72 G

Typ VPP [EH]		G/M	G/M	G/M
		48/48	60/60	72/72
Uniform Zone Size	mm	1250/1250	1500/1500	1800/1800
/H	inch	48/48	60/60	72/72
Heat Capacity	kg	1500	2000	2500
Operating temperature	°C	1350		
Max. Colling Pressure	bar	2-6-10		
Max. Vacuum Level	mbar	10 ⁻⁶		
Operating Vacuum	mbar	10 ⁻⁴ /10 ⁻⁵		
Furnace Size	m	6/7.5/7	7/8/8	8/8.5/9
W/H/L				



72/60 G

Application

■ Solution annealing ■ Bright annealing ■ Degassing ■ Brazing ■ Bright hardening HS Steel, hot work steel, cold work steel and martensite Stainless Steel ■ or Tempering

Furnace Features

■ Compact design ■ Cylindrical hot zone ■ Graphite [G] or Metal (multi-shields M) hot zone ■ Convection heating-system ConFlap® (option) ■ Temperature uniformity ■ Multiple hot zone controls ■ Isothermal quenching (option ConFlap®) Heating elements distributed 360° around the load ■ Industrial computer/PLC process control ■ Accommodates oversize loads ■ Easy maintenance

Process Advantages

■ Wide variety of applications ■ Reliable and consistent results ■ Minimal distortion ■ Short cycle time ■ Lower operating cost ■ Environmentally friendly

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