

Carbolite Gero's extensive chamber furnace range has a maximum operating temperature of 1800 °C and chamber capacities up to 725 litres. They are suitable for a variety of laboratory, pilot scale and industrial applications. Although there is flexibility in size and temperature, if the application requires the use of modified atmosphere (above 1100 °C) or vacuum then a furnace from Carbolite Gero's tube furnace range should be selected.

Carbolite Gero's design features optimised uniform volume



The selection of a chamber furnace should take into account the following factors:

General considerations

- Chamber furnaces have the advantage of being able to heat larger items than tube furnaces
- The size of the chamber required and how it is loaded/unloaded will determine which style of furnace is best for the application
- For applications involving chemical vapours, gases or humidity please check with Carbolite Gero or your local dealer which furnace meets the requirements

What temperature?

- Carbolite Gero considers all products above 700 °C which are heated using radiant heat, (rather than convection), as furnaces
- The range of chamber furnaces is available up to a maximum operating temperature of 1800 °C
- Continuous operation of a furnace at its maximum temperature will reduce its life. Recommended maximum continuous operating temperature is 100 °C below the maximum operating temperature
- Furnaces are designed to operate at high temperatures. Operation below temperatures of approximately 600 °C will be less accurate and continuous use at low temperatures may reduce the element life of some furnaces, ie MoSi₂ heated furnaces
- Each furnace has a uniform working volume; this is a three-dimensional space which meets a specific tolerance and is smaller than the total chamber volume. Carbolite Gero's designs optimise this uniform volume for applications that require a specific temperature uniformity (the image top right shows a typical optimised uniform volume H x W x D)

Chamber design

- The simplest and least expensive furnaces have front opening side or bottom-hinged doors
- Higher specification front opening 'up and away' vertically lifting doors keep the hot face insulation away from the operator, increasing safety and comfort
- Where tall objects and crucibles need lifting in and out of the chamber, vertically loading furnaces with heating elements in the chamber sides are available
- Bottom loading furnaces allow the load to be lifted into the heated chamber, or lowered to cool them

Modified atmosphere

To work with inert gases or modified atmosphere, one of the following options must be selected at order placement:

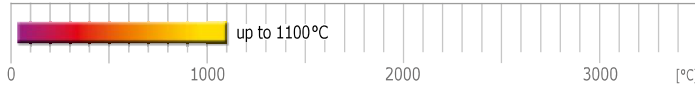
- A gasket, elastomer seal or sand sealed retort in a front opening chamber furnace
- An inverted crucible on a modified hearth in a bottom loading furnace (BLF 1600 °C, 1700 °C and 1800 °C models)

Temperature control

- All furnaces are supplied with accurate PID (proportional, integral and derivative) single ramp to setpoint controllers providing accurate control and minimal temperature overshoot. Higher temperature furnaces feature an 8-segment programmer as standard
- Multi-segment and/or multi-program controllers are available as an option on most models, please see pages 106–111
- Over-temperature protection is strongly recommended when a furnace is operating whilst unattended, or where the sample is valuable

Application specific and custom built furnaces

Carbolite Gero designs and manufactures all the furnaces within its range. Many options are available, as well as fully customised furnaces for specific applications. For examples of custom built furnaces and ovens please see page 97 or separate catalogue 'Custom Designed Ovens & Furnaces up to 1800 °C'



ELF – Economy Chamber Furnaces

The ELF laboratory furnaces comprise three bench mounted models designed for light duty and general use up to 1100 °C.

They have a simple drop down door and a top mounted ceramic chimney. The combination of low thermal mass insulation and free radiating wire elements embedded in the chamber sides provide efficient heating.

Standard features

- 1100 °C maximum operating temperature
- Carbolite Gero 301 controller with single ramp to setpoint and process timer
- 6, 14 or 23 litre chamber volumes
- Drop down door with air gap to minimise external temperature
- Delayed start / process timer function as standard
- Vacuum formed, low thermal mass insulation
- Hard ceramic hearth fitted as standard
- Ventilated via top mounted ceramic chimney

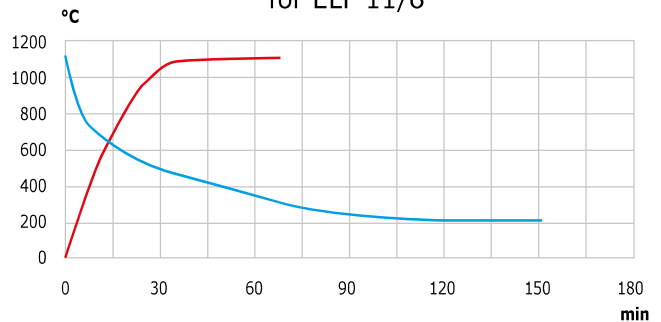


ELF 11/6

Options (specify these at time of order)

- Over-temperature protection (recommended to protect valuable contents & for unattended operation)

Heat-up and cool down rates for ELF 11/6

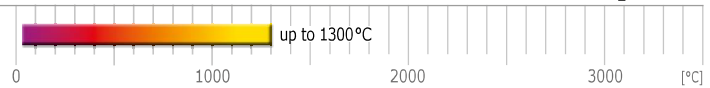


Technical data

Model	Max. temp. [°C]	Heat-up time [mins]	Max. continuous operating temp. [°C]	Dimensions: Usable chamber H x W x D [mm]	Dimensions: External H x W x D [mm]	Temperature uniformity of ± 5 °C within H x W x D [mm]	Volume [litres]	Max. power [W]	Holding power [W]	Thermocouple type	Weight [kg]
ELF 11/6	1100	28	1000	165 x 180 x 210	580 x 410 x 420	125 x 140 x 140	6	2000	900	K	24
ELF 11/14	1100	43	1000	210 x 220 x 310	630 x 450 x 520	170 x 180 x 205	14	2600	1300	K	31
ELF 11/23	1100	26	1000	235 x 255 x 400	715 x 505 x 690	195 x 215 x 305	23	5000	1550	K	52

i Please note:
 - Heat up time is measured to 100°C below max, using an empty chamber
 - Holding power is measured at continuous operating temperature

- External dimensions with door closed and including chimney
 - The uniform volume is smaller than the total chamber volume



CFW, CWF-B and CWF-BAL Standard Chamber Furnaces

The CWF range of general purpose laboratory chamber furnaces is bench mounted. Models are available in five sizes with a maximum operating temperature up to 1300°C.

The airflow in the CWF-B furnaces is enhanced by the addition of air inlet holes in the door and a tall chimney which rapidly removes the fumes from the furnace.

Standard features

- Carbolite Gero 301 controller with single ramp to setpoint and process timer
- Soft closing door on 5, 13, 21 & 23 litre models
- Vertical lift door keeps heated surface away from the user
- Delayed start / process timer function as standard
- Hard wearing alumina element carriers, furnace entrance & hearth
- Energy efficient low thermal mass insulation
- Free radiating wire wound elements for optimum uniformity
- Easy access to elements & controls simplifies maintenance & servicing

CFW:

- 1100°C, 1200°C or 1300°C maximum operating temperature
- 5, 13, 23, 36 or 65 litre chamber volumes

CFW-B:

- Enhanced airflow from tall chimney & door vents for full combustion

CFW-BAL:

- With integrated balance that runs independently of the furnace control system
- Software supplied with the balance may be used to monitor the balance reading via a computer
- Maximum capacity of balance is 3 kg with a resolution of 0.01 g (other capacities available)

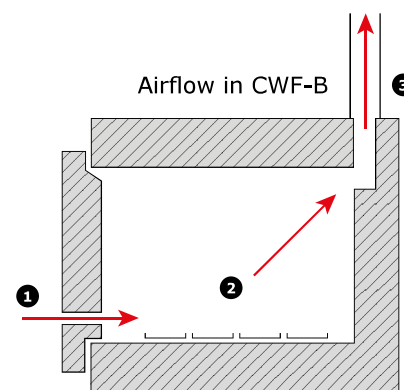
Options (specify these at time of order)

- A range of sophisticated digital controllers, multi-segment programmers and data loggers is available. These can be fitted with RS232, RS485 or Ethernet communications (see pages 106–111)
- Over-temperature protection (recommended to protect valuable contents & for unattended operation)
- A range of Inconel retorts to work with modified atmospheres up to 1100°C, please see page 119 for additional information
- AMS2750E Nadcap compatible models are available for aerospace applications
- CWF-BAL: 8 kg balance with a resolution of 0.1 g



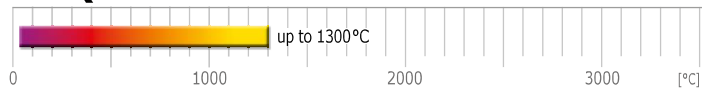
CFW 11/13 with CC-T1 temperature programmer

The CWF-BAL furnace with integral balance can be used for thermogravimetric analysis (TGA) and loss on ignition (LOI) applications, where weight change of the sample must be monitored during the heating process. This is required, for example, in the determination of inorganic matter content in materials such as cement, lime, calcinated bauxite and refractories. For applications involving organic matter content, please refer to page 51 for the AAF-BAL.



- 1) Air inlets through the door plug
- 2) Airflow through the chamber promotes burning of the samples

- 3) Chimney pulls air through the chamber



CWF, CWF-B and CWF-BAL Standard Chamber Furnaces



CWF 12/36 with 3216P1 programmer option



CWF-BAL 11/21 with optional Nanodac data logger

Technical data

CGH	Max. temp. [°C]	Heat-up time [mins]	Max. continuous operating temperature [°C]	Dimensions: Usable chamber H x W x D [mm]	Dimensions: External H x W x D [mm]	Dimensions: External with door open H x W x D [mm]	Temperature uniformity of ± 5°C within H x W x D [mm]	Volume [litres]	Max. power [W]	Weight [kg]
Standard Chamber Furnaces										
CWF 11/5	1100	47	1000	135 x 140 x 250	585 x 375 x 485	800 x 375 x 485	85 x 90 x 110	5	2400	30
CWF 11/13	1100	90	1000	200 x 200 x 325	655 x 435 x 610	905 x 435 x 610	120 x 120 x 185	13	3100	47
CWF 11/23	1100	36	1000	235 x 245 x 400	705 x 505 x 675	990 x 505 x 675	155 x 165 x 285	23	7000	68
CWF 12/5	1200	51	1100	135 x 140 x 250	585 x 375 x 485	800 x 375 x 485	85 x 90 x 125	5	2400	30
CWF 12/13	1200	80	1100	200 x 200 x 325	655 x 435 x 610	905 x 435 x 610	120 x 120 x 200	13	3100	47
CWF 12/23	1200	45	1100	235 x 245 x 400	705 x 505 x 675	990 x 505 x 675	155 x 165 x 325	23	7000	68
CWF 12/36	1200	37	1100	250 x 320 x 450	810 x 690 x 780	1105 x 690 x 780	170 x 240 x 357	36	9000	100
CWF 12/65	1200	40	1100	278 x 388 x 595	885 x 780 x 945	1245 x 780 x 945	178 x 288 x 455	65	14000	165
CWF 13/5	1300	75	1200	135 x 140 x 250	585 x 375 x 485	800 x 375 x 485	85 x 90 x 150	5	2400	30
CWF 13/13	1300	115	1200	200 x 200 x 325	655 x 435 x 610	905 x 435 x 610	120 x 120 x 225	13	3100	47
CWF 13/23	1300	55	1200	235 x 245 x 400	705 x 505 x 675	990 x 505 x 675	155 x 165 x 340	23	7000	68
CWF 13/36	1300	47	1200	250 x 320 x 450	810 x 690 x 780	1105 x 690 x 780	170 x 240 x 400	36	9000	100
CWF 13/65	1300	45	1200	278 x 388 x 595	885 x 780 x 945	1245 x 780 x 945	178 x 288 x 520	65	14000	165
Burn-off Chamber Furnaces										
CWF-B 11/13	1100	103	1000	200 x 200 x 325	655 x 435 x 610	905 x 435 x 610	n/a	13	3100	47
CWF-B 12/13	1200	130	1100	200 x 200 x 325	655 x 435 x 610	905 x 435 x 610	n/a	13	3100	47
Chamber Furnace with Integral Balance										
CWF-BAL 11/21	1100	60	1000	215 x 245 x 400	705 x 505 x 675 (400 x 170 x 500)*	990 x 505 x 675	n/a	21	7000	80

i Please note:
 - Heat up time is measured to 100°C below max, using an empty chamber
 - Holding power is measured at continuous operating temperature
 - Maximum power and heat up time based on a 240 V supply

- The uniform volume is smaller than the total chamber volume
 * Dimensions of control box