CARBOLITE®
a VERDER company



CHAMBER FURNACE, GRAPHITE INSULATION

HTK GR

www.carbolite.com/products/vacuum-furnace/chamber-furnaces/htk-gr/

HTK GR

CHAMBER FURNACE, GRAPHITE INSULATION

The Graphite Furnace HTK GR operates with rough and fine vacuum, inert gases such as nitrogen and argon, and reactive gases like hydrogen and carbon monoxide. The Graphite Furnace HTK GR cannot operate in an oxygen atmosphere due to the graphite insulation.

The rectangular design with a front door allows for easy loading and unloading. With seven standard sizes, the HTK GR range grows with your requirements – from the laboratory to production. The smallest designs with a capacity of 8 litres and 25 litres are typically employed by laboratories for research and development. The 80 litres, 220 litres, 400 litres, 600 litres and 1000 litres furnaces play to their strengths as pilot manufacturing systems or in large scale production. And if your process requires more: we can manufacture custom sizes to fit your exact specifications. All models offer flexible process capabilities for demanding industrial-scale applications.

Built entirely around graphite: both the insulation material and the heating elements of the HTK GR are made of graphite. The result: maximum temperatures up to 2800 °C – ideal for extreme heat treatment needs. As an option, a graphite retort ensures a defined gas guiding flow within the unit and improves temperature uniformity to an impressive < ± 10 °C. An optimised gas guiding flow is particularly beneficial in processes with high outgassing rates: the retort protects the graphite components and extends their lifetime.



Chamber furnace, graphite insulation – HTK GR

STANDARD FEATURES

- Graphite furnace, offering the highest possible temperatures
- Precisely controlled vacuum pumping speeds appropriate for powders
- Hydrogen partial pressure operation if requested
- Data recording for quality management

APPLICATION EXAMPLES

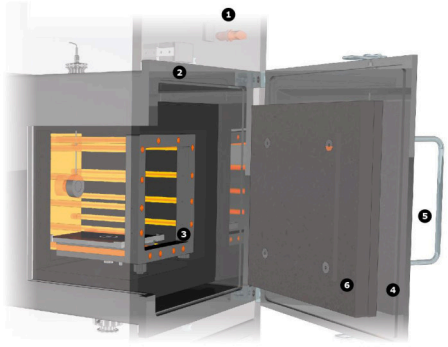
Graphitization, Pyrolysis, Siliconization, Sintering, technical ceramics

HTK GR

VIEW INSIDE OF THE HTK GRAPHITE FURNACE

Inside the chamber, heating elements are positioned at the bottom, left, right, and top sides of the furnace chamber allowing for improved temperature uniformity. For larger volumes, the back wall and front are equipped with heating elements to maintain excellent temperature uniformity.

The HTK W, HTK MO, HTK GR and HTK KE furnaces are surrounded by a water cooled vessel; thus classifying, the HTK systems as a cold wall furnace. The cooling water is guided through the double walled vessel.



View inside HTK GR

1 | Frame

2 | Water cooled vessel

3 | Heating cassette

4 | Groove for the sealing

5 | Front door

6 | Graphite insulation

Upon request, the HTK GR can be operated up to 3000 °C. For operation at 3000 °C, the furnace is specially designed with a specific isolation thickness, optimal positioning of the heating elements, and a pyrometer for temperature measurement and control. The pyrometer directly measures the heat radiation by optical methods via a window inside the furnace and is not directly inserted into the furnace.

This measurement principle only works if a sufficient amount of radiation is emitted. The needed radiation is only generated at temperatures exceeding 400 °C. For lower temperatures, a sliding thermocouple is used to control the lower temperatures.

Because of the increasing vapor pressure of graphite, 3000 °C operation is only possible under inert gas atmosphere. Additionally, the high vapor pressure also results in carbon being released to the atmosphere. For carbon sensitive samples, a metallic high temperature furnace must be used.

HTK GR

EXAMPLES



HTK 8 GR/22-1G SMART

Up to 2200°C



HTK 25 GR/22-1G AUTOMATIC

Up to 2200°C with optional pyrolysis package



HTK 400 GR/22-1G AUTOMATIC

Up to 2200°C



HTK 600 GR/22-1G AUTOMATIC

Up to 2200°C with optional fast cooling



HTK 1000 GR/24

Up to 2400°C

HTK GR

TECHNICAL DATA

Parameter	HTK 8 GR/22-1G	HTK 25 GR/22-1	HTK 80 GR/22-1G	HTK 220 GR/22-1G
Insulation material	Graphite	Graphite	Graphite	Graphite
Dimensions: External H x W x D (mm)	2100 x 1300 x 1100	2200 x 1900 x 1800	2300 x 2100 x 2200	2500 x 2300 x 2600
Transport weight (kg)	1200	1700	2000	3000
Volume (l)	8	25	80	220
H x W x D, usable space without retort (mm)	200 x 200 x 200	250 x 250 x 400	400 x 400 x 500	600 x 600 x 600
H x W x D, usable space with retort (mm)	180 x 180 x 200	230 x 230 x 400	380 x 380 x 400	560 x 560 x 560
Tmax vacuum (°C)	2200	2200	2200	2200
Tmax atmospheric pressure (°C)	2200	2200	2200	2200
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10	± 10	± 10	± 10
Max. heat-up rate (K/min)	10	10	10	10
Cooling time (h)	6	6	8	8
Power (kW)	26.5	60	100	160
Voltage (V)	400 (3P)	400 (3P)	400 (3P)	400 (3P)
Current (A)	3 x 66	3 x 90	3 x 150	3 x 240
Series fuse (A)	3 x 80	3 x 125	3 x 200	3 x 315
Leakage rate - clean, cold and empty (mbar l/s)	5x10-3	5x10-3	5x10-3	5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum	rough or fine vacuum	rough or fine vacuum	rough or fine vacuum
Flow (l/min)	40	70	100	150
Max. inlet temperature (°C)	23	23	23	23
Nitrogen or Argon flow, others on request (l/h)	200-2000	200-2000	200-2000	1000-10000
Controller	on request	on request	on request	on request

HTK GR

TECHNICAL DATA · CONTINUED

Parameter	HTK 400 GR/22-1G	HTK 600 GR/22-1G	HTK 1000 GR/24
Insulation material	Graphite	Graphite	Graphite
Dimensions: External H x W x D (mm)	2500 x 2300 x 2600	2500 x 2500 x 2900	2850 x 3350 x 4500
Transport weight (kg)	3800	4500	8000
Volume (l)	400	1000	1000
H x W x D, usable space without retort (mm)	650 x 700 x 900	650 x 750 x 1200	-
H x W x D, usable space with retort (mm)	630 x 680 x 900	630 x 730 x 1200	900 x 930 x 1200
Tmax vacuum (°C)	2200	2200	2400
Tmax atmospheric pressure (°C)	2200	2200	2400
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10	± 10	± 10
Max. heat-up rate (K/min)	10	10	5
Cooling time (h)	12	12-16	> 12
Power (kW)	250	300	360
Voltage (V)	400 (3P)	400 (3P)	400 or 480 (3P)
Current (A)	3 x 370	3 x 450	3 x 450
Series fuse (A)	3 x 500	3 x 500	3 x 500
Leakage rate - clean, cold and empty (mbar l/s)	5x10-3	5x10-3	
Vacuum range depending on the pumping unit	rough or fine vacuum	rough or fine vacuum	
Flow (l/min)	200	2200	320-370
Max. inlet temperature (°C)	23	23	23
Nitrogen or Argon flow, others on request (l/h)	1000-10000	1000-10000	
Controller	on request	on request	on request

Values reproduced from the product technical data. Empty cells indicate values not supplied on the product page.

HTK GR

CONTACT US →

www.carbolite.com/contact-services/contact-form/?prefilltext=contact_form.request&product=G-3-UCF-C

REQUEST A QUOTE →

www.carbolite.com/contact-services/contact-form/?prefilltext=contact_form.quote_request&product=G-3-UCF-C



CARBOLITE®
a VERDER company

www.carbolite.com/products/vacuum-furnace/chamber-furnaces/htk-gr/

© Carbolite Gero – www.carbolite.com / Content may be subject to modifications or corrections