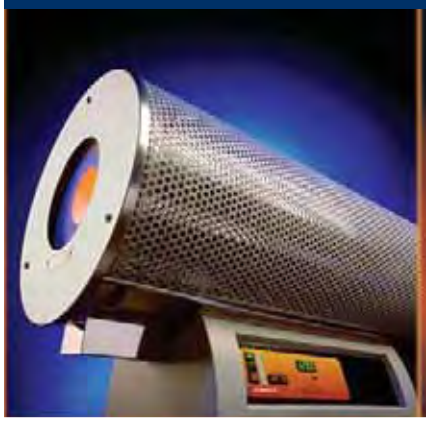
CARBOLITE®

Laboratory Thermal Equipment



Furnaces

Ovens

Incubators

Barloworld Scientific

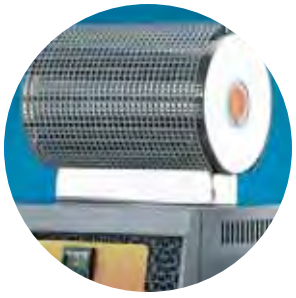
CARBOLITE®

Today, when so many long established manufacturers no longer exist or are unrecognizable because of acquisition, it is comforting to know that some companies have not changed. One such company is Carbolite, an organization that continues to focus on the core business it was originally founded on over 65 years ago.

Established in 1938, Carbolite has the knowledge and experience that only comes with time. With a history of building high quality products and providing outstanding customer service, Carbolite is still known for these same principles that helped establish their worldwide reputation.

A tradition of innovation, and wealth of engineering know-how have helped make Carbolite a world leader in laboratory heat processing equipment. Carbolite laboratory furnaces and ovens are known worldwide for their operational flexibility, responsiveness, and precise temperature control.

Throughout this catalog, Carbolite is pleased to present their popular line of laboratory furnace, oven and incubator products. Each is designed to meet the most critical heat processing requirements, and have been proven in a wide range of applications. They are, in fact, among the most efficient and reliable laboratory furnace, oven and incubator products you can buy. So, please take a few moments to check out the many diverse products found in the catalog, and you'll learn why Carbolite continues to grow in recognition as today's leading producer of laboratory thermal process equipment.



Barloworld Scientific

Carbolite is proud to be part of Barloworld Scientific, an organization that has grouped world leading scientific product manufacturers. The benefit to you, our customer, is that Carbolite will not only continue to provide the best products in heat technology, but you can turn to other Barloworld Scientific companies for many of your other scientific product needs.

Science Equipment

Barloworld Scientific has grouped four famous brand names that manufacture a broad range of laboratory bench-top equipment.

- **Carbolite®** has built an enviable reputation for service and quality in the manufacture of laboratory furnaces, ovens and incubators.
- **Stuart®** provides an extensive line of hotplates, block heaters, hybridization ovens, water baths, shakers, stirrers, rockers, blood tube rotators and colony counters.
- **Jenway®** makes a wide range of scientific instruments, including spectrophotometers, flame photometers, colorimeters, and meters for the measurement of dissolved oxygen, pH, conductivity and specific ions.
- **Techne®** is a world leader in the manufacture of temperature control equipment, including Dri-Block® heaters, water baths, and molecular biology products, including hybridization incubators and thermal cyclers.

Disposable Plastics

- **Sterilin®**, a pioneer in single use laboratory plastics, continues to set world standards for quality and reliability in the field of life science. An extensive range of consumables incorporates products for the medical and research laboratories, as well as pharmaceutical, food, dairy and water testing industries.

Reusable Plastics

- **Azlon®**, one of the most widely known and respected brands in durable plastic labware, is recognized for its leadership in polymer science and the innovations developed in the field of reusable plastics. Azlon® products include bottles, wash bottles, measuring cylinders, beakers, and fabricated plastic products designed for specific customer requirements.

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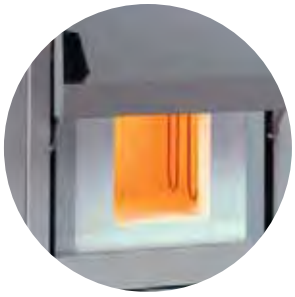
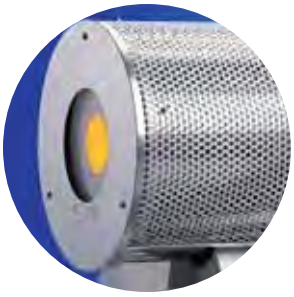
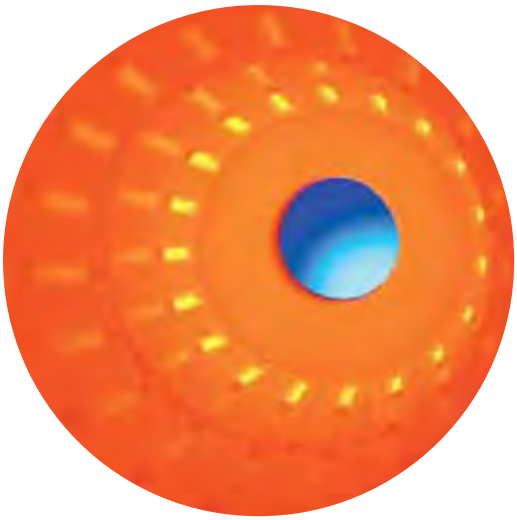




Outstanding Product Range

Throughout the following pages you will learn why Carbolite's name is synonymous with laboratory furnace and oven products. Over 300 standard furnace and oven products are described. You will find front loading box furnaces, one and three zone tube furnaces for horizontal and vertical operation, and top and bottom loading furnaces. Numerous chamber sizes, operating temperatures from 750°C to 1800°C, and multiple chamber design configurations provide today's broadest line of laboratory furnace products. In addition to our furnaces, please review our extensive oven range. You'll find traditional laboratory bench top models that operate up to 300°C, large volume floor standing units, and high temperature ovens that operate to 400°C, 500°C and 600°C. Clean room ovens, gas tight ovens, and heavy duty industrial models further enhance this broad product range. Combine Carbolite's extensive standard product range, our many specialized products, and your ability to customize Carbolite furnaces and ovens with numerous standard options and accessories, and you'll discover that you've found the best source for all of your laboratory thermal process needs.



Product Performance and Quality

Temperature Uniformity
Uniquely designed and positioned heating elements, combined with low thermal mass ceramic fiber insulation, provide highly uniform temperatures throughout the working chamber zones. Heating elements with increased power near chamber openings, and insulating chamber vestibules enhance temperature uniformity in both box and tube furnaces. Three zone tube furnaces are offered when enhanced linear uniformity is required.

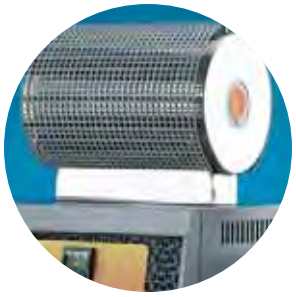
Responsiveness
Every Carbolite furnace is designed to provide the responsiveness demanded for today's critical process requirements. A unique integral design of powerful heating elements and superior insulation materials, combined with today's latest and most sophisticated temperature control technology, deliver essential heat-up and recovery rates, providing the thermal responsiveness Carbolite products are known for.

Precise Temperature Control
Sophisticated temperature controls are precisely tuned to the furnace temperature and operating characteristics. These PID instruments deliver the exact desired temperature and process repeatability you can count on, run after run. Power to the heating elements is controlled by a thyristor based solid-state relay. The relay works in the fast cycle zero voltage switching mode to ensure precise power control.

Versatility
Each Carbolite product is designed to provide the greatest efficiency and versatility to the end user. Tube furnace tube adapters facilitate quick and convenient switching to alternate diameter tubes. Tube furnaces are designed for horizontal or vertical operation. Multiple accessories and options allow convenient configuration of a furnace for a specific application.

Special Note
The life of furnace heating elements and thermocouple may be affected when frequently operated at or near the maximum operating temperature of the furnace.

Design
Carbolite laboratory furnaces are recognized for their superior aesthetic and mechanical designs. The quality components and workmanship that goes into every unit further enhances the operational and long-life performance you expect from every Carbolite furnace. The control system is normally positioned in the lower front of the furnace cabinetry, providing convenient observation and access to the temperature and power controls. The compact furnace designs have a small footprint which conserves valuable bench space.



Safety
Safety and performance are the highest priority in every Carbolite laboratory furnace design. Box furnaces feature a vertical counterbalanced door mechanism that keeps the hot face insulation away from the operator when the door is opened. Every Carbolite box and hinged tube furnace incorporates a positive break safety switch that isolates power to the heating elements when the door or chamber is opened. The double shell construction of Carbolite furnaces promotes convective air flow, providing a safe outer case temperature.

Insulation
All Carbolite laboratory furnaces are designed with today's latest and most efficient insulation materials. Low thermal mass ceramic fiber insulation is incorporated into every furnace insulation assembly. This advanced high performance insulation allows for faster heat-up and recovery rates, and energy savings. High temperature furnaces use graded insulation materials to provide enhanced thermal efficiencies. Dense refractory is utilized to reduce potential damage in critical areas, such as a box furnace chamber opening, or the chamber floor.

Heating Elements
Carbolite laboratory furnaces utilize resistive metallic wire, silicon carbide, and molybdenum disilicide heating elements. The furnaces that incorporate wire or SiC heating elements are designed to provide full power on either 208 or 240 volts. As silicon carbide elements resistance slowly changes, Carbolite's unique control system allows easy voltage adjustment to the element circuit, assuring that the original furnace heating characteristics remain unchanged. Molybdenum disilicide heating elements offer the advantages of excellent mechanical strength, long-life performance, installation with old elements in series connections, and operation continuously or intermittently.

Temperature Control Technology

Carbolite is pleased to offer the latest design in temperature control technology. The Models 300 and 301 controllers are non-programmable, and the Models 3216P1, 3508P1, 3216P5, 3508P10 and 3508P25 are programmable controllers. These instruments, combined with the many Carbolite control options and accessories, assures that you can select a furnace control system that will meet your specific requirements. Think about your present and future needs when selecting your controller. Contact Carbolite with questions or special control system requirements. See other temperature control system options on page 37.

Model 300 & 301 Controller

The Model 300 is an on/off temperature controller that utilizes the same large digital display design as the more sophisticated 301 instrument. Each temperature controller will display either the setpoint or process temperatures. The Model 301 is an advanced PID temperature control that incorporates a single ramp-to-setpoint facility and a process timer. The process timer allows selection of multiple timer modes. The controller push buttons and digital display are mounted behind, but integrally incorporated in the design of an attractive wipe clean polyester membrane. Over-temperature control and digital communications options are available with the 301 controller. The Model 300 on/off temperature controller is only offered with Carbolite oven and incubator products.

Model 3216P1 Programmer

The Model 3216P1 is an advanced setpoint programmable temperature control. This 1/16 DIN digital PID programmer provides 16 programmable segments, consisting of 8 ramps (either up or down) and 8 dwells (timed soaks). Multiple parameter displays and scrolling text messages let operators know the process and instrument status. The three color LCD display simultaneously indicates actual furnace temperature and setpoint temperature.

Model 3508P1 Programmer

The Model 3508P1 is an advanced setpoint programmable temperature control. This 1/8 DIN digital PID programmer provides 20 individual programmable segments with any segment capable of being a ramp (either up or down) or dwell (timed soak). Text messages, process parameters, and other operator information is displayed on a 4 line alpha-numeric message center, providing the operator with detailed status of both the process and instrument. The three color LCD display simultaneously indicates actual furnace temperature and setpoint temperature.

Over-Temperature Protection Control

An independent over-temperature protection control system provides additional safety and positive protection of both the furnace and load. When ordered with the Model 301 control, the over-temperature option is integrated into the main controller, but with an independent power supply, thermocouple and control circuit. When ordered with other controllers, a separate Model 2132 1/32 DIN digital controller is used. This independent over-temperature protection system includes the Model 2132 alarm instrument, magnetic contactor and separate thermocouple.

Other Programmers

The 3216P5 programmable control is very similar to Carbolite's standard 3216P1 programmer, except 5 different programmed recipes may be stored in memory. Each recipe is limited to 8 ramps and 8 dwells. The 3508P10 and 3508P25 programmers are similar to the 3508P1 programmer, except they offer greater segment capability and additional programs. The 3508P10 can store up to 10 programs in memory and has a total of 500 segments. The 3508P25 can store up to 25 programs in memory and has a total of 500 segments.

1100°C Economy Box Furnaces

General Features

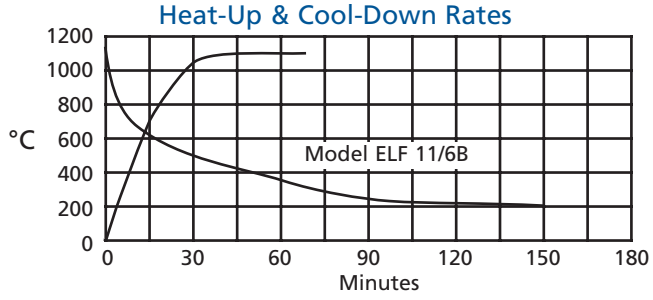
- Low cost.
- Maximum operating temperature of 1100ºC.
- Three chamber sizes available.
- Excellent chamber uniformity.
- Drop-down door serves as a shelf when loading and unloading samples.
- Positive break door safety switch isolates power to the chamber when door is opened.
- Fast heat-up enhanced by low mass ceramic fiber chamber.
- Long-life heating elements.
- Integral Model 301 PID temperature controller.
- Ideal for light duty applications requiring good thermal response.
- Low outer case temperature provided through double shell construction.
- Dense ceramic hearth provides excellent resistance to wear and spillage.
- Chamber vent provides for process exhaust.
- Small case size conserves bench space.

ELF 11/6B/301

TYPICAL APPLICATIONS

- Material Testing
- Heat Treating
- Annealing
- Fusions
- Hardening
- Tempering
- Sintering
- Melting
- Curing
- Drying

Heat-Up & Cool-Down Rates



1100°C Economy Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
♦ ELF 11/6B	1100	6.50 (165)	7.00 (180)	8.25 (210)	22.75 (580)	16.25 (410)	16.25 (410)	K	2.0	208/240	62
♦ ELF 11/14B	1100	8.25 (210)	8.75 (220)	12.25 (310)	24.75 (630)	17.75 (450)	20.50 (520)	K	2.6	208/240	86
♦ ELF 11/23	1100	9.25 (235)	10.00 (255)	15.75 (400)	28.25 (715)	20.00 (505)	26.00 (660)	K	5.0	208/240	155

♦ Stock Products

1100°C, 1200°C & 1300°C General Purpose Box Furnaces

CWF 12/13/3216P1

General Features

- Maximum operating temperatures of 1100°C, 1200°C and 1300°C.
- Three chamber sizes available.
- Two high power side heating elements provide enhanced heat-up and chamber uniformity.
- Graded element winding further optimizes chamber uniformity.
- Dense refractory around chamber entrance resists abrasion and wear.
- Chamber vent provides for process exhaust.
- Vertical lift door design keeps hot door insulation away from operator.
- Hard ceramic hearth provides excellent resistance to wear and spillage.
- Low thermal mass insulation improves both energy efficiency and the furnace thermal performance.
- Low outer case temperature provided through double shell construction.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Choice of Model 301 control or programmers.
- Small case size conserves bench space.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of multiple accessories and options. (See pages 35-37)

SEVERAL CWF BOX FURNACE OPTIONS

- Viewing Port
- Inert Gas Inlet
- Flowmeters
- Gas Tight Retorts
- Programmable Controls
- Digital Communications
- Over-Temperature Control
- Gas Safety System

1100°C, 1200°C and 1300°C General Purpose Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
CWF 11/5	1100	5.25 (135)	5.50 (140)	10.00 (250)	23.00 (585)	14.75 (375)	19.00 (485)	K	2.4	208/240	80
CWF 11/13	1100	8.00 (200)	8.00 (200)	13.00 (325)	25.75 (655)	17.00 (432)	24.00 (610)	K	3.1	208/240	125
CWF 11/23	1100	9.25 (235)	9.50 (245)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (673)	K	7.0	208/240	163
CWF 12/5	1200	5.25 (135)	5.50 (140)	10.0 (250)	23.00 (585)	14.75 (375)	19.00 (485)	R	2.4	208/240	80
♦ CWF 12/13	1200	8.00 (200)	8.00 (200)	13.00 (325)	25.75 (655)	17.00 (432)	24.00 (610)	R	3.1	208/240	125
♦ CWF 12/23	1200	9.25 (235)	9.50 (245)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (673)	R	7.0	208/240	163
CWF 13/5	1300	5.25 (135)	5.50 (140)	10.0 (250)	23.00 (585)	14.75 (375)	19.00 (485)	R	2.4	208/240	80
♦ CWF 13/13	1300	8.00 (200)	8.00 (200)	13.00 (325)	25.75 (655)	17.00 (432)	24.00 (610)	R	3.1	208/240	125
CWF 13/23	1300	9.25 (235)	9.50 (245)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (673)	R	7.0	208/240	163

♦ Stock Products

Note: CWF 12/13, CWF 13/13 and CWF 12/23 are stocked with 3216P1 programmer. Specify voltage at time of order. Furnaces operate on single phase voltage.

1100°C & 1200°C Rapid Heating Box Furnaces

General Features

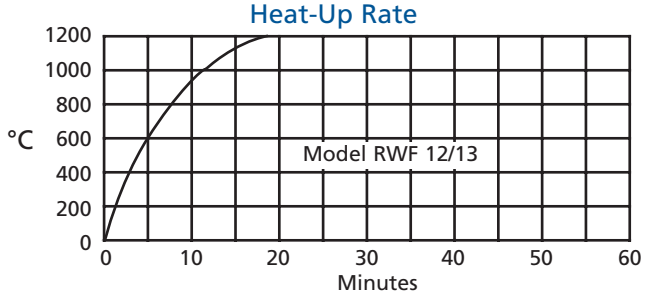
- Maximum operating temperatures of 1100°C or 1200°C.
- Three chamber sizes available.
- Extremely fast heat-up rates provided by two high power side heating elements.
- Graded element winding and free radiating coil design provide excellent chamber uniformity.
- Vertical lift door design keeps hot door insulation away from operator.
- Holding Power of 20-25% for RWF furnaces reduces energy costs.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- High efficiency low mass vacuum formed ceramic fiber insulation greatly enhances furnace performance.
- Hard ceramic hearth provides excellent resistance to wear and spillage.
- Chamber vent provides for process exhaust.
- Low outer case temperature provided through double shell construction.
- Choice of Model 301 control or programmers.
- Small case size conserves bench space.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of multiple accessories and options. (See pages 35-37)

RWF 12/5/301

TYPICAL BOX FURNACE APPLICATIONS

- Material Testing
- Heat Treating
- Annealing
- Fusions
- Hardening
- Tempering
- Sintering
- Melting
- Curing
- Drying

Heat-Up Rate



1100°C & 1200°C Rapid Heating Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
RWF 11/5	1100	5.25 (130)	6.25 (160)	10.00 (250)	23.50 (585)	14.75 (375)	19.00 (485)	K	2.75	208/240	73
RWF 11/13	1100	7.75 (195)	8.25 (210)	13.00 (325)	25.75 (655)	17.25 (435)	24.00 (610)	K	5.0	208/240	117
RWF 11/23	1100	8.75 (220)	10.25 (260)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (675)	K	9.1	208/240	168
RWF 12/5	1200	5.25 (130)	6.25 (160)	10.00 (250)	23.50 (585)	14.75 (375)	19.00 (485)	R	2.75	208/240	73
RWF 12/13	1200	7.75 (195)	8.25 (210)	13.00 (325)	23.75 (655)	17.25 (435)	24.00 (610)	R	5.0	208/240	117
RWF 12/23	1200	8.75 (220)	10.25 (260)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (675)	R	9.1	208/240	168

Specify voltage at time of order.

Furnaces operate on single phase voltage.

1200°C & 1300°C Heavy Duty Box Furnaces

GPC 12/36/3216P1

General Features

- Maximum operating temperatures of 1200°C and 1300°C.
- Two large volume chamber sizes available.
- Rugged construction for heavy-duty heat treating requirements.
- High power free radiating side heating elements provide fast heat-up and enhanced chamber uniformity.
- Vertical lift door design keeps hot door insulation away from operator.
- Low thermal mass insulation improves energy efficiency and fast heat-up rates.
- Hard ceramic hearth provides excellent resistance to wear and spillage.
- Long-life heavy gauge coil heating elements.
- Chamber vent provides for process exhaust.
- Dense refractory around chamber entrance resists abrasion and wear.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Low outer case temperature provided through double shell construction.
- Small case size conserves bench space.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of Model 301 control or programmers.
- Choice of multiple accessories and options. (See pages 35-37)

1200°C & 1300°C Heavy Duty Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
GPC 12/36	1200	10.00 (250)	12.50 (320)	17.75 (450)	32.00 (810)	27.00 (690)	30.75 (780)	R	9.0	208/240	350
GPC 12/65	1200	11.00 (280)	15.50 (390)	23.50 (595)	34.75 (885)	30.75 (780)	37.00 (945)	R	14.0	208/240*	428
GPC 13/36	1300	10.00 (250)	12.50 (320)	17.75 (450)	32.00 (810)	27.00 (690)	30.75 (780)	R	9.0	208/240	350
GPC 13/65	1300	11.00 (280)	15.50 (390)	23.50 (595)	34.75 (885)	30.75 (780)	37.00 (945)	R	14.0	208/240*	428

Specify voltage at time of order.

*3 phase electrical design.

1400°C, 1500°C & 1600°C High Temperature Box Furnaces

General Features

- Maximum operating temperatures of 1400°C, 1500°C and 1600°C.
- Four chamber sizes available.
- Heating elements located on both sides of chamber ensure good thermal uniformity.
- Vertical lift door design keeps hot door insulation away from operator.
- Long-life silicon carbide heating elements are resistant to mechanical damage and chemical attack.
- Hard ceramic hearth provides excellent resistance to wear and spillage.
- Low thermal mass insulation improves energy efficiency and heat-up rates.
- Power may be easily increased to heating elements from the temperature controller to compensate SiC element resistance change (aging). This feature assures that furnace original heat-up characteristics and maximum rated temperature is always achieved.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Low outer case temperature provided through double shell construction.
- Chamber vent provides for process exhaust.
- Small case size conserves bench space of bench top units.
- Choice of Model 301 control or programmers.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of multiple accessories and options. (See pages 35-37)

RHF 16/3/3216P1

RHF 16/35/3216P1/OTC

1400°C, 1500°C & 1600°C High Temperature Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
RHF 14/3	1400	4.75 (120)	4.75 (120)	8.00 (200)	25.75 (655)	17.00 (435)	24.00 (610)	R	4.5	208/240	124
RHF 14/8	1400	6.75 (170)	6.75 (170)	10.75 (270)	27.75 (705)	20.00 (505)	26.50 (675)	R	8.0	208/240	192
RHF 14/15	1400	8.75 (220)	8.75 (220)	12.00 (305)	32.00 (810)	27.00 (690)	30.75 (780)	R	10.0	208/240*	406
RHF 14/35	1400	10.00 (250)	12.00 (300)	18.50 (465)	34.75 (885)	30.75 (780)	37.00 (945)	R	16.0	208/240*	459
RHF 15/3	1500	4.75 (120)	4.75 (120)	8.00 (200)	25.75 (655)	17.00 (435)	24.00 (610)	R	4.5	208/240	124
RHF 15/8	1500	6.75 (170)	6.75 (170)	10.75 (270)	27.75 (705)	20.00 (505)	26.50 (675)	R	8.0	208/240*	192
RHF 15/15	1500	8.75 (220)	8.75 (220)	12.00 (305)	32.00 (810)	27.00 (690)	30.75 (780)	R	10.0	208/240*	406
RHF 15/35	1500	10.00 (250)	12.00 (300)	18.50 (465)	34.75 (885)	30.75 (780)	37.00 (945)	R	16.0	208/240*	459
♦ RHF 16/3	1600	4.75 (120)	4.75 (120)	8.00 (200)	25.75 (655)	17.00 (435)	24.00 (610)	R	4.5	208/240	124
RHF 16/8	1600	6.75 (170)	6.75 (170)	10.75 (270)	27.75 (705)	20.00 (505)	26.50 (675)	R	8.0	208/240*	192
RHF 16/15	1600	8.75 (220)	8.75 (220)	12.00 (305)	32.00 (810)	27.00 (690)	30.75 (780)	R	10.0	208/240*	406
RHF 16/35	1600	10.00 (250)	12.0 (300)	18.50 (465)	60.25 (1530)	35.50 (900)	40.25 (1020)	R	16.0	208/240*	688

♦ Stock product. Note: RHF 16/3 is stocked with 3216P1 programmer. Specify voltage at time of order. *3 phase electrical design.

1700°C High Temperature Box Furnaces

HTF 17/10/3216P1

HIGH TEMPERATURE APPLICATIONS

- Sintering of High Temperature Materials
- Glass Melting
- High Temperature Testing of Ceramics
- Fusion and Firing Processes
- Powder Metallurgy Processes

General Features

- Three chamber sizes available.
- Heating elements located on both sides of chamber ensure good thermal uniformity.
- All Carbolite standard 1700ºC furnaces are fitted with 3216P1 programmer and a separate independent over-temperature protection controller.
- Long-life molybdenum disilicide heating elements are suitable for intermittent or continuous operation.
- Vertical lift door design keeps hot door insulation away from operator.
- Advanced high temperature, high strength hot face insulation is combined with graded low thermal mass insulation to improve energy efficiency and heat-up rates.
- Large diameter heating elements greatly reduce potential for mechanical breakage.
- RS232 digital communications provided as standard on Models HTF 17/5 and HTF 17/10.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Low temperatures of outer case and critical components are provided through fan cooling.
- Molybdenum disilicide element resistance does not change with usage, providing no restriction on placement of a new element in circuit with older elements.
- Chamber vent provides for process exhaust.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of optional programmable controls.
- Choice of multiple accessories and options. (See pages 35-37)

1700°C High Temperature Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
♦ HTF 17/5	1700	6.25 (158)	6.00 (150)	8.75 (225)	22.25 (565)	32.50 (830)	25.50 (650)	B	4.19	208/240	247
HTF 17/10	1700	9.25 (232)	8.00 (200)	8.75 (225)	22.25 (565)	32.50 (830)	25.50 (650)	B	5.92	208/240	318
✓ RHF 17/25	1700	12.00 (300)	12.00 (300)	12.00 (300)	71.00 (1800)	43.25 (1100)	26.75 (680)	B	9.60	208/240*	1136

♦ Stock Product
✓ Electric Door

Note: HTF 17/5 is stocked with 3216P1 programmer.
HTF 17/5 and HTF 17/10 are provided with RS232 digital communications.

Specify voltage at time of order.
* 3 phase electrical design.

1800°C High Temperature Box Furnaces

General Features

- Four chamber sizes available.
- Heating elements located on both sides of chamber ensure excellent thermal uniformity.
- All Carbolite standard 1800°C furnaces are fitted with 3216P1 programmer and a separate independent over-temperature protection controller.
- Long-life molybdenum disilicide heating elements are suitable for intermittent or continuous operation.
- Vertical lift door design keeps hot door insulation away from operator.
- Advanced high temperature, high strength hot face insulation is combined with graded low thermal mass insulation to improve energy efficiency and heat-up rates.
- Large diameter heating elements greatly reduce potential for mechanical breakage.
- RS232 digital communications provided as standard on Models HTF 18/4 and HTF 18/8.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Low temperatures of outer case and critical components are provided through fan cooling.
- Molybdenum disilicide element resistance does not change with usage, providing no restriction on placement of a new element in circuit with older elements.
- Chamber vent provides for process exhaust.
- Choice of optional programmable controls.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of multiple accessories and options. (See pages 35-37)

HTF 18/27/3216P1

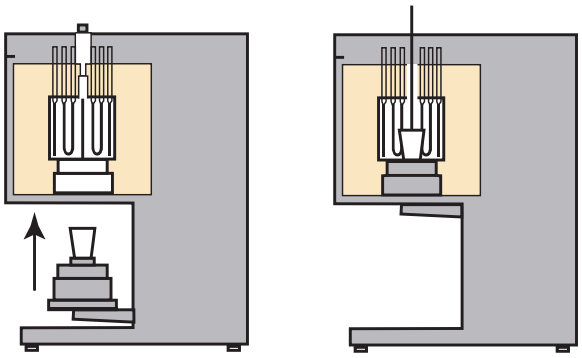
1800°C High Temperature Box Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
HTF 18/4	1800	5.50(140)	5.50 (140)	7.50 (190)	22.25 (565)	32.50 (830)	25.50 (650)	Pt 20% Rh/Pt 40% Rh	4.5	208/240	265
HTF 18/8	1800	8.25 (208)	7.50 (190)	7.50 (190)	22.25 (565)	32.50 (830)	25.50 (650)	Pt 20% Rh/Pt 40% Rh	6.4	208/240	375
✓ HTF 18/15	1800	8.75 (220)	8.75 (220)	12.00 (300)	62.25 (1580)	27.25 (690)	31.50 (800)	Pt 20% Rh/Pt 40% Rh	9.0	208/240	805
HTF 18/27	1800	12.00 (300)	12.00 (300)	12.00 (300)	63.50 (1610)	30.75 (780)	37.25 (945)	Pt 20% Rh/Pt 40% Rh	18.0	208/240*	1125

Specify voltage at time of order. Note: HTF 18/4 and HTF 18/8 are provided with RS232 digital communications. *3 phase electrical design.
✓ Electric Door

1700°C & 1800°C Bottom Loading Furnaces

BLF 17/3/3508P1



General Features

- Maximum operating temperatures of 1700°C and 1800°C.
- Three chamber sizes available.
- Convenient loading of chamber through electrically actuated lift mechanism.
- Superior sample uniformity is obtained by positioning elements on all sides of hexagon shaped chamber.
- All standard 1700°C and 1800°C BLF furnaces are fitted with 3216P1 programmer and a separate independent over-temperature protection control.
- Elevator hearth design provides safe and smooth loading and unloading of delicate loads.
- Fast heating and cooling of the sample is achieved by raising or lowering the sample from the furnace chamber.
- Long-life molybdenum disilicide heating elements are suitable for intermittent or continuous operation.
- Advanced high temperature, high strength hot face insulation is combined with graded low thermal mass insulation to improve thermal performance and energy efficiency.
- Positive break safety switch isolates power to the heating elements when hearth is lowered.
- Chamber vent provides for process exhaust.
- Large diameter heating elements greatly reduce potential for mechanical breakage.
- Low temperatures of outer case and critical components are provided through fan cooling.
- Molybdenum disilicide element resistance does not change with usage, providing no restriction on placement of a new element in circuit with older elements.
- Optional gas containment cover allows processing under high purity inert atmospheres.
- Optional protective alumina liner is available for aggressive processes that may harm elements or insulation materials.

1700° & 1800°C Bottom Loading Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Diameter	Height	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
BLF 17/3	1700	6.00 (150)	7.50 (190)	38.50 (975)	21.00 (530)	29.50 (750)	Type B	5.0	208/240	397
BLF 17/8	1700	8.00 (200)	10.00 (250)	76.75 (1950)	31.50 (800)	53.50 (1360)	Type B	9.0	208/240*	1178
BLF 17/21	1700	13.00 (330)**	12.00 (300)	73.00 (1850)	33.50 (850)	49.25 (1250)	Type B	12.0	208/240*	1180
BLF 18/3	1800	6.00 (150)	7.50 (190)	38.50 (975)	21.00 (530)	29.50 (750)	Pt 20% Rh/Pt 40% Rh	6.0	208/240	397
BLF 18/8	1800	8.00 (200)	10.00 (250)	76.75 (1950)	31.50 (800)	53.50 (1360)	Pt 20% Rh/Pt 40% Rh	10.0	208/240*	1178

**Edge to edge of hexagon shaped hearth.

Specify voltage at time of order.

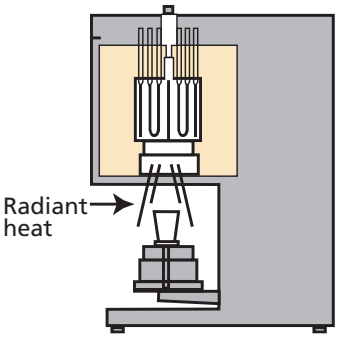
*3 phase electrical design.

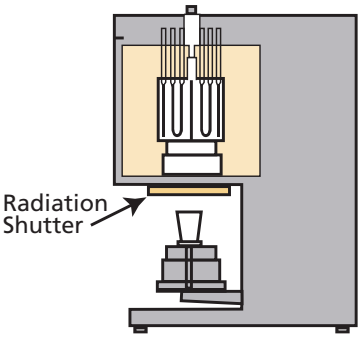
1700°C &1800°C Options for Bottom Loading Furnaces

BLF 17/8/3508P1

Radiation Shutter

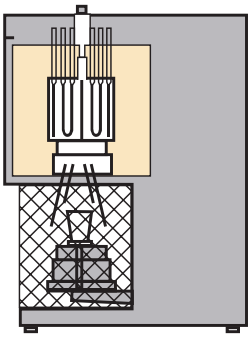
To prevent heat loss and direct heat radiation from a BLF furnace chamber when the hearth is in the lowered position, an optional radiation shutter may be provided.





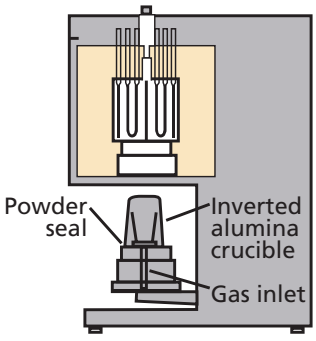
Hearth Cage

Carbolite offers an optional hearth cage that encloses the hearth when in the lowered position. This option may be desirable if the load is not stable on the hearth, there is potential for the load to break during cooling, or as a safety guard to prevent contact with the hot load.



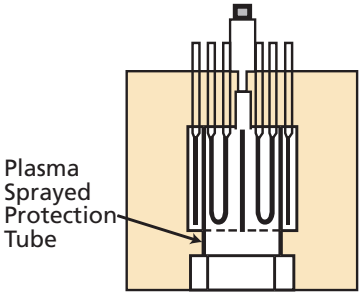
Atmosphere Processing

BLF furnace chambers are not gas tight. Therefore, to process under an inert atmosphere, a ceramic muffle is placed on the furnace hearth. An inverted alumina crucible provides a gas tight enclosure over the furnace load, and inert gas is introduced through the furnace hearth.



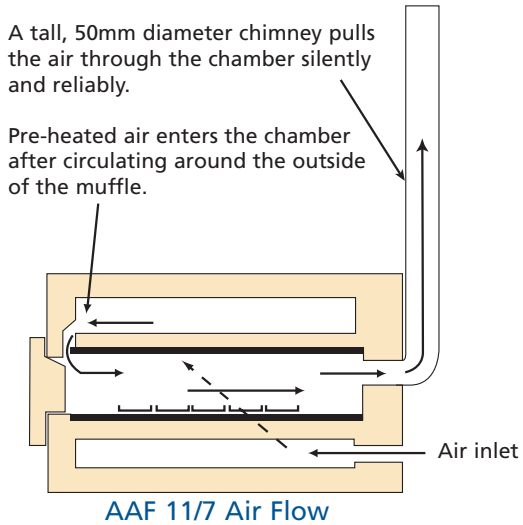
Protective Liner

Because some processes, e.g. glass melting, can potentially cause damage to heating elements and/or insulation materials, an optional protective liner may be installed in the furnace chamber.



1100°C Ashing and Burn-Off Furnaces

AAF 11/7/301



AAF 11/7 Air Flow

General Features

- Five different ashing and burn-off furnace models to choose from.
- Select the model and design best suited to your need, based on the process and material to be heated.
- Air inlets located in front of chamber and outlet chimney in rear facilitate natural convective air flow.
- Maximum operating temperature of 1100°C.
- Chamber air flow provides oxygen to enhance ashing or burning process, and removal of exhaust.
- Isolation of heating element from working chamber in AAF and GSM furnaces eliminates potential of element contamination by process.
- Reduction of carbon build-up is assured by air flow through the furnace chamber.
- BWF high power graded element winding provides enhanced heat-up and improved chamber uniformity.
- Large diameter extended chimney provides for efficient process exhaust.
- Wire wound muffles heat the chamber from 4 sides, providing good temperature uniformity.
- Models AAF 11/3, AAF 11/7 and GSM 11/8 all incorporate traditional wire-wound muffle design.
- GSM fused quartz muffle offers superior containment of aggressive atmospheres.
- Unique GSM quartz muffle provides dust free working chamber.
- Model AAF 11/18 isolates heating elements with protective silicon carbide tiles. See drawing on page 17.
- Vertical lift door design keeps hot door insulation away from the operator.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- Low outer case temperature provided through double shell construction.
- Choice of Model 301 control or programmers.

APPLICATIONS	SAMPLE MATERIALS	FURNACE
Ashing for Material Analysis	Natural Materials & Fibers	BWF & AAF
	Natural Materials & Fibers, Animal Fats, Man Made & Natural Hydrocarbons	AAF
	Natural Materials & Fibers, Animal Fats, Man Made & Natural Hydrocarbons, H_2SO_4, HNO_3, HCL	GSM
Ashing for Material Analysis in a Dust Free Chamber	Natural Materials & Fibers, Animal Fats, Man Made & Natural Hydrocarbons, H_2SO_4, HNO_3, HCL	GSM
Burn-off and Removal of Material for Cleaning	Natural Materials & Fibers	BWF & AAF
	Natural Materials & Fibers, Man Made & Natural Hydrocarbons	AAF

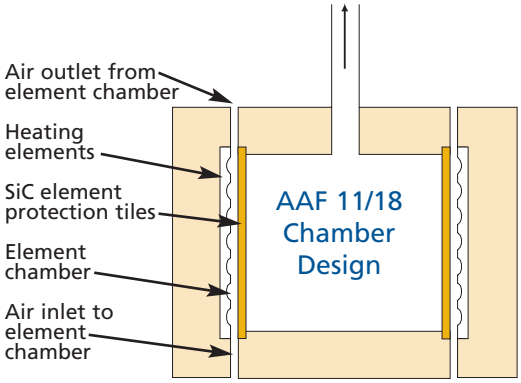
Examples of Natural Materials & Fibers: Foods, Grains

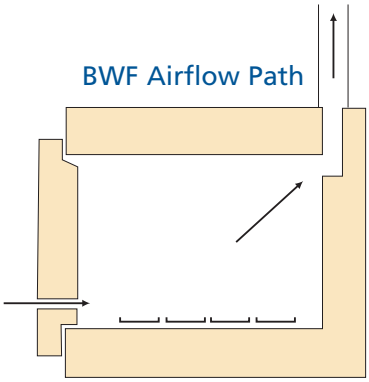
Examples of Hydrocarbon Materials: Plastics, Rubber, Coal

1100°C Ashing and Burn-Off Furnaces

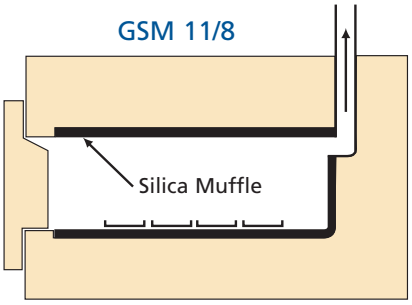
AAF 11/18/301

BWF 11/13/301





Trays supplied with AAF furnaces.



GSM external case design is the same as above photos.

1100°C Ashing and Burn-Off Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
AAF 11/3	1100	3.25 (85)	6.00 (150)	10.00 (250)	22.75 (580)	14.50 (370)	19.00 (485)	K	1.75	120/208/240	53
AAF 11/7	1100	3.50 (90)	6.75 (170)	18.00 (455)	25.50 (650)	17.00 (430)	29.00 (740)	K	3.9	208/240	160
AAF 11/18	1100	9.25 (235)	7.75 (195)	15.75 (400)	27.75 (705)	20.00 (505)	26.50 (675)	K	7.25	208/240	160
GSM 11/8	1100	4.75 (120)	7.00 (175)	13.50 (345)	27.75 (705)	20.00 (505)	28.50 (725)	K	3.0	208/240	152
♦ BWF 11/13	1100	8.00 (200)	8.00 (200)	13.00 (325)	25.75 (655)	17.25 (435)	24.00 (610)	K	3.1	208/240	113

♦ Stock Product Note: BWF 11/13 is stocked with 301 digital controller. Furnaces operate on single phase voltage. Specify voltage at time of order.

1200°C Top Loading Crucible Furnaces

VCF 12/5/3216P1

General Features

- Four chamber sizes available.
- Maximum operating temperature of 1200°C.
- Excellent chamber uniformity provided by elements positioned on four sides of chamber.
- Door handle and hinge mechanism conveniently raises door plug upward and to the side for full access to the chamber.
- Long-life coiled wire heating elements embedded in protective cast refractory slabs.
- Durable insulating door plug includes built-in exhaust vent.
- Chamber volumes from .2 ft.^{3} to 3.5 ft.^{3}
- Positive break door safety switch isolates power to the heating elements when door is raised.
- Temperature controls are built into furnace cabinetry.
- Low thermal mass insulation improves energy efficiency.
- Hard refractory hearth provides excellent resistance to wear and spillage.
- Low outer case temperature provided through double shell construction.
- Choice of Model 301 control or programmers.
- Serviceability is aided by furnace mechanical and electrical design.
- Choice of multiple accessories and options. (See pages 35-37)

TYPICAL VCF APPLICATIONS

- Melting
- Fusions
- Curing
- Drying
- Hardening
- Annealing
- Tempering
- Sintering

1200°C Top Loading Crucible Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
VCF 12/5	1200	6.00 (155)	5.00 (130)	10.25 (260)	21.00 (530)	16.00 (405)	26.00 (660)	R	2.5	208/240	155
VCF 12/10	1200	7.00 (180)	6.00 (155)	14.50 (365)	22.00 (555)	17.00 (430)	30.00 (765)	R	3.0	208/240	225
VCF 12/23	1200	10.00 (250)	8.00 (200)	17.75 (450)	23.00 (600)	19.75 (500)	33.50 (850)	R	6.0	208/240	278
VCF 12/100	1200	16.00 (410)	16.00 (410)	23.50 (600)	36.50 (930)	37.50 (950)	43.25 (1100)	R	15.0	208/240*	430

Specify voltage at time of order.

* 3 phase electrical design.

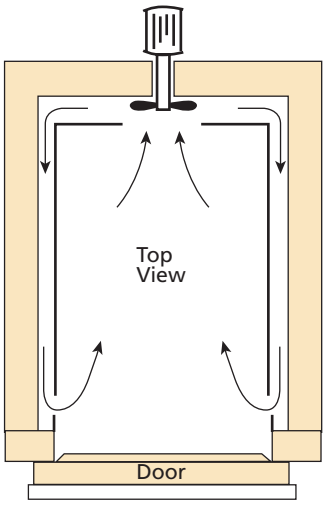
750°C Air Recirculating Furnaces

General Features

- Maximum operating temperature of 750°C.
- Two chamber sizes available.
- Long-life mineral insulated sheathed heating elements are provided on both sides of the chamber.
- Powerful centrifugal fan forces air over the heating elements for efficient heating of chamber.
- Fan and air guide system provides continuous movement of air around the load for maximum temperature uniformity.
- Heavy duty stainless steel chamber liner.
- Chamber is fitted with shelf runners for convenient placement of optional shelves.
- Choice of Model 301 control or programmers.
- Side hinged door minimizes heat loss.
- Low thermal mass insulation improves energy efficiency.
- Dense refractory around chamber entrance resists abrasion and wear.
- Chamber vent provides for process exhaust.
- Choice of multiple accessories and options. (See pages 35-37)

TYPICAL HRF APPLICATIONS

- Stress Relieving
- Annealing
- Tempering
- Thermal Aging
- Melting Low Temperature Materials



750° Air Recirculating Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
HRF 7/22	750	8.75 (220)	8.00 (200)	19.50 (495)	23.25 (590)	17.75 (450)	34.25 (870)	K	3.0	208/240	164
HRF 7/45	750	11.50 (295)	10.50 (265)	22.50 (575)	29.75 (755)	23.75 (605)	43.25 (1100)	K	6.0	208/240	295

Specify voltage at time of order.

Furnaces operate on single phase voltage.

1200°C Top Hat Furnace

LTH 12/3/3508P1/OTC
with Cascade Control

General Features

- Maximum operating temperature of 1200°.
- Unique "Top Hat" design allows chamber to be raised and lowered over load.
- Unrestricted access to furnace hearth facilitates safe and easy loading and unloading.
- Long-life free radiating heating element design provides excellent chamber uniformity.
- When furnace chamber is raised, load is exposed in ambient air, facilitating rapid cool-down rates.
- Low thermal mass ceramic fiber insulation improves energy efficiency and fast heat-up rates.
- Electrically actuated raise/lower chamber mechanism is controlled by rocker switch on front of furnace base.
- Lower outer case temperature is provided through double shell construction.
- An optional refractory metal bell jar is available for processing under inert atmospheres.
- Choice of 301 or programmable controls. Model 301 is installed in front of furnace upper casework, and programmable controls are housed in separate control box.
- Other control system options are available. (See page 37)

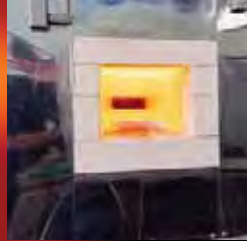
1200°C Laboratory Top Hat Furnace

Furnace Model	Max. Temp. (°C)	Working Chamber Dimensions Inches (mm) Diameter	Height	External Dimensions Inches (mm) Height	Width	Depth	Time to Raise or Lower Chamber	TC Type (kW)	Max. Power	Furnace Voltage (lb.)	Shipping Weight
LTH 12/3	1200	5.50 (140)	8.00 (200)	25.75 (655)	16.25 (410)	21.25 (540)	5 sec.	R	3.0	208/240	117

Specify voltage at time of order.

Furnaces operate on single phase voltage.

Assay Furnaces



General Features

- Maximum operating temperature of 1200ºC.
- Unique long-life furnace construction specifically designed for the assay of precious metals.
- Silicon carbide heating elements are positioned above and below the work chamber, assuring excellent temperature uniformity.
- Heating elements are protected from spillage and corrosive fumes by silicon carbide tiles that form the roof and hearth of the furnace.
- Incoming air is preheated to ensure rapid heat transfer to the cupels, and even temperature distribution throughout the work chamber.
- A low airflow path directly over the cupels speeds up the oxidation process.
- Low thermal mass ceramic fiber insulation combined with high quality refractory brick provides maximum thermal efficiency.
- A counterbalanced vertical lift door design keeps the hot face insulation facing away from the operator.
- Positive break door safety switch isolates power to the heating elements when door is opened.
- The door incorporates a viewing port for convenient observation of the internal chamber.
- A 3" diameter insulated exhaust duct exits near the rear of chamber, and incorporates a removable trap below the chimney to collect any condensed lead.
- It is recommended the furnace be positioned beneath an efficient exhaust system, preferably fitted with a proprietary lead filter.
- Power may be easily increased to heating elements from the temperature controller to compensate for SiC element resistance change (aging). This feature assures that the furnace will always achieve the original heat-up and performance specifications.
- Four chamber sizes available.

CF 24/301/OTC

- Low outer case temperature is provided through double shell construction.
- The furnace temperature is precisely regulated by Carbolite's Model 301 PID digital temperature controller.
- A 24 hour, 7 day timer is provided as standard to allow switching the furnace on and off automatically.

Charge Capacity

Model	Max. No. of Cupel No. 8	Max. No. of Cupel No. 6
CF 15	15	24
CF 24	24	32
CF 50	50	72
CF 60	60	90

Based on Cupel No. 8 of a size 44.5 mm diameter x 30.2 mm high and Cupel No. 6 of a size of 35.7 mm diameter x 28.2 mm high.

Assay Furnaces

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
CF 15	1200	5.00 (125)	8.75 (220)	13.75 (350)	41.25 (1050)	37.50 (950)	37.50 (950)	R	9.0	208/240 *	480
CF 24	1200	8.00 (205)	10.00 (255)	18.00 (460)	83.00 (2110)	41.25 (1050)	42.25 (1070)	R	14.5	208/240 *	798
CF 50	1200	9.00 (230)	13.75 (350)	21.25 (540)	82.75 (2100)	41.25 (1050)	43.25 (1100)	R	20.0	208/240 *	1323
CF 60	1200	9.75 (250)	15.75 (400)	25.50 (650)	82.75 (2100)	47.25 (1200)	47.25 (1200)	R	31.0	208/240 *	1398

Specify voltage at time of order.

* 3 phase electrical design.

Asphalt Binder Analyzer

ABA 7/35/301

The asphalt binder analyzer is supplied with four sample baskets, two basket covers, four basket cover locking clips, two support trays, loading handle, cooling cage and printer paper.

The Carbolite Model ABA 7/35 Asphalt Binder Analyzer is specifically designed to determine the asphalt binder content of hot mix asphalt by the loss-on-ignition method. The analyzer is fully compliant with all ASTM, AASHTO and BS standards specifying the process and equipment for this procedure. The analyzer combines a sophisticated furnace and weighing system that continuously measures the weight loss of a bituminous mixture during combustion, and automatically calculates the binder content of the asphalt. Carbolite's Asphalt Binder Analyzer is widely recognized for its superior design, high quality construction, durability, and trouble-free service.

Design & Construction Features

- The primary customer interface for data input is through a large, high resolution, backlit display. This easy-to-read display helps to guide the operator with user friendly instructions regarding the analyzer set-up and data input.
- The Carbolite furnace accepts the industry's largest hot mix asphalt (HMA) test sample, up to 5000 grams (11 lbs.), for analysis in a single test.
- The ABA 7/35 is fitted with a state-of-the-art Ohaus balance. Using standard weights, this balance can easily be calibrated and leveled while installed in the furnace.
- The unique design of the balance pan extension and basket support, ensures that the sample tray is properly guided into position every time it is placed in the chamber.
- Long-life free radiating heating element design.
- Low thermal mass ceramic fiber insulation and high power heating elements combine to provide fast heat-up. Furnace reaches operating temperature in 20-30 minutes.
- Carbolite's Model 301 digital PID temperature controller utilizes the latest temperature control technology to precisely control both the main chamber and after burner chamber process temperatures.
- The ABA 7/35 is equipped with a printer that provides a permanent record of all tests.
- The analyzer software incorporates a lift compensation factor, which allows for the lift created by the extraction fan and the reduced air density.
- Furnace cabinetry is designed for bench mounting, or may be set on optional support stand.

Safety Features

- The analyzer door is automatically locked during the test, and will remain locked even with interruption of power.
- An independently controlled afterburner with exhaust fan and vent is designed to substantially reduce furnace emissions. The unit is fully compliant with the relevant emission standards, without requiring a filter system.
- Low outer case temperature provided through double shell construction.
- Positive break door safety switch isolates power to the heating elements when door is opened.

Asphalt Binder Analyzer

Furnace Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
♦ ABA 7/35	750	8.50 (220)	12.75 (350)	17.75 (450)	K	8.0	208/240	38.50 (980)	23.75 (600)	29.50 (750)	380

♦ Stock Product

Note: Furnace chimney extends 10" above furnace case.

Asphalt Binder Analyzer

Test Related Features & Benefits

- The ability of the ABA 7/35 to accurately measure weights to .1 gram, temperatures to 1 degree, and binder content, weight loss and asphalt calibration factor to .01 percent delivers precise test results time and again.
- Typical test times range from 20 to 40 minutes, based on the diameter of the largest aggregate.
- The Carbolite asphalt analyzer will automatically calculate the "Asphalt Calibration Factor" when conducting a test with a known binder content.
- All test set-up parameters can be saved with unique (customer specified) file names into libraries, and easily recalled for use at a later date.
- The Carbolite asphalt binder analyzer automatically determines the calibration factor for both "asphalt mix" and "dry aggregate". The analyzer can calculate binder contents using calibration factors based on asphalt mixes and dry aggregate samples without the need for a conversion between the two.
- A test sample must always be externally weighed prior to beginning the ignition test procedure. This sample weight can be input manually, or entered automatically via an Ohaus balance connected to the analyzer via RS 232 digital communications. This automated procedure removes any possibility of operator error.

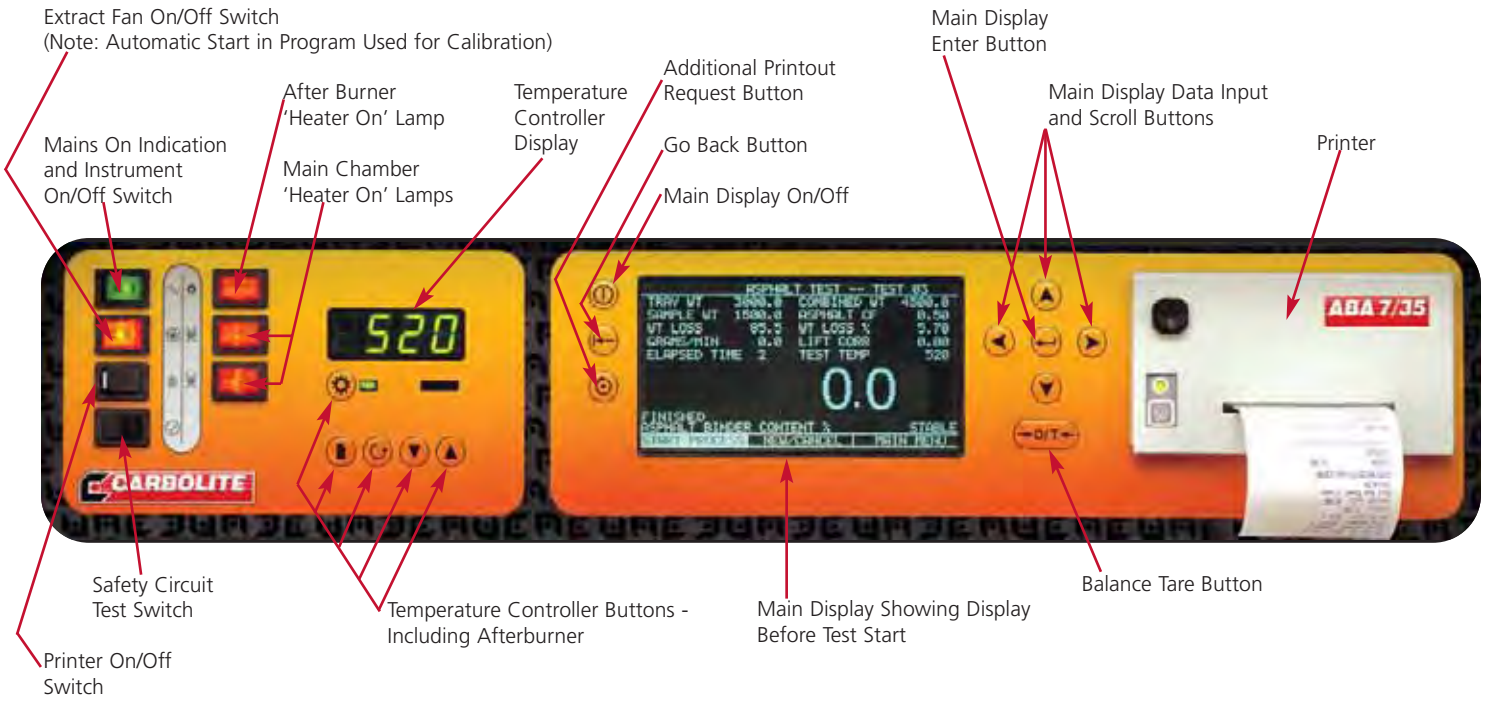
The Test

Once the test has commenced, the door is automatically locked for the entire period of the test and the extraction fan is automatically started. During the test, the large backlit LCD display shows the asphalt sample weight to a display accuracy of 0.1 g, the present weight loss (both in grams and as a %), the rate of change of sample weight and also the duration of the test. This unique display gives an immediate indication of the progress of the test. The binder content, percentage weight loss and calibration factor are measured to 0.01%.

At the end of the test, which is signaled by an audible alarm, the display changes to clearly show the binder content of the sample, the door is unlocked and the results are printed. A choice of print-outs is available; either as a final end of test analysis or as a continuous print-out showing results every minute including a final end of test analysis. Additional print outs can be requested at the end of the test for permanent records or for test documentation.

The final printed test results include the furnace setpoint temperature, sample weight, final weight, weight loss in grams, percent weight loss, calibration factor, test run time, and time and date.

Asphalt Binder Analyzer Control Panel



900°C, 1000°C & 1200°C Single Zone Tube Furnaces

MTF 10/25/130/301
MTF 12/38/250/301

CTF 12/65/550/301
MTF 12/38/400/301

General Features

- Eleven standard size wire-wound tube furnaces.
- Maximum operating temperatures of 900°C, 1000°C & 1200°C.
- Rapid heat-up to operating temperature.
- Select from multiple work tube diameters ranging from 5/8" (15 mm) to 4" (100 mm).
- Seven heated length choices from 5" (130 mm) to 36" (900 mm) provide for multiple working and uniformity requirements.
- Integral ceramic work tube with external element winding creates furnace chamber.
- Integral work tube is convenient and suitable for processing in air.
- Easily slide a separate tube through work tube for processing under atmosphere.
- Furnace incorporates low thermal mass ceramic fiber insulation for improved response times.
- Furnaces are normally mounted horizontally on a support base or cabinet.
- Thermocouple is located in a protection tube between the chamber work tube and heating element.
- All wire-wound tube furnaces can be provided for optional vertical operation. (See page 35)
- Safety outer mesh guard provides low temperature external surface.
- Furnace controls are built into the supporting base or cabinet, providing convenient observation and access to all power and temperature controls.
- Choice of Model 301 control or programmers.
- Choice of multiple accessories and options, including process tubes, gas tight end seals, insulating plugs, radiation shields, etc. (See pages 35-37)

900°C, 1000°C & 1200°C Single Zone Wire-Wound Tube Furnaces

Furnace Model	Max. Temp. (°C)	Work Tube Inside Dia. Inches (mm)	Heated Length Inches (mm)	Overall Furnace Length Inches (mm)	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
MTF 9/15/130	900	0.6 (15)	5.00 (130)	7.00 (180)	K	.25	120	7.00 (180)	7.00 (180)	3.50 (90)	14
MTF 10/15/130	1000	0.6 (15)	5.00 (130)	6.00 (150)	K	.40	120	10.50 (265)	8.00 (200)	6.75 (175)	22
♦ MTF 10/25/130	1000	1.00 (25)	5.00 (130)	6.00 (150)	K	.40	120	10.50 (265)	8.00 (200)	6.75 (175)	22
MTF 12/25/250	1200	1.00 (25)	10.00 (250)	12.00 (300)	N	.70	120	14.75 (375)	14.50 (370)	14.75 (375)	38
♦ MTF 12/38/250	1200	1.50 (38)	10.00 (250)	12.00 (300)	N	1.0	120	17.00 (430)	14.50 (370)	14.75 (375)	38
MTF 12/25/400	1200	1.00 (25)	15.75 (400)	17.75 (450)	N	1.0	120	14.75 (375)	17.75 (450)	14.75 (375)	44
♦ MTF 12/38/400	1200	1.50 (38)	15.75 (400)	17.75 (450)	N	1.5	120	17.00 (430)	17.75 (450)	14.75 (375)	44
MTF 12/38/850	1200	1.50 (38)	33.50 (850)	35.50 (900)	N	2.8	208/240	17.00 (430)	35.50 (900)	14.75 (375)	104
♦ CTF 12/65/550	1200	2.50 (65)	21.50 (550)	24.50 (625)	N	2.0	208/240	20.75 (525)	24.50 (625)	14.25 (360)	80
CTF 12/75/700	1200	3.00 (75)	27.50 (700)	30.50 (775)	N	3.0	208/240	20.75 (525)	30.50 (775)	14.25 (360)	84
CTF 12/100/900	1200	4.00 (100)	35.50 (900)	38.50 (975)	N	4.5	208/240	20.75 (525)	38.50 (975)	14.25 (360)	104

♦ Stock Products

Note: Stock furnaces are provided with 301 control.

Specify voltage at time of order.
Furnaces operate on single phase voltage.

1200°C Three Zone Tube Furnaces

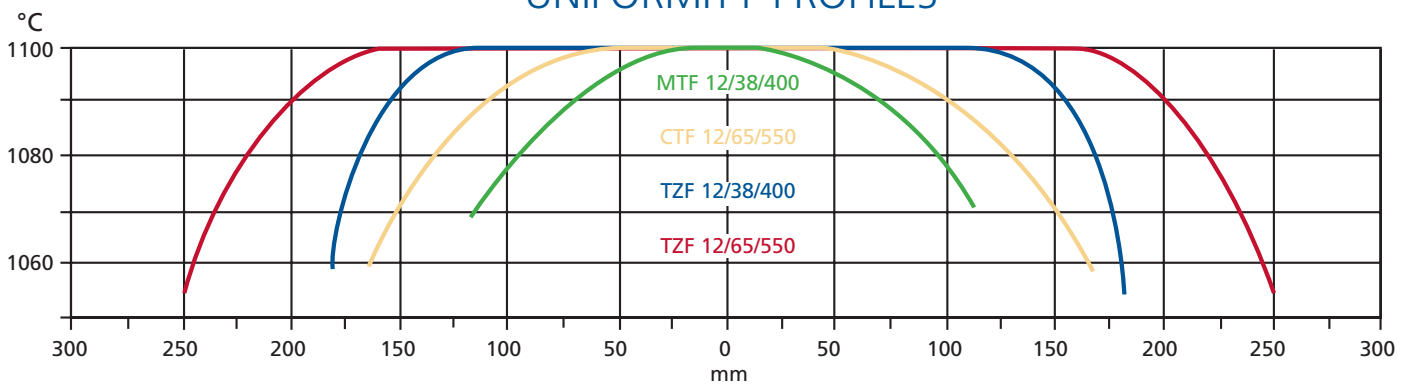
General Features

- Design features listed for single zone wire-wound tube furnaces (page 24) also apply to TZF three zone tube furnaces.
- Five standard size three zone wire-wound tube furnaces to choose from.
- Three zone design provides enhanced linear temperature uniformity.
- Maximum operating temperature of 1200°C.
- Three temperature control instruments allow variation of setpoint temperature in each furnace zone. (See page 37)
- End zone controllers may be slaved to center zone or fully independent.
- Select from multiple work tube diameters ranging from 1.5" (38 mm) to 4" (100 mm).
- Five heated length choices from 15.75" (400 mm) to 36" (900 mm).

TZF 12/75/700/3216P1

Each TZF model is derived from a MTF or CTF tube furnace having two additional independently controlled heating zones. TZF three zone tube furnaces are ideal for applications which demand a uniform temperature over an extended length. The end zones are normally wired to maintain an adjustable temperature differential from the center zone. This design has the advantage that if a programmable control is installed in the center zone, the end zones will follow the same program. Alternatively, when programming is not required, fully independent control of the end zones is available if specified when ordering. See page 37.

UNIFORMITY PROFILES



MTF 12/38/400 ±5°C over 135mm
TZF 12/38/400 ±5°C over 305mm
CTF 12/65/550 ±5°C over 230mm
TZF 12/65/550 ±5°C over 390mm

1200°C Three Zone Wire-Wound Tube Furnaces

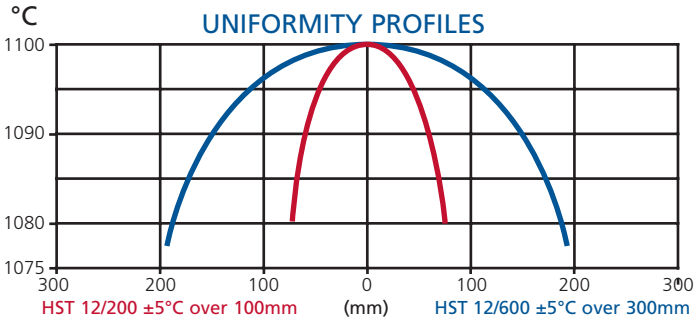
Furnace Model	Max. Temp. (°C)	Work Tube Inside Dia. Inches (mm)	Heated Length Inches (mm)	Overall Length Inches (mm)	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
TZF 12/38/400	1200	1.50 (38)	15.75 (400)	17.75 (450)	N	1.5	120/208/240	17.00 (430)	17.75 (450)	14.75 (375)	71
TZF 12/38/850	1200	1.50 (38)	33.50 (850)	35.50 (900)	N	2.8	208/240	17.00 (430)	35.50 (900)	14.75 (375)	110
TZF 12/65/550	1200	2.50 (65)	21.50 (550)	23.50 (600)	N	2.0	208/240	20.75 (525)	24.50 (625)	14.25 (360)	84
TZF 12/75/700	1200	3.00 (75)	27.50 (700)	29.50 (750)	N	3.0	208/240	20.75 (525)	30.50 (775)	14.25 (360)	102
TZF 12/100/900	1200	4.00 (100)	35.50 (900)	37.50 (950)	N	4.5	208/240	20.75 (525)	38.50 (975)	14.25 (360)	106

Specify voltage at time of order.

Furnaces operate on single phase voltage.

1200°C Horizontal Split-Hinge Tube Furnaces

HST 12/70/600



HST 12/86/400/301

General Features

- Maximum operating temperature of 1200°C.
- Available in multiple heated lengths of 8", 12", 16", 24" and 36".
- Split-hinge design allows for convenient process observation, enhanced cooling, and easy fixturing of the process tube.
- Designed to accept process tubes up to 4" OD (100 mm).
- Insulating end vestibules improve chamber uniformity and incorporate interchangeable tube adapters.
- These tube adapters allow easy conversion to different diameter process tubes.
- Carbolite split-hinge tube furnaces are available in single and three zone designs.
- Three zone tube furnaces provide a longer uniform temperature zone through elevation of end zone temperatures to compensate for normal end losses.
- Carbolite HZS and TVS three zone tube furnaces are zoned 6-12-6 and 6-24-6.
- Long-life free radiating heating element design provides excellent radial and linear chamber uniformity.
- High efficiency low mass vacuum formed ceramic fiber insulation enhances heat-up and recovery rates.
- Each three zone furnace incorporates three separate temperature controls to allow variation of setpoint temperature in each zone.
- HZS model end zone controllers may be slaved to the center zone or fully independent.
- Positive break furnace safety switch isolates power to the heating elements when furnace is opened.
- Low outer case temperature provided through double shell construction.
- Carbolite hinged tube furnaces are designed for bench mounting, and are interconnected to a separate control cabinet with a 6 foot cable.
- Choice of 301 or programmable controls.
- See tube furnace options on pages 35-37.

1200°C Horizontal Split-Hinge Tube Furnaces

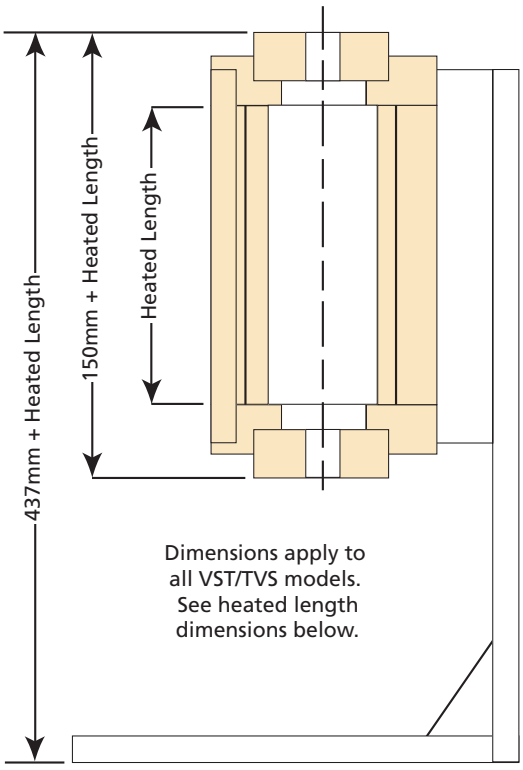
Furnace Model	Max. Temp. (°C)	Maximum O.D. Tube ✓ Inches (mm)	Heated Length Inches (mm)	No. of Zones	External Dimensions Inches (mm) Height	Length	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
HST 12/200	1200	4.00 (100)	8.00 (200)	1	13.75 (350)	13.75 (350)	16.25 (410)	N	1.0	120	75
HST 12/300	1200	4.00 (100)	12.00 (300)	1	13.75 (350)	17.75 (450)	16.25 (410)	N	1.5	120	82
♦ HST 12/400	1200	4.00 (100)	15.75 (400)	1	13.75 (350)	21.50 (550)	16.25 (410)	N	2.0	208/240	88
HST 12/600	1200	4.00 (100)	23.75 (600)	1	13.75 (350)	29.50 (750)	16.25 (410)	N	3.0	208/240	102
HST 12/900	1200	4.00 (100)	35.50 (900)	1	13.75 (350)	41.25 (1050)	16.25 (410)	N	4.5	208/240	153
HZS 12/600	1200	4.00 (100)	23.75 (600)	3	13.75 (350)	29.50 (750)	16.25 (410)	N	3.0	208/240	115
HZS 12/900	1200	4.00 (100)	35.50 (900)	3	13.75 (350)	41.25 (1050)	16.25 (410)	N	4.5	208/240	161

♦ Stock Product ✓ Specify tube OD at time of order. Note: Stock furnace is provided with 301 control. Specify voltage at time of order. Furnaces operate on single phase voltage.

1200°C Vertical Split-Hinge Tube Furnaces

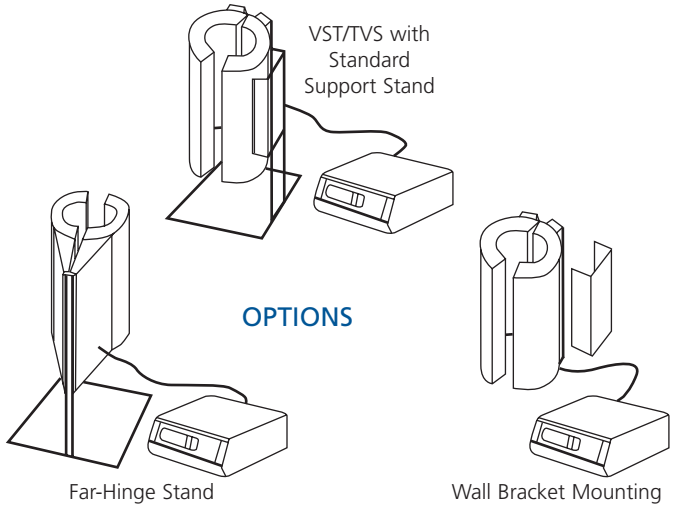
General Features

- General design features listed for horizontal split-hinge tube furnaces (page 26) also apply to vertical split-hinge tube furnaces.
- Standard vertical hinged tube furnaces are provided with a vertical support stand.
- Optional far hinge vertical support stand or wall bracket are available. (see below)



VST/TVS Tube Furnace on Standard Support Stand

TVS 12/600/3508P1



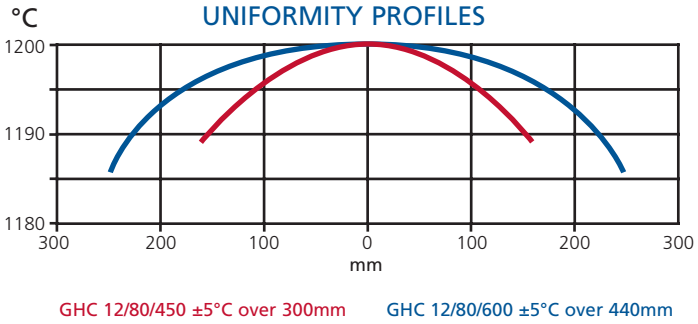
1200°C Vertical Split-Hinge Tube Furnaces

Furnace Model	Max. Temp. (°C)	Maximum O.D. Tube ✓ Inches (mm)	Heated Length Inches (mm)	Overall Furnace Length Inches (mm)	Number of Zones	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
VST 12/200	1200	4.00 (100)	8.00 (200)	13.75 (350)	1	N	1.0	120	71
VST 12/300	1200	4.00 (100)	12.0 (300)	17.75 (450)	1	N	1.5	120	73
VST 12/400	1200	4.00 (100)	15.75 (400)	21.50 (550)	1	N	2.0	208/240	75
VST 12/600	1200	4.00 (100)	23.75 (600)	29.50 (750)	1	N	3.0	208/240	91
VST 12/900	1200	4.00 (100)	35.50 (900)	41.25 (1050)	1	N	4.5	208/240	200
TVS 12/600	1200	4.00 (100)	23.75 (600)	29.50 (750)	3	N	3.0	208/240	91
TVS 12/900	1200	4.00 (100)	35.50 (900)	41.25 (1050)	3	N	4.5	208/240	200

✓ Specify tube OD at time of order. Specify voltage at time of order. Furnaces operate on single phase voltage.

1200°C Large Bore Tube Furnaces

GHA 12/75/600/301



GHC 12/80/450 ±5°C over 300mm GHC 12/80/600 ±5°C over 440mm

General Features

- Maximum operating temperature of 1200°C.
- Designed to accept process tubes up to 6.5" OD.
- Six different heated lengths of 18", 24", 30", 36", 42" & 48" provide for multiple working and uniformity requirements.
- Insulating end vestibules improve chamber uniformity and incorporate interchangeable tube adapters.
- These tube adapters allow convenient conversion to different diameter process tubes.
- Long-life free radiating heating element design provides excellent radial and linear chamber uniformity.
- High efficiency low mass vacuum formed ceramic fiber insulation enhances heat-up rates.
- Carbolite large bore tube furnaces are available in single and three zone designs.
- Three zone tube furnaces provide a longer uniform temperature zone through elevation of end zone temperatures to compensate for normal end losses.
- Safety outer mesh guard provides low temperature external surface.
- Furnaces are normally mounted horizontally on an attractive support base.
- Furnace controls are built into the support base, providing convenient observation and access to all power and temperature controls.
- Each tube furnace is available for optional vertical operation.
- Vertical design is interconnected to a separate control cabinet with a 6 foot cable. (See page 35)
- Each three zone furnace incorporates three separate temperature controls to allow variation of setpoint temperature in each zone.
- GHC model end zone controllers may be slaved to the center zone or fully independent. (See page 37)
- Choice of 301 or programmable controls.
- See tube furnace options on pages 35-37.

1200°C Large Bore Tube Furnaces

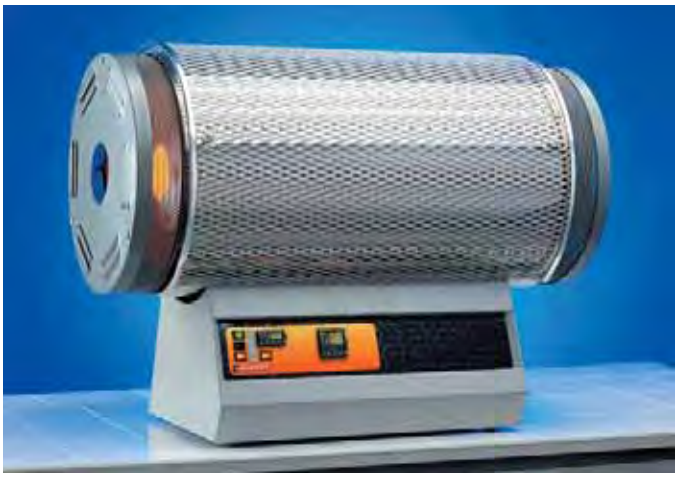
Furnace Model	Max. Temp. (°C)	Maximum OD Tube ✓ Inches (mm)	Heated Length Inches (mm)	Number of Zones	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
GHA 12/450	1200	6.50 (165)	17.75 (450)	1	N	3.12	208/240	26.50 (670)	26.75 (676)	18.50 (468)	130
GHA 12/600	1200	6.50 (165)	23.50 (600)	1	N	3.90	208/240	26.50 (670)	32.50 (826)	18.50 (468)	146
GHA 12/750	1200	6.50 (165)	29.50 (750)	1	N	4.68	208/240	26.50 (670)	38.50 (976)	18.50 (468)	179
GHA 12/900	1200	6.50 (165)	35.50 (900)	1	N	5.46	208/240	26.50 (670	44.50 (1126)	18.50 (468)	203
GHA 12/1050	1200	6.50 (165)	41.25 (1050)	1	N	6.24	208/240	26.50 (670)	50.25 (1276)	18.50 (468)	238
GHA 12/1200	1200	6.50 (165)	47.25 (1200)	1	N	7.02	208/240	26.50 (670)	56.25 (1426)	18.50 (468)	265
GHC 12/450	1200	6.50 (165)	17.75 (450)	3	N	3.12	208/240	26.50 (670)	26.75 (676)	18.50 (468)	130
GHC 12/600	1200	6.50 (165)	23.50 (600)	3	N	3.90	208/240	26.50 (670)	32.50 (826)	18.50 (468)	146
GHC 12/750	1200	6.50 (165)	29.50 (750)	3	N	4.68	208/240	26.50 (670)	38.50 (976)	18.50 (468)	179
GHC 12/900	1200	6.50 (165)	35.50 (900)	3	N	5.46	208/240	26.50 (670)	44.50 (1126)	18.50 (468)	203
GHC 12/1050	1200	6.50 (165)	41.25 (1050)	3	N	6.24	208/240	26.50 (670)	50.25 (1276)	18.50 (468)	238
GHC 12/1200	1200	6.50 (165)	47.25 (1200)	3	N	7.02	208/240	26.50 (670)	56.25 (1426)	18.50 (468)	265

✓ Specify tube OD at time of order. Specify voltage at time of order. Furnaces operate on single phase voltage.

1500°C & 1600°C Tube Furnaces

General Features

- Maximum operating temperatures of 1500ºC or 1600ºC.
- Available in heated lengths of 18" and 24" single zone.
- The 24" heated length is also available in a 3 zone design.
- Three zone tube furnaces provide a longer uniform temperature zone through elevation of end zone temperatures to compensate for normal end losses.
- Mini design offered with 7" heated length, for use with process tubes up to 2.25" OD.
- Furnaces incorporate low thermal mass ceramic fiber insulation for improved heat-up rates.
- Long-life free radiating silicon carbide heating elements provide excellent radial and linear chamber uniformity.
- Power may be easily increased to heating elements from the temperature controller to compensate for SiC element resistance change (aging). This feature assures that furnace original heat-up characteristics and maximum rated temperature is always achieved.
- Furnaces are normally mounted horizontally on a support base or cabinet.
- Furnace controls are built into the support base, providing convenient observation and access to all power and temperature controls.
- Insulating end vestibules improve chamber uniformity.
- Safety outer mesh guard provides low temperature external surface.
- All 1500º & 1600ºC tube furnaces can be provided for optional vertical operation. (See page 35)
- Vertical design is interconnected to a separate control cabinet with 6 ft. cable.
- Three zone furnaces incorporate three separate temperature controls to allow variation of setpoint temperature in each zone.
- TZF model end zone controllers may be slaved to the center zone or fully independent. (see page 37)
- Choice of 301 or programmable controls.
- See tube furnace options on pages 35-37.



STF 15/450/3216P1/OTC

STF 15/610/3216P1
with Vertical Option "L" Stand

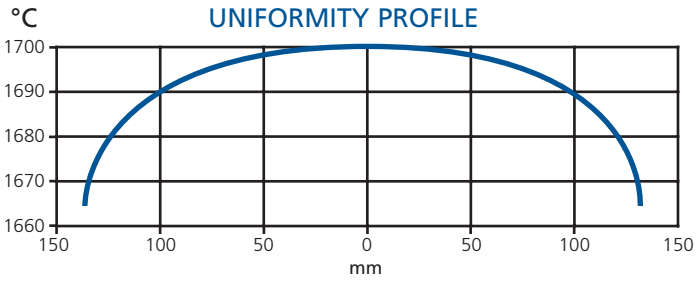
1500°C & 1600°C Single and Three Zone Tube Furnaces

Furnace Model	Max. Temp. (°C)	Maximum O.D. Tube ✓ Inches (mm)	Heated Length Inches (mm)	No. of Zones	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
STF 15/180	1500	2.25 (60)	7.00 (180)	1	R	1.5	208/240	19.75 (500)	23.75 (600)	14.75 (375)	85
♦ STF 15/450	1500	3.50 (90)	17.75 (450)	1	R	5.5	208/240	26.00 (660)	32.75 (830)	17.50 (445)	100
STF 15/610	1500	3.50 (90)	24.00 (610)	1	R	6.0	208/240	26.00 (660)	44.50 (1130)	17.50 (445)	133
STF 16/180	1600	2.25 (60)	7.00 (180)	1	R	2.5	208/240	19.75 (500)	23.75 (600)	14.75 (375)	95
STF 16/450	1600	3.50 (90)	17.75 (450)	1	R	6.0	208/240	26.00 (660)	32.75 (830)	17.50 (445)	110
STF 16/610	1600	3.50 (90)	24.00 (610)	1	R	7.0	208/240	26.00 (660)	44.50 (1130)	17.50 (445)	139
TZF 15/610	1500	3.50 (90)	24.00 (610)	3	R	8.0	208/240*	26.00 (660)	44.50 (1130)	17.50 (445)	133
TZF 16/610	1600	3.50 (90)	24.00 (610)	3	R	9.0	208/240*	26.00 (660)	44.50 (1130)	17.50 (445)	139

♦ Stock Product ✓ Specify tube OD at time of order. Specify voltage at time of order. * 3 phase electrical design.
Note: Stock furnace is provided with the 3216P1 programmable control and over-temperature protection control.

1700°C & 1800°C Horizontal Tube Furnaces

CTF 17/75/300/3216P1



CTF 17/75/300 ±5°C over 205mm
±2°C over 150mm
±1°C over 75mm

General Features

- Maximum operating temperatures of 1700°C and 1800°C.
- Use with process tubes up to 3.5" OD.
- Available in heated lengths of 12" and 24" single zone.
- The 24" heated length is also available in a 3 zone design.
- Three zone tube furnaces provide a longer uniform temperature zone through elevation of end zone temperatures to compensate for normal end losses.
- All Carbolite 1700°C and 1800°C tube furnaces are fitted with a 3216P1 programmable temperature control and a separate independent over-temperature protection control.
- Long-life free radiating molybdenum disilicide heating elements provide excellent radial and linear uniformity.
- Advanced high temperature graded insulation assembly provides improved energy efficiency and heat-up rates.
- Furnace controls are built into the furnace cabinetry, providing convenient observation and access to all power and temperature controls.
- Low outer case temperature provided through double shell construction.
- Mesh tube guards at ends of furnace prevent accidental contact with hot tube.
- Insulating end vestibules improve chamber uniformity.
- Molybdenum disilicide element resistance does not change with usage, providing no restriction on placement of a new element in circuit with older elements.
- Three zone furnaces incorporate three separate temperature controls to allow variation of setpoint temperature in each zone.
- Serviceability is aided by furnace mechanical and electrical design.
- See tube furnace options on pages 35-37.

1700° & 1800° Horizontal Single and Three Zone Tube Furnaces

Furnace Model	Max. Temp. (°C)	Maximum O.D. Tube ✓ Inches (mm)	Heated Length Inches (mm)	No of Zones	TC Type	Max. Power	Furnace Voltage (kW)	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
CTF 17/300	1700	3.50 (90)	12.00 (300)	1	B	6.0	208/240	34.50 (878)	28.50 (720)	25.00 (630)	454
CTF 17/600	1700	3.50 (90)	23.75 (600)	1	B	9.0	208/240	34.50 (878)	40.25 (1020)	25.00 (630)	565
CTF 18/300	1800	3.50 (90)	12.00 (300)	1	Pt 20% Rh/Pt 40% Rh	6.0	208/240	37.25 (943)	28.50 (720)	25.00 (630)	454
CTF 18/600	1800	3.50 (90)	23.75 (600)	1	Pt 20% Rh/Pt 40% Rh	10.0	208/240	37.25 (943)	40.25 (1020)	25.00 (630)	565
TZF 17/600	1700	3.50 (90)	23.75 (600)	3	B	9.0	208/240*	34.50 (878)	40.25 (1020)	25.00 (630)	732
TZF 18/600**	1800	3.50 (90)	23.75 (600)	3	Pt 20% Rh/Pt 40% Rh	10.0	208/240*	37.25 (943)	40.25 (1020)	25.00 (630)	732

✓ Specify tube OD at time of order.
Specify voltage at time of order.
*3 Phase electrical design.
** Retransmission of setpoint provided as standard. (See page 37)

1700°C & 1800°C Vertical Tube Furnaces

VST 17/75/250

General Features

- Maximum operating temperature of 1700°C.
- Split-hinge design provided with vertical support stand.
- Overall heated length of 10".
- Designed to accept process tubes up to 3.5" OD (90 mm).
- Six long-life molybdenum disilicide heating elements are suspended vertically around the tube to ensure excellent radial and linear uniformity.
- Carbolite VST hinged tube furnace is designed for bench mounting, and is interconnected to a separate control cabinet with 6 ft. cable.
- Provided with 3216P1 programmable temperature control and a separate independent over-temperature protection control.
- Advanced high temperature graded insulation assembly provides improved energy efficiency and heat-up rates.
- Low outer case temperature provided through double shell construction.
- Insulating end vestibules reduce heat losses and improve chamber uniformity.
- Positive break furnace safety switch isolates power to the heating elements when furnace is opened.

PVT 18/75/350/3508P1

General Features

- Maximum operating temperature of 1800°C.
- Available in heated lengths of 8" and 13.75".
- Each PVT furnace is designed to accept a different diameter process tube. Models available for 2", 3", 4" & 5" diameter tubes.
- Long-life free radiating lanthanum chromite heating elements are suspended vertically around the tube, providing excellent radial and linear uniformity.
- Carbolite PVT tube furnaces are provided with a floor standing vertical support stand, and are interconnected to a separate control cabinet with 6 ft. cable.
- Provided with 3216P1 programmable temperature control and a separate independent over-temperature protection control.
- Advanced high temperature graded insulation assembly provides improved energy efficiency.
- Insulating end vestibules reduce heat losses and improve chamber uniformity.
- Low outer case temperature provided through double shell construction.
- Lanthanum chromite heating elements give off a small amount of chromium vapor, which the work tube shields all but the most sensitive work pieces from contamination or pink coloration.

1700°C & 1800°C Vertical Tube Furnaces

Furnace Model	Max. Temp. (°C)	Maximum OD Tube ✓ Inches (mm)	Heated Length Inches (mm)	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
VST 17/250	1700	3.50 (90)	10.00 (250)	B	4.5	208/240	34.00 (865)	23.75 (600	27.75 (705)	665
PVT 18/50/200	1800	2.25 (57)	8.00 (200)	Pt 20% Rh/Pt 40% Rh	6.0	208/240	See Below	27.50 (700)	32.00 (810)	420
PVT 18/75/350	1800	3.25 (83)	13.75 (350)	Pt 20% Rh/Pt 40% Rh	8.0	208/240 *	See Below	27.50 (700)	32.00 (810)	660
PVT 18/100/350	1800	4.25 (108)	13.75 (350)	Pt 20% Rh/Pt 40% Rh	8.0	208/240 *	See Below	27.50 (700)	32.00 (810)	660
PVT 18/125/350	1800	5.25 (133)	13.75 (350)	Pt 20% Rh/Pt 40% Rh	12.0	208/240 *	See Below	27.50 (700)	32.00 (810)	660

✓ Specify tube OD at time of order. Specify voltage at time of order. * 3 Phase electrical design.
Customer must specify desired PVT furnace height when ordering (Contact Carbolite)

1200°C & 1500°C Vacuum Tube Furnaces

VZF 12/60/700

General Features

- Maximum operating temperatures of 1200ºC and 1500ºC.
- Choice of 2" or 3" ID work tubes.
- Designed to offer vacuum levels of better than $1x10^{-5}$ mbar with a clean empty worktube.
- Each vacuum tube furnace system includes a two-stage sliding vane rotary pump and a water cooled oil diffusion pump.
- Every HVT furnace incorporates Pirani and Penning gauges, roughing/backing valves, and a high vacuum baffle valve.
- All vacuum and temperature instrumentation and components, and power controls are housed in a furnace support base cabinet.
- One end of the furnace ceramic process tube is joined to the vacuum system by a stainless steel elbow.
- Access to the tube is through the opposite end which is fitted with a removable stainless steel flange.
- Radiation shields are provided for both ends of the furnace to ensure reduced temperature on the end seals, and maximum temperature uniformity with minimum loss of pumping speed.
- A number of special options are available including gas systems, automatic/semi-automatic vacuum systems, air cooled diffusion pump, and cooling water failure alarm.
- Long-life free radiating silicon carbide heating elements provide excellent chamber uniformity on 1500ºC tube furnaces.
- On 1500ºC furnaces, power may be easily increased to heating elements from the temperature controller to compensate SiC element resistance change (aging). This feature assures that furnace original heat-up characteristics and maximum rated temperature is always achieved.
- Furnaces incorporate low thermal mass ceramic fiber insulation for improved response times and thermal efficiency.
- Safety outer mesh guard surrounds furnace body to provide for low temperature external surface.
- Choice of Model 301 control or programmers.

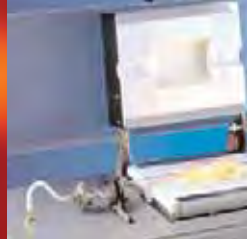
1200°C & 1500°C Vacuum Tube Furnace

Furnace Model	Max. Temp. (°C)	Work Tube Inside Diameter Inches (mm)	Heated Length Inches (mm)	No. of Zones	External Dimensions Inches (mm) Height	Length	Depth	TC Type	Max. Power (kW)	Furnace Voltage	Shipping Weight (lb.)
HVT 12/50/550	1200	2.00 (50)	21.50 (550)	1	57.00 (1450)	67.00 (1700)	24.00 (600)	N	2.0	208/240	583
HVT 12/60/700	1200	2.30 (60)	27.50 (700)	1	57.00 (1450)	67.00 (1700)	24.00 (600)	N	3.0	208/240	596
HVT 12/80/700	1200	3.00 (80)	27.50 (700)	1	57.00 (1450)	67.00 (1700)	24.00 (600)	N	3.5	208/240	596
HVT 15/50/450	1500	2.00 (50)	17.75 (450)	1	61.50 (1565)	67.00 (1700)	24.00 (600)	R	5.5	208/240	610
HVT 15/75/450	1500	3.00 (75)	17.75 (450)	1	61.50 (1565)	67.00 (1700)	24.00 (600)	R	5.5	208/240	610

Specify voltage at time of order.

Furnaces operate on single phase voltage.

1100°C Rotary Reactor Furnaces



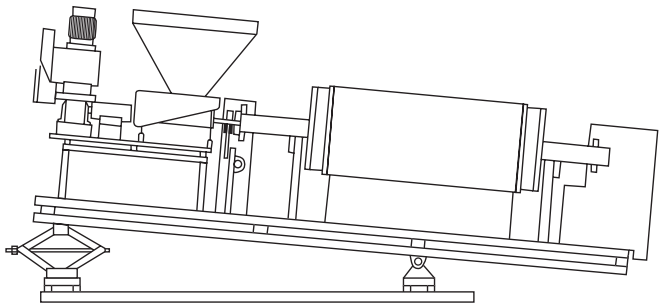
General Features

- Laboratory scale rotary batch furnace provides agitation of powdered solids under controlled atmosphere and temperature environment.
- Maximum operating temperature of 1100°C.
- Designed to simulate larger industrial rotary calcining processes in a laboratory size furnace.
- Continuous agitation of material overcomes the problems of long reaction times experienced by static processing in a box or tube furnace.
- The material is retained and heated in an enlarged vessel section of a quartz tube.
- Furnace is available in two sizes measured by the quartz vessel diameter and length. (See specification chart)
- A typical charge for the furnace would be moderately fine to course granular solids which do not contain significant quantities of dust.
- The smooth internal vessel profile allows convenient loading, emptying and cleaning with minimum powder loss.
- Hinged heated chamber design provides easy access for removal and insertion of the quartz vessel.
- A long-life resistance wire heating element is combined with low thermal mass insulation to provide an efficient uniform heated chamber.
- The quartz vessel will rotate in one direction 270°, and then reverse its rotation 270°.
- Quartz vessel rotation is variable through adjustment of panel mounted speed control.
- Quartz vessel is fluted on the internal surface to insure good mixing and uniform exposure of particles to the atmosphere.
- Furnace is provided with a nitrogen flow meter, with alternate gas and additional flowmeters available as options.
- Outlet end of quartz vessel extends into stainless steel exhaust box that is fitted with gas outlet port.
- Positive break furnace safety switch isolates power to the heating elements when the furnace is opened.
- Controls are built into furnace cabinetry, providing convenient observation and access to all power and temperature controls.
- Choice of Model 301 control or programmers.

HTR 11/75/3216P1

Rotary Tube Furnaces

Carbolite can provide continuous or batch rotary tube furnaces specifically designed to a customer's process requirement. The general design concept of such rotary tube furnaces is similar, but furnace and system specifications will vary based on process temperature, throughput, atmosphere requirements, characteristics of material, cooling requirements, etc. Please contact Carbolite to discuss your rotary tube furnace requirement.



1100°C Rotary Reactor Furnaces

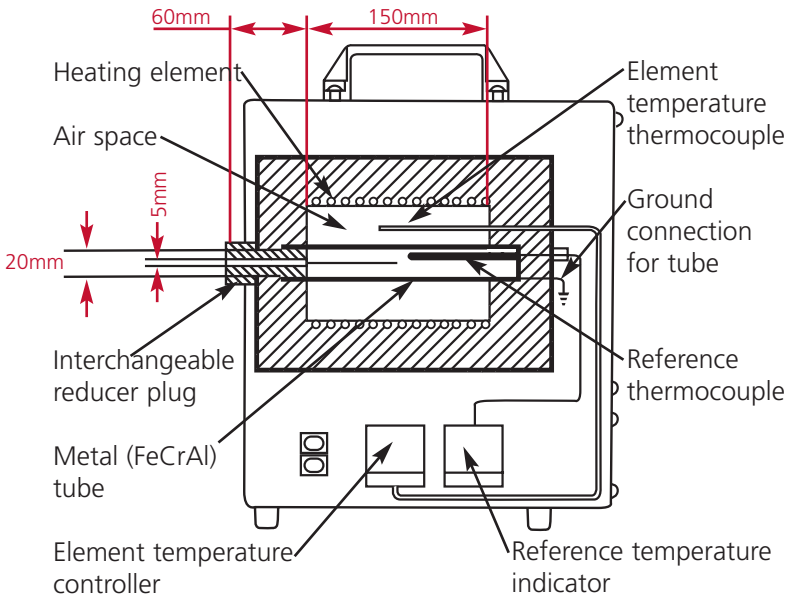
Furnace Model	Max. Temp. (°C)	Vessel Size Inches (mm) Diameter	Length	Vessel Volume* (liters)	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
HTR 11/75	1100	3.00 (75)	4.00 (100)	.06 to .08	K	1.5	208/240	19.00 (480)	45.00 (1140)	21.75 (550)	194
HTR 11/150	1100	6.00 (150)	8.00 (200)	.7 to .9	K	3.0	208/240	21.25 (540)	51.25 (1300)	27.25 (690)	296

*Specific volume may be affected by material specifications and flow characteristics.

Specify voltage at time of order.
Furnaces operate on single phase voltage.

1200°C Thermocouple Calibration Furnace

PTC 12/20/150



General Features

- A unique thermocouple calibration furnace that is intended for applications where portability is an attraction.
- Calibrate most types of thermocouples up to 1200°C (2192°F).
- Accepts thermocouples up to 7.5 mm diameter.
- The PTC 12/20/150 thermocouple calibration furnace is designed for calibration by the comparison method.
- This method compares the thermocouple under test with a reference thermocouple combined with reference temperature indicator.
- The built-in reference temperature indicator will provide temperature readout in 1° resolution.
- Thermocouples being calibrated must be connected to a customer supplied readout or the optional Carbolite Independent Temperature Readout.
- This readout temperature can be checked against the reference temperature, and any error used to correct all readings taken by the thermocouple being calibrated.
- A Carbolite calibration certificate stating temperature error between work space temperature and indicated temperature at 700°C and 1100°C is provided with furnace.
- The high conductivity of the alloy work tube assures excellent thermal uniformity within the calibration work zone.
- Furnace calibration work zone temperature is precisely controlled by PID instrument incorporating the latest temperature control technology.
- Insertion of the thermocouple to be calibrated accurately positions its tip adjacent to the reference thermocouple.
- The rapid heat-up and stabilization of PTC 12/20/150 makes it ideal for on site checking of thermocouples with minimum downtime.
- Three insulating end plugs (one each - 1.5 mm dia. hole, 3 mm dia. hole, and solid) are provided with each furnace.

1200°C Portable Thermocouple Calibration Furnace

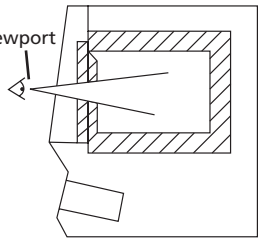
Furnace Model	Max. Temp. (°C)	Working Temperature Range	Maximum OD TC can be Calibrated	TC Type	Max. Power (kW)	Furnace Voltage	External Dimensions Inches (mm) Height	Length	Depth	Shipping Weight (lb.)
PTC 12/20/150	1200	400°C - 1200°C	7.5mm	N	1.1	120	15.75 (399)	12.25 (310)	9.00 (225)	31

Furnace Options

Box Furnace Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all box furnace options.

Access and/or Viewing Port
A 1" diameter hole is placed through the furnace door. Optionally select an open hole with a stainless steel cover disc that pivots, or a quartz window that is permanently fitted in the hole

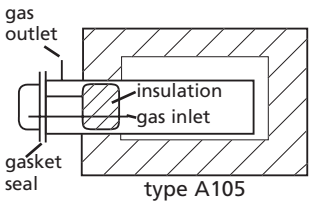


Additional Thermocouple
An additional thermocouple, similar to the control thermocouple, is built into the furnace and connected to a thermocouple socket. This TC socket is mounted in the furnace control panel. Typically used by the customer for connection to a recorder or other temperature measurement device.

Thermocouple Calibration Port
An additional thermocouple ceramic sheath is installed adjacent to the control thermocouple and accessed through the back of the furnace. Allows insertion of a customer's reference thermocouple for checking or calibration of the existing controller/thermocouple system.

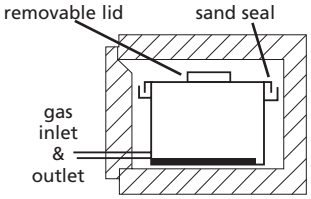
Inert Gas Inlet
A 6 mm hose connection on the rear of furnace is connected to a ceramic tube that extends into the chamber. This option is suitable only for inert gases or oxygen.
NOTE: Carbolite box furnaces are not gas tight. Gas introduction may affect the furnace heating characteristics and/or the performance of some heating elements. (Contact Carbolite with questions.)

Atmosphere Retorts (1100ºC)
Gas tight inconel enclosures designed specifically to fit in standard Carbolite box furnaces. Type A105 style retort is designed with easily removable insulated front plug door. Gas inlet and outlet pipes are accessible near front of retort. The normal furnace door mechanism is retained for use when the retort is removed.



type A105

Type A107 style retorts are similar to a pack carburizing box using a sand seal between the deep base and shallow removable lid. Gas inlet and outlet pipes extend from the front of the retort through slots in the furnace door.



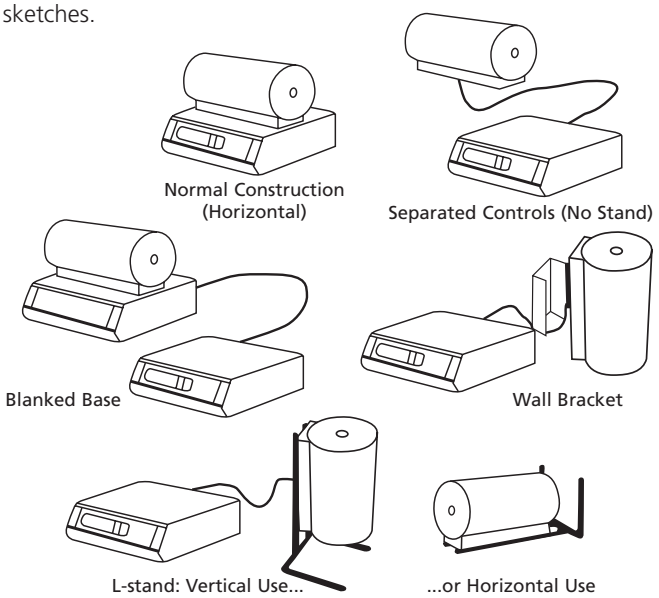
type A107

Tube Furnace Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all tube furnace options.

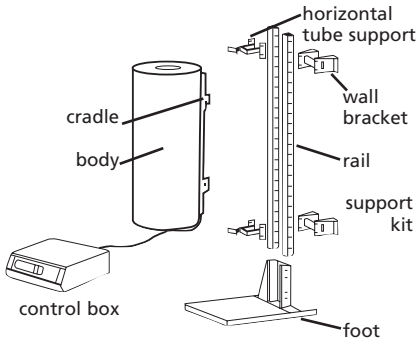
Special Size Tube Furnaces
MTF, CTF & TZF wirewound tube furnaces (pages 24 & 25), HST, HZS, VST & TVS split-hinge tube furnaces (pages 26 & 27) and GHA & GHC large bore tube furnaces (page 28) can be provided with special heated and/or zone lengths. Wirewound tube furnaces can also be provided with special diameter work tubes.

Mounting Options
Non-split tube furnaces such as the MTF, CTF and STF, and the matching TZF models are supplied as standard for horizontal use. Alternate mounting options are available as depicted in the sketches.



Split-hinge VST & TVS tube furnaces are also available with different mounting options. See page 27.

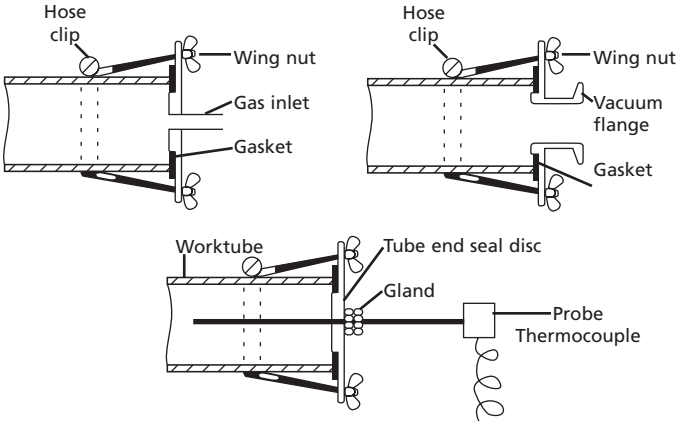
Large bore "G" style tube furnaces are normally provided for horizontal operation as shown in the photo on page 28. Alternatively, these tube furnaces can be provided for vertical operation. See adjacent sketch.



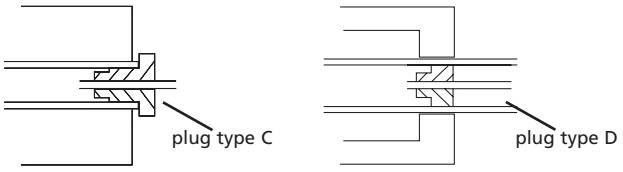
G range - versatile
No Stand: control box with body & cradle only
No Foot: everything except the foot

Furnaces Options

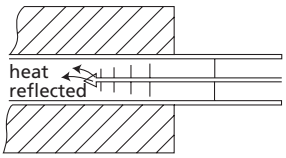
Gas Tight End Seals
Gas tight end seals provide a convenient method of sealing each end of an open end process tube. Each end seal is fitted with a 6 mm hose connection for gas inlet or outlet. Optional vacuum flanges and glands for probe thermocouples can also be installed in the end seals. Gas tight end seals are appropriate for tube diameters of 2" or larger. Standard end seals are suitable for vacuums to 10^{-3} mbar. For higher vacuums to 10^{-5} mbar, a double flange end seal design is available. (Contact Carbolite)



Insulating Plugs
Ceramic fiber insulating plugs installed near the ends of process tubes reduce heat losses and improve uniformity. Type C insulating plugs are designed for applications when processing will be done under air, and are suitable for use with tubes of 1.5" ID and larger. Type D insulating plugs are normally used in conjunction with gas tight end seals when processing is carried out under an atmosphere. Suitable for use with tubes of 2" ID and larger.



Radiation Shields
Radiation shields are typically used for applications where ceramic fiber plugs are unsuitable, e.g. where a high purity atmosphere or vacuum is required. Normally used in conjunction with gas tight end seals when processing is carried out under atmosphere. Suitable for use with tubes of 2" ID and larger. Radiation shields designed for operating temperatures up to 1200°C are fabricated of inconel, and above 1200°C, are fabricated of alumina.

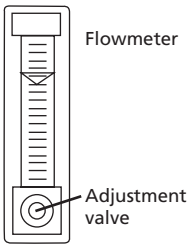


Process Tubes
Carbolite offers multiple diameters and lengths of process tubes suitable for use with Carbolite or other manufacturer tube furnaces. Mullite, high purity alumina, quartz and alloy tubes are available.

Gas Control Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all gas control options.

Gas Flowmeters
Multiple gas flowmeters with a standard scale length of 100 mm (3% accuracy) with needle valve are provided for use with gas inlets and retorts. A mounting bracket is included.



Inert Gas Inlet
See description under Box Furnace Options.

Solenoid Valves
An electric valve used to start and stop a gas flow. May be activated manually by a panel mounted switch, or automatically through a program segment output or temperature alarm relay.

Atmosphere Control System
Recommended when hydrogen gas is required for processing. Provides greater safety and convenience in control of hydrogen and nitrogen purge gas. Protects H_2 introduction at low temperatures, provides a monitored burn-off pilot flame, and senses failure of the gas supplies. Includes H_2 and N_2 flowmeters and is provided in a separate cabinet. Suitable for use with box furnace Type A105 atmosphere retorts or gas tight tubes installed in tube furnaces. Uses a pressure system. For mass flow system, please contact Carbolite.

Temperature Measurement Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all temperature measurement options.

Temperature Indicator
A digital temperature indicator is built into the furnace control panel and wired to a panel mounted thermocouple socket. Intended for use with a probe thermocouple. Also available in a separate stand alone cabinet, so it can be used as a portable temperature checker.

Chart & Data Acquisition Recorders
Carbolite can offer both Chart and Data Acquisition Recorders in single and multiple channel models. Assorted optional features are available with all recorders. The recorder is mounted in the furnace control panel when space permits, or alternatively in a separate cabinet.

Furnace Options

Thermocouple Probes
Normally used to monitor temperatures in tube furnaces. Semi-flexible metal sheathed mineral insulated Type K and Type N thermocouples are available in 24" and 39" lengths in 1.5 mm and 3.0 mm diameters. Type R, B and Pt 20% Rh/Pt 40% Rh thermocouples are available in 21", 27" and 33" lengths. Because these thermocouples are very fragile, it is recommended that the thermocouple be combined with an optional 10 mm diameter alumina protection sheath. Each probe thermocouple is fitted with 3' or 6' of compensating leadwire and plug.

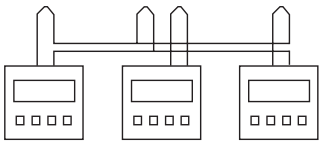
Retransmission of Setpoint
If you require programmed cooling with a 3 zone tube furnace, the Retransmission of Setpoint Option is required. This option provides control of the end controls setpoint via an analog signal transmitted from the center zone programmable controller. The standard differential thermocouple design is not suitable for programmed cooling.

Control System Options

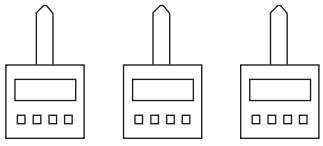
Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all control system options.

Optional Programmers
See statement at top and bottom of page 6.

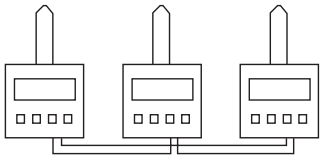
Three Zone Controls
The usual purpose of a three zone furnace and control system is to provide a longer uniform working zone within the furnace. Carbolite's standard 3 zone control system is a back-to-back thermocouple system with slave end zone controls.


back-to-back

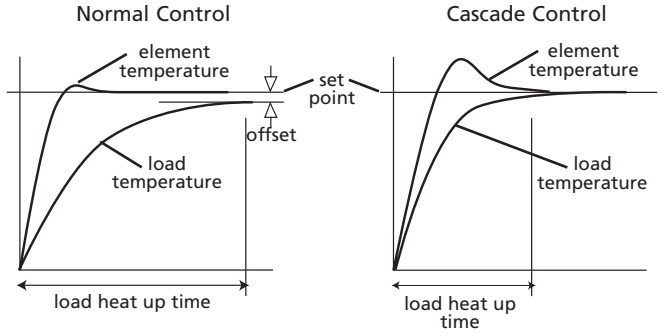
An alternate 3 zone control system is to provide three totally independent temperature controllers tied directly to individual thermocouples positioned in each zone of the furnace. This is a no charge option.


independent

When controlled programmed cooling is a critical requirement in your program, the Retransmission of Setpoint Option must be ordered. Unfortunately, a disadvantage of a programmable 3 zone system with slave end zones is its inability to effectively cool at a programmed rate.


setpoint retransmission

Cascade Control
This control system adds a second thermocouple and controller to the furnace. The additional thermocouple is placed close to the load and connected to the primary controller (load control). The other thermocouple senses the temperature near the heating elements and is connected to the second controller (element control). The Cascade Control System allows you to heat the furnace load at a faster rate and control it more precisely than the conventional one controller one thermocouple temperature control system. Cascade control is not available with the 301 controller.



Digital Communications
Optionally select RS232 or RS485 digital communications. RS232 permits a single controller to communicate with a computer. RS485 permits multiple controllers to communicate with a computer through "daisy chaining" of the instruments. Digital communications is wired to panel mounted sub-miniature "D" socket on rear of furnace.

RS232/485 converter allows connection of furnace control system with RS485 to PC fitted with RS232.

RS232 and RS485 cables are available for connection between furnace and PC, as well as cables to "daisy chain" several furnaces together when operating with a RS485 connection.

ITools Software
Carbolite offers ITools software that allows the instrument to be setup, monitored and recorded from a PC. Contact Carbolite for a complete description, as well as alternate software.

Separate Controls
Where controls are normally built in, an additional control box is supplied, and a blank panel is fitted to the furnace base. This option should be selected when you want the power and temperature controls remotely positioned from the furnace location. Applicable to box furnaces. For tube furnaces, see pages 35.

250°C & 300°C Laboratory Ovens

General Features

- Six oven chamber sizes to choose from.
- Mechanical convection and gravity convection designs.
- 250°C (482°F) and 300°C (572°F) maximum operating temperatures.
- Temperature stability of ±0.2°C.
- Chamber air circulation provides excellent temperature uniformity.
- Polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Each oven is provided with non-tilt nickel plated shelves with multi-position settings for convenient loading and unloading.
- Long-life mineral insulated metal sheathed heating elements.
- Fast heat-up and recovery rates.
- Digital temperature controller will display either setpoint or process temperatures.
- Adjustable from control panel, chamber ventilation and exhaust vent is provided in rear wall.
- Side mounted control panel avoids damage from accidental spillage.
- Efficient fibrous insulation ensures cool outer case temperatures.
- Side hinged door provides access to full width of chamber when open.

PF 30/301

- Lever action of flush fitting door latch ensures gentle closure and provides a handle when unlatched.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.
- Choice of 300, 301 or programmable controls.
- Multiple built-in options available. (See pages 50 & 51)

Mechanical Convection Laboratory Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW)	Oven Voltage	Shipping Weight (lb.)
PF 30	300	11.75 (300)	11.50 (292)	12.50 (320)	18.50 (470)	26.25 (665)	20.50 (520)	1.0	120	82
PF 60	300	15.75 (400)	15.25 (392)	16.50 (420)	22.50 (570)	30.00 (765)	24.50 (620)	1.5	120	128
PF 120	300	19.50 (500)	19.25 (492)	20.50 (520)	26.50 (670)	34.00 (865)	28.50 (720)	2.0	208/240	175
PF 200	300	29.50 (750)	23.25 (592)	20.50 (520)	36.25 (920)	38.00 (965)	28.50 (720)	2.7	208/240	227
PF 400	250	59.00 (1500)	23.75 (605)	20.00 (510)	77.50 (1970)	38.75 (980)	28.50 (720)	6.0	208/240	748
PF 800	250	59.00 (1500)	47.25 (1200)	20.00 (510)	67.75 (1720)	62.50 (1585)	39.50 (1000)	9.0	208/240	960

Ovens operate on single phase voltage.

Specify voltage at time of order.

Gravity Convection Laboratory Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW)	Oven Voltage	Shipping Weight (lb.)
PN 30	300	10.00 (250)	13.00 (330)	12.50 (320)	18.50 (470)	26.25 (665)	20.50 (520)	.75	120	82
PN 60	300	13.75 (350)	15.25 (392)	16.50 (420)	22.50 (570)	30.00 (765)	24.50 (620)	1.00	120	128
PN 120	300	17.75 (450)	19.25 (492)	20.50 (520)	26.50 (670)	34.00 (865)	28.50 (720)	1.50	120	175
PN 200	300	27.50 (700)	23.25 (592)	20.50 (520)	36.25 (920)	38.00 (965)	28.50 (720)	2.25	208/240	227

Specify voltage at time of order.

Ovens operate on single phase voltage.

250°C & 300°C Laboratory Ovens

TYPICAL OVEN APPLICATIONS

- Drying
- Baking
- Stability Testing
- Sterilizing
- Pre-Heating
- Aging
- Curing
- Incubation
- Softening
- Soldering

SEVERAL OVEN OPTIONS

- Programmable Controls
- Over-Temperature Controls
- Door Window
- Access Ports
- Timers
- Exhaust Fan
- Interior Light
- Chart Recorder

Shelving Specifications by Chamber Size

SHELVES	30	60	120	200	400	800
Number Supplied	2	2	2	2	3	3
Maximum Possible	3	5	9	15	30	30
Max. Dist. Load/Shelf (lb)	22	22	22	22	22	22
Total Max. Load (lb)	44	66	88	110	165	220

PF 400/3216P1

Oven Performance Specifications

Oven Model	Holding Power at Max. Temp. (kW)	Temperature Uniformity At Max. Temp. (%)	Temperature Stability On/Off Control (°C)	Temperature Stability PID Control (°C)	Heat-Up Time (Minutes) 100°C	Heat-Up Time (Minutes) 200°C	Heat-Up Time (Minutes) 300°C	Recovery Time (min) (Door Open 60 sec.) 100°C	Recovery Time (min) (Door Open 60 sec.) 200°C	Recovery Time (min) (Door Open 60 sec.) 300°C
PF 30	.35	+/-1.0	+/-1.0	+/-0.2	4.5	12	25	1	2.5	4
PF 60	.60	+/-1.0	+/-1.0	+/-0.2	4.5	12	25	1	2.5	4
PF 120	.80	+/-1.0	+/-1.0	+/-0.2	4.5	12	25	1	2.5	4
PF 200	1.25	+/-1.0	+/-1.0	+/-0.2	5.5	14	30	1.5	3	5
PF 400	2.20	+/- 1.7	+/- 1.0	+/- 0.2	15	40	85*	10	12	25*
PF 800	3.50	+/-1.7	+/-1.0	+/-0.2	17	45	100*	12	15	30*
PN 30	.3	+/-2.3	+/-1.5	+/-0.5	12	26	52	2.5	5	8.5
PN 60	.48	+/-2.3	+/-1.5	+/-0.5	12	26	52	2.5	5	8.5
PN 120	.48	+/-2.3	+/-1.5	+/-0.5	12	26	52	2.5	5	8.5
PN 200	1.16	+/-3.5	+/-1.5	+/-0.5	14	29	58	3	6	10

Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

*Maximum Temperature 250°C

250°C Laboratory Ovens

AX 60/TLK-R

General Features

- Three different chamber volumes to choose from.
- 250°C (482°F) maximum operating temperature.
- Precise PID digital temperature controller.
- Mechanical convection air circulation provides excellent chamber temperature uniformity.
- Polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Each oven is provided with non-tilt nickel plated shelves with multi-position settings for convenient loading and unloading.
- Long-life mineral insulated metal sheathed heating elements.
- Fast heat-up and recovery rates.
- Digital temperature controller will display either setpoint or process temperatures.
- Exhaust vent in rear wall includes adjustable vent for control of airflow.
- Side mounted control panel avoids damage from accidental spillage.
- Efficient fibrous insulation ensures cool outer case temperatures.
- Side hinged door provides access to full width of chamber when open.
- Lever action of flush fitting door latch ensures gentle closure and provides a handle when unlatched.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.

Shelving Specifications by Chamber Size			
SHELVES	30	60	120
Number Supplied	2	2	2
Maximum Possible	4	6	8
Max. Dist. Load/Shelf (lb)	22	22	22
Total Maximum Load (lb)	44	66	88

Oven Performance Specifications

Oven Model	Holding Power at Max. Temp. (kW)	Temperature Uniformity at Max. Temp. (°C)	Air Exchanges in Chamber Volume Per Hour (100°C)	Temperature Stability (°C)	Heat-Up Time (Minutes) 50°C	100°C	200°C	250°C	Recovery Time (Minutes) (Door Open 60 Seconds) 50°C	100°C	200°C	250°C
AX 30	.32	±2.4	65	±0.2	3	6	15	23	1	1	2	3
AX 60	.475	±3.4	28	±0.2	3	7	17	25	1	1	2	3
AX 120	.65	±3.9	14	±0.2	3	7	18	26	1	1.5	2.5	3

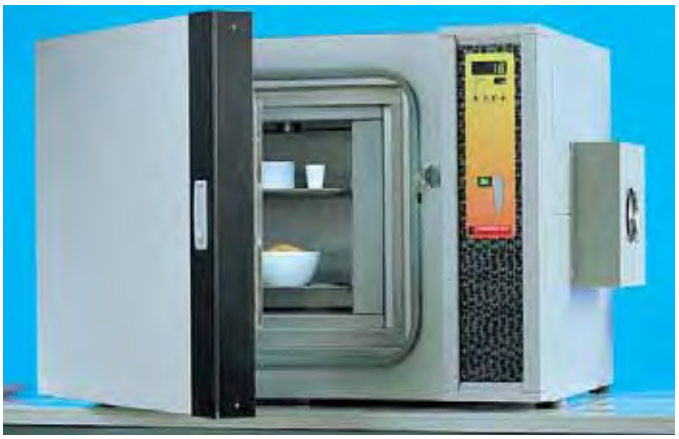
Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Mechanical Convection Laboratory Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Max. Power (kW)	Oven Voltage	Shipping Weight (lb.)
♦ AX 30	250	11.50 (295)	11.75 (300)	12.50 (320)	17.25 (440)	23.25 (590)	18.25 (465)	1.0	120	82
♦ AX 60	250	15.50 (395)	15.75 (400)	16.50 (420)	21.25 (540)	27.25 (690)	22.25 (565)	1.5	120	128
♦ AX 120	250	19.50 (495)	19.75 (500)	20.50 (520)	25.25 (640)	31.25 (790)	26.25 (665)	2.0	208/240	175

♦ Stock Product Specify voltage at time of order. Ovens operate on single phase voltage.

400°C, 500°C & 600°C High Temperature Laboratory Ovens



LHT 5/30/301

General Features

- Three oven chamber sizes to choose from.
- 400°C (752°F), 500°C (932°F) and 600°C (1112°F) maximum operating temperatures.
- Forced air convection provides excellent temperature uniformity.
- Temperature stability of ±0.2°C.
- Stainless steel inner chamber is convenient to clean and resistant to corrosion.
- Long-life mineral insulated metal sheathed heating elements.
- Each oven is provided with two perforated stainless steel shelves with multi-position settings for convenient loading and unloading.
- An adjustable 1.5" diameter chamber exhaust vent is located on top of oven.
- Side mounted control panel avoids damage from accidental spillage.
- Efficient fibrous insulation provides safe outer case temperatures.
- Side hinged door provides access to full width of chamber when open.
- Lever action of flush fitting door latch ensures gentle closure and provides a handle when unlatched.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.
- Choice of 301 or programmable controls.
- Multiple built-in options available. (See pages 50 & 51)

High Temperature Oven Performance Specifications

Oven Model	Holding Power at Max. Temp. (kW)	Temperature Uniformity at Max. Temp. (°C)	Temperature Stability PID Control (°C)	Heat-Up Time (Minutes) 400°C	500°C	600°C	Recovery Time (min) (Door Open 60 sec.) 400°C	500°C	600°C
LHT 4/30	.45	±5	±0.2	50	75	120	10	16	20
LHT 4/60	.69	±5	±0.2	50	75	120	10	16	0
LHT 4/120	1.06	±5	±0.2	50	75	120	10	16	20
LHT 5/30	.94	±5	±0.2	50	75	120	10	16	20
LHT 5/60	1.08	±5	±0.2	50	75	120	10	16	20
LHT 5/120	1.47	±5	±0.2	50	75	120	10	16	20
LHT 6/30	.98	±5	±0.2	50	75	120	10	16	20
LHT 6/60	1.13	±5	±0.2	50	75	120	10	16	20
LHT 6/120	1.53	±5	±0.2	50	75	120	10	16	20

Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

400°C, 500°C & 600°C High Temperature Laboratory Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW)	Oven Voltage	Shipping Weight (lb.)
LHT 4/30	400	11.75 (300)	11.75 (300)	12.00 (305)	22.50 (570)	32.75 (830)	24.50 (620)	1.00	120	196
LHT 4/60	400	15.75 (400)	15.75 (400)	16.00 (405)	26.50 (670)	36.75 (930)	28.50 (720)	1.50	120	256
LHT 4/120	400	25.50 (650)	19.00 (480)	16.00 (405)	36.25 (920)	40.50 (1030)	28.50 (720)	2.25	208/240	333
LHT 5/30	500	11.75 (300)	11.75 (300)	12.00 (305)	22.50 (570)	32.75 (830)	24.50 (620)	2.00	208/240	196
LHT 5/60	500	15.75 (400)	15.75 (400)	16.00 (405)	26.50 (670)	36.75 (930)	28.50 (720)	2.25	208/240	256
LHT 5/120	500	25.50 (650)	19.00 (480)	16.00 (405)	36.25 (920)	40.50 (1030)	28.50 (720)	3.00	208/240	333
LHT 6/30	600	11.75 (300)	11.75 (300)	12.00 (305)	22.50 (570)	32.75 (830)	24.50 (620)	2.00	208/240	196
LHT 6/60	600	15.75 (400)	15.75 (400)	16.00 (405)	26.50 (670)	36.75 (930)	28.50 (720)	2.25	208/240	256
LHT 6/120	600	25.50 (650)	19.00 (480)	16.00 (405)	36.25 (920)	40.50 (1030)	28.50 (720)	3.00	208/240	333

See shelving specifications on page 49.

Specify voltage at time of order.

Ovens operate on single phase voltage.

300°C Industrial Ovens

GP220A/3508P1

Shelving Specifications by Chamber Size						
SHELVES	220A	330A	450A	220B	330B	450B
Number Supplied	3	4	5	3	3	3
Maximum Possible	5	8	11	5	5	5
Max. Dist. Load/Shelf (lb)	33	33	33	33	33	44
Total Maximum Load (lb)	99	132	165	99	99	132

General Features

- Three different chamber volumes to choose from.
- 300°C (572°F) maximum operating temperature.
- Select from either vertical (A Series) or horizontal (B Series) design format.
- Vertical designs have controls positioned on top with single left side-hinged door.
- Horizontal designs have double side-hinged doors and controls positioned on side.
- Powerful fan and air guide system provides excellent temperature uniformity throughout the work chamber.
- Polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Long-life high efficiency mineral insulated metal sheathed heating elements.
- Oven chamber incorporates adjustable ventilation and exhaust vent.
- Oven door is fitted with resilient woven glass fiber seal.
- Positive latch door closure provides effective thermal seal of chamber.
- Choice of 301 or programmable controls.
- Extensive range of options and customization available. (See pages 50 & 51)

"A" Series provided with nickel plated wire shelving.
"B" Series provided with perforated stainless steel shelves.

General Purpose Industrial Oven Performance Specifications

Oven Model	Temperature Uniformity (°C)	Temperature Stability (°C)	Heat-Up Time Amb. to 300°C (Minutes)	Recovery Time (Minutes) Door Open 60 Seconds 100°C	200°C	300°C	Air Exchanges Per Hour (Vents Open)
GP220A	±5	±0.5	75	12	18	24	160
GP330A	±5	±0.5	80	13	20	28	110
GP450A	±5	±0.5	75	14	21	30	80
GP220B	±5	±0.5	75	12	18	24	160
GP330B	±5	±0.5	80	15	24	30	110
GP450B	±5	±0.5	75	17	24	35	80

Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

300°C General Purpose Industrial Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Max. Power (kW)	Oven Voltage	Shipping (lb.)
GP220A *	300	24.00 (610)	24.00 (610)	24.00 (610)	49.00 (1240)	34.00 (862)	33.50 (850)	3.00	208/240	527
GP330A *	300	36.00 (915)	24.00 (610)	24.00 (610)	61.00 (1545)	34.00 (862)	33.50 (850)	4.50	208/240	573
GP450A *	300	48.00 (1220)	24.00 (610)	24.00 (610)	73.00 (1850)	34.00 (862)	33.50 (850)	6.00	208/240	600
GP220B *	300	24.00 (610)	24.00 (610)	24.00 (610)	36.00 (910)	47.00 (1190)	33.50 (850)	3.00	208/240	527
GP330B	300	24.00 (610)	36.00 (915)	24.00 (610)	36.00 (910)	59.00 (1495)	33.50 (850)	4.50	208/240	573
GP450B	300	24.00 (610)	48.00 (1220)	24.00 (610)	36.00 (910)	71.00 (1800)	33.50 (850)	6.00	208/240	600

* Has single side hinged door. Specify voltage at time of order. Ovens operate on single phase voltage.

400°C, 500°C & 600°C High Temperature Industrial Ovens

General Features

- Three chamber sizes to choose from.
- 400ºC (752ºF), 500ºC (932ºF) and 600ºC (1112ºF) maximum operating temperatures.
- Powerful fan and air guide system provides excellent temperature uniformity throughout the work chamber.
- Temperature Stability: Better than ±0.5ºC.
- Stainless steel inner chamber is convenient to clean and resistant to corrosion.
- Long-life mineral insulated metal sheathed heating elements.
- Each oven is provided with perforated stainless steel shelves for convenient loading and unloading. See specification chart.
- An adjustable 1.5" diameter chamber exhaust vent is located on top of oven.
- Efficient fibrous insulation provides safe outer case temperatures.
- Side hinged door provides access to full width of chamber when open.
- Positive latch door closure provides effective thermal seal of chamber.
- Choice of 301 or programmable controls
- Multiple built-in options available. (See pages 50 & 51)

HT 5/220/3216P1/OTC

High Temperature Industrial Oven Performance Specifications

Oven Model	Temperature Uniformity (°C)	Temperature Stability (°C)	Heat-Up Time Amb. to Max. Temp. (Minutes)
HT 4/28	±5	±0.5	50
HT 4/95	±5	±0.5	60
HT 4/220	±5	±0.5	60
HT 5/28	±5	±0.5	60
HT 5/95	±5	±0.5	60
HT 5/220	±5	±0.5	60
HT 6/28	±5	±0.5	75
HT 6/95	±5	±0.5	75
HT 6/220	±5	±0.5	90

Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Shelving Specifications by Chamber Size

SHELVES	28	95	220
Number Supplied	2	3	3
Maximum Possible	2	5	5
Max. Dist. Load/Shelf (lb)	22	33	55
Total Maximum Load (lb)	44	66	110

400°C, 500°C & 600°C High Temperature Industrial Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW)	Oven Voltage	Shipping Weight (lb.)
HT 4/28	400	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	1.00	120/208/240	197
HT 4/95	400	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	2.00	208/240	400
HT 4/220	400	24.00 (610	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	3.00	208/240	587
HT 5/28	500	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	2.00	208/240	197
HT 5/95	500	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	3.00	208/240	400
HT 5/220	500	24.00 (610)	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	4.50	208/240	587
HT 6/28	600	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	2.00	208/240	197
HT 6/95	600	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	4.50	208/240	400
HT 6/220	600	24.00 (610)	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	6.00	208/240	587

Specify voltage at time of order.

Ovens operate on single phase voltage.

250°C Clean Room Ovens

CR70/301 and CR 30/301

Carbolite clean room ovens are designed for use in a Class 100 environment. They are not fitted with internal filters to provide a Class 100 environment inside the oven when not used in a clean room area.

General Features

- Seven chamber sizes to choose from.
- 250°C (482°F) maximum operating temperature.
- Designed for use in Class 100 clean room.
- Temperature Stability: Better than ±0.5°C.
- Fully welded polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Each oven is provided with non-tilt nickel plated shelves with multi-position settings for convenient loading and unloading.
- Powerful fan and air guide system provides temperature uniformity of better than ±5°C throughout the working area of chamber.*
- Superior oven insulation design provides excellent thermal efficiency.
- Long-life high efficiency mineral insulated metal sheathed heating elements.
- Chamber ventilation and exhaust vent is located on top of chamber.
- Compression fittings effectively seal the fan shaft, heating element and thermocouple where they enter the oven chamber.
- Positive latch door closure combined with silicon rubber door seal assures effective seal of chamber.
- Oven insulation is appropriately sealed to prevent contamination of the oven chamber or work area.
- Choice of 301 or programmable controls
- Multiple built-in options available. (See pages 50 & 51)

250°C Clean Room Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Number of Shelves	Max. Power (kW)	Oven Voltage	Shipping Weight (lb.)
CR 30	250	12.25 (310)	12.25 (310)	12.25 (310)	25.75 (655)	18.00 (460)	24.50 (625)	2	1.00	120/208/240	137
CR 70	250	12.25 (310)	18.50 (470)	18.50 (470)	25.75 (655)	24.50 (620)	31.25 (790)	2	1.50	120/208/240	205
CR 130	250	21.50 (550)	18.50 (470)	18.50 (470)	35.25 (895)	24.50 (620)	31.25 (790)	3	2.00	208/240	300
CR 180	250	30.25 (770)	18.50 (470)	18.50 (470)	44.00 (1115)	24.50 (620)	31.25 (790)	3	2.25	208/240	309
CR 220	250	24.00 (610)	24.00 (610)	24.00 (610)	44.50 (1130)	30.75 (780)	33.50 (850)	3	3.00	208/240	441
CR 330	250	36.00 (915)	24.00 (610)	24.00 (610)	56.75 (1440)	30.75 (780)	33.50 (850)	4	4.50	208/240	574
CR 450	250	48.00 (1220)	24.00 (610)	24.00 (610)	69.00 (1750)	30.75 (780)	33.50 (850)	5	6.00	208/240	708

Contact Carbolite for larger size clean room ovens. Specify voltage at time of order. Ovens operate on single phase voltage.
*Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

400°C, 500°C & 600°C High Temperature Clean Room Ovens

General Features

- Three chamber sizes to choose from.
- 400°C (752°F), 500°C (932°F) and 600°C (1112°F) maximum operating temperatures.
- Designed for use in Class 100 clean room.
- Temperature Stability: Better than ±0.5°C.
- Fully welded stainless steel inner chamber is easy to clean and resistant to corrosion.
- Each oven is provided with perforated stainless steel shelves for convenient loading and unloading. See specification chart.
- Powerful fan and air guide system provides better than ±5°C uniformity throughout the working area of chamber.*
- Long-life high efficiency mineral insulated metal sheathed heating elements.
- Chamber ventilation and exhaust vent is located on top of chamber.
- Superior oven insulation design provides excellent thermal efficiency and safe outer case temperatures.
- Compression fittings effectively seal the fan shaft, heating element and thermocouple where they enter the oven chamber.
- Positive latch door closure provides effective thermal seal of chamber.
- Oven insulation is appropriately sealed to prevent contamination of the oven chamber or work area.
- Choice of 301 or programmable controls
- Multiple built-in options available. (See pages 50 & 51)

HTCR 6/28/3508P1/OTC

Carbolite clean room ovens are designed for use in a Class 100 environment. They are not fitted with internal filters to provide a Class 100 environment inside the oven when not used in a clean room area.

Shelving Specifications by Chamber Size			
SHELVES	28	95	220
Number Supplied	2	3	3
Maximum Possible	2	5	5
Max. Dist. Load/Shelf (lb)	22	33	55
Total Maximum Load (lb)	44	66	110

400°C, 500°C & 600°C High Temperature Clean Room Ovens

Oven Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW)	Oven Voltage	Shipping Weight (lb.)
HTCR 4/28	400	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	1.00	120/208/240	197
HTCR 4/95	400	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	2.00	208/240	400
HTCR 4/220	400	24.00 (610)	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	3.00	208/240	587
HTCR 5/28	500	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	2.00	208/240	197
HTCR 5/95	500	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	3.00	208/240	400
HTCR 5/220	500	24.00 (610)	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	4.50	208/240	587
HTCR 6/28	600	12.00 (305)	12.00 (305)	12.00 (305)	31.75 (805)	22.00 (560)	32.00 (810)	2.00	208/240	197
HTCR 6/95	600	18.00 (455)	18.00 (455)	18.00 (455)	37.75 (960)	32.00 (810)	39.75 (1010)	4.50	208/240	400
HTCR 6/220	600	24.00 (610)	24.00 (610)	24.00 (610)	43.50 (1105)	38.00 (965)	45.00 (1145)	6.00	208/240	587

Contact Carbolite for larger size clean room ovens. Specify voltage at time of order. Ovens operate on single phase voltage.
*Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Laboratory Incubators

PIN 30/301

General Features

- Six incubator chamber sizes to choose from.
- Mechanical convection and gravity convection designs.
- Ideal for laboratory applications requiring dry heat incubation from ambient +10°C to 80°C temperature range.
- Tempered glass inner door allows samples to be viewed without disturbing the chamber environment.
- Temperature stability of ±0.2°C.
- Chamber air circulation provides ±1.0°C temperature uniformity.*
- Polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Each incubator is supplied with non-tilt nickel plated shelves with multi-position height settings for convenient loading and unloading.
- Precise digital temperature controller will display either set point or process temperatures.
- Fast heat-up and recovery rates.
- Long-life mineral insulated metal sheathed heating elements.
- Adjustable from control panel, chamber ventilation and exhaust vent is provided in rear wall.
- Side mounted control panel avoids damage from accidental spillage.
- Efficient fibrous insulation ensures cool outer case temperatures.
- Side hinged door provides access to full width of chamber when open.
- Lever action of flush fitting door latch ensures gentle closure and provides a handle when unlatched.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.
- Choice of 300, 301 or programmable controls.
- Multiple built-in options available. (See pages 50 & 51)

Mechanical Convection Laboratory Incubators

Incubator Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (Watts)	Incubator Voltage	Shipping Weight (lb.)
PIF 30	80	11.75 (300)	11.50 (292)	12.50 (320)	18.50 (470)	26.25 (665)	20.50 (520)	250	120	86
PIF 60	80	15.75 (400)	15.25 (392)	16.50 (420)	22.50 (570)	30.00 (765)	24.50 (620)	700	120	135
PIF 120	80	19.50 (500)	19.25 (492)	20.50 (520)	26.50 (670)	34.00 (865)	28.50 (720)	700	120	183
PIF 200	80	29.50 (750)	23.25 (592)	20.50 (520)	36.25 (920)	38.00 (965)	28.50 (720)	1000	120	245
PIF 400	80	59.00 (1500)	23.75 (605)	20.00 (510)	77.50 (1970)	38.75 (980)	28.50 (720)	2000	208/240	748
PIF 800	80	59.00 (1500)	47.25 (1200)	20.00 (510)	67.75 (1720)	62.50 (1585)	39.50 (1000)	4000	208/240	975

Specify voltage at time of order.

Incubators operate on single phase voltage.

Gravity Convection Laboratory Incubators

Incubator Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (Watts)	Incubator Voltage	Shipping Weight (lb.)
PIN 30	80	10.00 (255)	13.00 (330)	12.50 (320)	18.50 (470)	26.25 (665)	20.50 (520)	250	120	86
PIN 60	80	13.75 (350)	15.25 (392)	16.50 (420)	22.50 (570)	30.00 (765)	24.50 (620)	550	120	135
PIN 120	80	17.75 (450)	19.25 (492)	20.50 (520)	26.50 (670)	34.00 (865)	28.50 (720)	700	120	183
PIN 200	80	27.50 (700)	23.25 (592)	20.50 (520)	36.25 (920)	38.00 (965)	28.50 (720)	1000	120	245

Incubators operate on single phase voltage.

Laboratory Incubators

INCUBATOR APPLICATIONS

- Bacterial Research
- Curing
- Hermatological Testing
- Enzyme Digestion Studies
- Coliform Determinations
- Crystallization Studies
- Tissue Culturing
- Histochemical Procedures
- Dry and Staining Procedures
- Microbiological Determinations

PIN 30/301

Shelving Specifications by Chamber Size						
SHELVES	30	60	120	200	400	800
Number Supplied	2	2	2	2	3	3
Maximum Possible	3	5	9	15	30	30
Max. Dist. Load/Shelf (lb)	22	22	22	22	22	22
Total Maximum Load (lb)	44	66	88	110	165	220

Incubator Performance Specifications

Incubator Model	Holding Power at Max. Temp. (Watts)	Temperature Uniformity at Max. Temp. (%)	Temperature Stability On/Off Control (°C)	Temperature Stability PID Control (°C)	Heat-Up Time (Minutes) 37°C	60°C	80°C	Recovery Time (Minutes) (Door Open 60 sec.) 37°C	60°C	80°C
PIF 30	115	±1.5	±1.0	±0.2	2.5	8.5	16.5	1.0	2.0	3.5
PIF 60	150	±1.5	±1.0	±0.2	3.0	7.0	12.0	0.5	1.0	1.5
PIF 120	200	±1.5	±1.0	±0.2	3.0	8.5	15.5	1.0	1.5	2.5
PIF 200	300	±1.5	±1.0	±0.2	4.0	12.0	23.0	1.5	3.0	5.0
PIF 400	530	±2.0	±1.0	±0.2	15.0	40.0	85.0	10.0	12.0	25.0
PIF 800	840	±2.0	±1.0	±0.2	17.0	45.0	100.0	12.0	15.0	30.0
PIN 30	70	±3.5	±2.0	±0.5	6.5	12.5	18.0	0.5	1.0	1.5
PIN 60	95	±3.5	±2.0	±0.5	6.5	12.5	18.0	1.0	2.5	3.0
PIN 120	140	±3.5	±2.0	±0.5	6.5	12.5	18.0	2.0	3.5	4.5
PIN 200	250	±3.5	±2.0	±0.5	8.0	16.0	25.0	2.5	4.0	6.0

* Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Cooled Incubators

PIC 30/3216P1

General Features

- Four chamber sizes to choose from.
- Designed for applications that require process temperatures below ambient. The incubator is cooled by a hermetically sealed refrigeration system.
- Temperature operating Range: 0ºC to 60ºC.
- Tempered glass inner door allows samples to be viewed without disturbing the chamber environment.
- Temperature stability of ±0.25ºC.
- Polished stainless steel inner chamber is easy to clean and resistant to corrosion.
- Powerful fan and air guide system provide temperature uniformity of ±1.0ºC at 37ºC.*
- Stainless steel chamber is fully externally welded to prevent moisture from entering the insulation cavity.
- Each incubator is supplied with non-tilt nickel plated wire shelves with multi-position settings for convenient loading and unloading.
- Precise digital temperature controls offered in single setpoint or programmable instruments.
- Long-life mineral insulated metal sheathed heating elements.
- Incubator insulation design provides excellent thermal efficiency.
- Adjustable from control panel, chamber ventilation and exhaust vent is provided in rear.
- Side mounted control panel avoids damage from accidental spillage.
- Side hinged door provides access to full width of chamber when open.
- Lever action of flush fitting door latch ensures gentle closure and provides a handle when unlatched.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.
- Multiple built-in options available. (See pages 50 & 51)

Cooled Incubators

Incubator Model	Max. Temp. (°C)	Min. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (Watts)	Incubator Voltage	Shipping Weight (lb.)
PIC 30	60	0	11.75 (300)	11.50 (292)	12.50 (320)	30.25 (770)	26.25 (665)	20.50 (520)	250	120	122
PIC 60	60	0	15.75 (400)	15.25 (392)	16.50 (420)	34.25 (870)	30.00 (765)	24.50 (620)	700	120	196
PIC 120	60	0	19.50 (500)	19.25 (492)	20.50 (520)	38.25 (970)	34.00 (865)	28.50 (720)	700	120	247
PIC 200	60	0	29.50 (750)	23.25 (592)	20.50 (520)	48.00 (1220)	38.00 (965)	28.50 (720)	1000	120	320

* Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Gas Cooled Chambers

General Features

- Normal working temperature range from -60°C to 200°C.
- Four chamber sizes to choose from.
- Use with liquid carbon dioxide or liquid nitrogen cooling agents.
- Liquid carbon dioxide allows cooling down to -60°C and liquid nitrogen to -150°C.
- Forced air convection provides excellent temperature uniformity.
- Temperature Stability: Better than ±0.5°C.
- Fast heat-up and cool-down rates.
- Long-life mineral insulated metal sheathed heating elements.
- Stainless steel inner chamber is convenient to clean and resistant to corrosion.
- Efficient fibrous insulation assures excellent thermal seal of chamber.
- Standard instrumentation is 3216P1 programmable temperature controller.
- Cool channel of temperature controller switches the cooling agent injection solenoid valve.
- Each gas cooled chamber is provided with perforated stainless steel shelves for convenient loading and unloading. See specification chart.
- Side mounted control panel avoids damage from accidental spills.
- Positive latch door closure provides effective seal of chamber.
- Long-life mechanical design is also aesthetically attractive in today's modern laboratory.

GCC 60/3216P1

Shelving Specifications by Chamber Size				
SHELVES	30	60	120	200
Number Supplied	2	2	2	2
Maximum Possible	3	4	5	5
Max. Dist. Load/Shelf (lb)	22	22	22	33
Total Maximum Load (lb)	44	66	88	99

Gas Cooled Chamber Performance Specifications

Gas Cooled Chamber Model	Temperature Uniformity (°C)	Temperature Stability (°C)	Minimum Temperature Liquid Carbon Dioxide	Minimum Temperature Liquid Nitrogen	Heat-Up Time Amb. to 200°C (Min.)	Cool-Down Time Amb. to -60°C (Min.)
GCC 30	±5	±0.5	-60°C	-150°C	26	12
GCC 60	±5	±0.5	-60°C	-150°C	26	12
GCC 120	±5	±0.5	-60°C	-150°C	26	12
GCC 200	±5	±0.5	-60°C	-150°C	26	12

Temperature uniformity is not based on full chamber dimensions. Contact Carbolite for details.

Gas Cooled Chambers

Gas Cooled Chamber Model	Max. Temp. (°C)	Internal Chamber Dimensions Inches (mm) Height	Width	Depth	External Dimensions Inches (mm) Height	Width	Depth	Maximum Power (kW) 200°	300°	Operating Voltages	Shipping Weight (lb.)
GCC 30	200	12.25 (310)	11.75 (300)	13.00 (330)	22.50 (570)	30.25 (765)	30.50 (770)	.75	1.0	120/208/240	205
GCC 60	200	16.00 (410)	15.75 (400)	15.00 (380)	26.50 (670)	34.00 (865)	34.25 (870)	1.00	1.5	120/208/240	252
GCC 120	200	26.00 (660)	19.75 (500)	15.00 (380)	36.25 (920)	38.00 (965)	34.25 (870)	1.50	2.0	120/208/240	309
GCC 200	200	24.00 (610)	24.00 (610)	24.00 (610)	33.00 (840)	45.00 (1140)	33.50 (850)	2.25	3.0	208/240	375

Optional 300°C maximum operating temperature is available.
Optional -150°C liquid nitrogen cooling available.

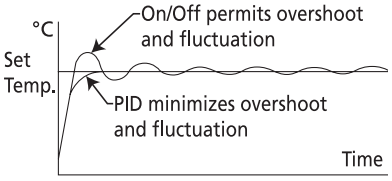
Gas cooled chambers operate on single phase voltage.
Specify voltage at time of order.

Oven and Incubator Options

Control System Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all control system options.

Temperature Controllers
Carbolite offers two basic single set-point temperature controls. The Model 301 is a PID digital temperature control and the Model 300 is an On/Off digital temperature control. See page 6 for more information. The Model 300 on/off temperature controller is only recommended for heating applications when precise temperature control is not critical. (Example: Drying Applications)



Optional Programmers
See statement at the top and bottom of page 6.

Cascade Control
See description on page 37.

Inputs and Outputs
Carbolite can provide instrumentation outputs such as Temperature Alarm Relay Output, Program Segment Output, and DC Retransmission of Process Variable or Setpoint, as well as DC Remote Setpoint Input. Contact Carbolite with specific questions and/or requirements.

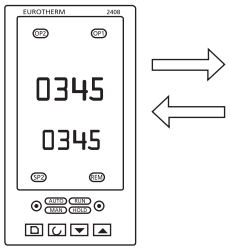
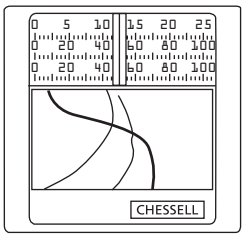
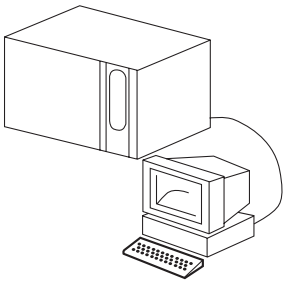


Chart & Data Acquisition Recorders
See description on page 36.

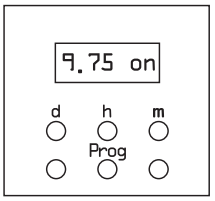


Digital Communications
See description on page 37.

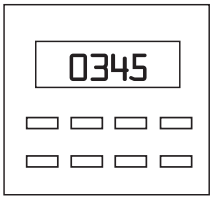


Software
See description on page 37.

Timers
Carbolite offers a number of different analog and digital timers that may be configured to start or stop the oven operation, create a timed delay at the start or end of process, triggered by an alarm contact in the oven controller, initiate an audible alarm, and set in functions of minutes, hours, days and weeks.



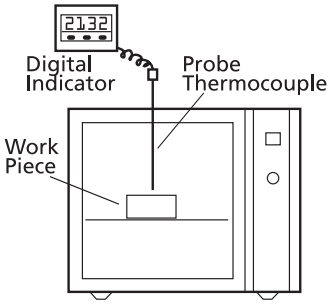
A defrost timer may be ordered with Cooled Incubators. The timer switches off the refrigeration unit once every 24 hours to allow automatic defrosting.



Temperature Measurement Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all temperature measurement options.

Temperature Indicator
See description on page 36.



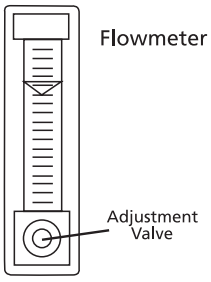
Additional Thermocouple
See description on page 35.

Thermocouple Probes
See description on page 37.

Gas & Air Flow Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all gas and air flow options.

Gas Flowmeters
See description on page 36.



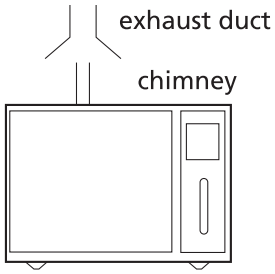
Oven and Incubator Options

Gas & Air Flow Options (Continued)

Solenoid Valves
See statement at bottom of page 36.

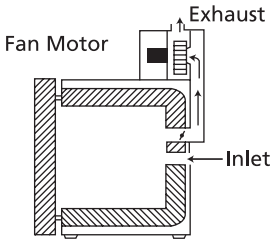
Inert Gas Inlet
See description on page 35.

Chimney
An extended 6" high chimney allows for indirect connection to customer's exhaust ductwork. Not applicable to all models.

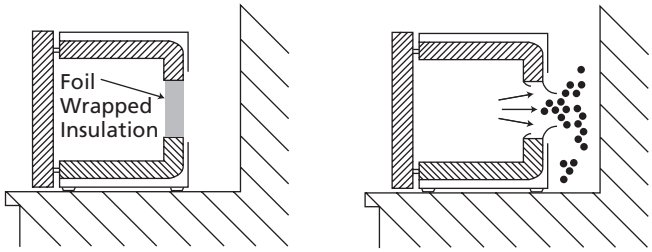


Fan Switch
An air recirculating fan in an oven chamber normally runs all the time that the oven is operating. This option allows manual switching on and off of the fan while the heating elements remain on. Please discuss with Carbolite before ordering this option.

Air Exhaust Fan
An air exhaust fan is an extra fan and air duct that is installed externally on top of the oven, and draws air from the oven exhaust vent. This option is usually specified when air (process exhaust) inside the oven has to be vented to a laboratory extraction system or to the outside of a room or building.



Stoving and Curing Option
When curing a product, stoving paint, etc. the fumes created may be dangerous to health or possibly explosive, therefore they have to be continually removed from the oven. This option includes a sealed chamber, exhaust fan and air switch, and an explosion relief panel. Please contact Carbolite before ordering this option.



Moisture Extraction Option
The moisture extraction option is required if the load placed in the oven has a high water/liquid content. Oven modifications include a sealed chamber and an extraction fan.

Assorted Options

Contact Carbolite regarding application questions, and for detailed descriptions, specifications, and pricing of all assorted options.

Door Switch
A door switch cuts off power to the heating elements when the door is opened. This option would prevent temperature overshoot in incubators.

Locking Handle
A keyed locking handle that allows locking of the oven door.

Cable Ports
Cable Ports allow cables, pipes or tubing to be easily passed into the oven chamber. Cable ports can be installed through any oven wall in which it does not interfere with internal components. The left hand side is commonly specified, but customer should advise desired location. Standard cable port sizes are 1/4", 1.5" and 2.0" diameter. Larger sizes are provided with swivel covers.

Viewing Window
Viewing windows may be installed in the majority of Carbolite oven models. The viewing window is installed in the oven door. Standard size viewing windows are 6" x 6" and 12" x 12".

Variable Speed Fan
The variable speed fan option allows one to vary the operating speed of the air recirculating fan. This option may be desirable if the load consisted of light powder or a material that could be disturbed by the normal air movement created by the air recirculating fan.

Interior Light
An interior light is a standard option available with many Carbolite oven and incubator products. This option is frequently combined with the viewing window option when it is necessary to visually inspect the load during the heating process.

Furnace, Oven & Incubator Ordering Information

Product Information

Requests for additional product information and/or Descriptive Technical Quotations on any Carbolite product should be made directly to Carbolite, or an Authorized Carbolite Distributor.

Ordering Information

Always specify the furnace, oven or incubator model, including controller number and electrical supply specifications.

Examples: CWF 12/13/3216P1/240V/60 Hz Single Phase
LHT 5/60/301/208V/60 Hz Single Phase

If you have questions on the furnace, oven or incubator selection or identification procedures, please contact Carbolite.

Options: Always provide the furnace, oven or incubator model number, a complete description, including the controller or other component the option will be used with.
Examples: To order End Seals, provide all tube dimensions (ID, OD & L) and the furnace model in which the tube will be used. To order an oven Cable Port, specify the size and location where it should be placed. If you have questions on option selection, please contact Carbolite.

Spare Parts: It is recommended that routine spare parts be kept on hand to reduce down-time in the event of failure. Carbolite would be pleased to recommend spares to purchase at the time the furnace, oven or incubator is ordered. When ordering spare parts for an existing furnace, oven or incubator, always specify the complete furnace, oven or incubator model number and serial number. This information is provided on the data plate and in the instruction booklet.

Prices: Contact Carbolite or an Authorized Distributor for the current price of Carbolite Furnaces, Ovens, Incubators, Options, and Spare Parts.

Electrical Supply Information

Standard Voltages: All furnace, oven and incubator products are offered for operation on 208V or 240V single phase. Selected models are designed for operation on 208V or 240V 3 phase delta. Low wattage furnaces and many oven and incubator products may be ordered for 120V operation. Other voltages may incur extra charge. If you have questions, please contact Carbolite.

Ground (Earth): All models require a proper ground (earth) connection for operator safety and correct operation of the controllers.

Voltage and Frequency Tolerance: While models will accept some tolerance on the supply, many are adjusted to give optimum performance at a specific voltage. Please always state the expected operating voltage as closely as possible. Also state the frequency (50 Hz. or 60 Hz.) the furnace, oven or incubator will operate on.

Single Phase Supplies: Furnaces, ovens or incubators designed for operation on a 208V or 240V single phase line are suitable for operation on Live to Neutral or Live to Live supplies. Please state single phase and the voltage. If your supply is Live to Live taken from two phases of a three phase supply, please describe the supply as single phase.

Three Phase Supplies: A furnace or oven made for three phase operation will only be usable on the type of supply for which it was ordered. Some models, normally supplied for single phase operation, may be optionally selected to run on a three phase supply. Contact Carbolite for specific models.

Supply Cables and Fuses: Supply cables (line cords) are fitted to single phase furnaces, ovens and incubators up to 16 amps rating. Supply cables are not fitted to single phase furnaces, ovens or incubators over 16 amps, or to three phase products, except on special order. Internal supply-rated fuses will be installed in furnaces, ovens and incubators only when a supply cable is also provided.

General Information

Design and Specifications: All Carbolite products carry a CE Mark, indicating compliance with all appropriate CE standards. Due to improvements in design and/or performance, some items may differ slightly from the specifications provided in this catalog.

Repair Inquiries: Please contact Carbolite's Customer Service Department regarding all product repair questions.

O.E.M. Sales: Quotations for specialized or custom designed products are available through our O.E.M. Sales Department.