FB-16

ASHING & BURN-OFF *furnaces*

complete temperature CONTROL

FOR
ASHING, BURN OFF,
CALCINATION AND
LOSS ON IGNITION

MAXIMUM
TEMPERATURE OF
1200°C

CONFORMING TO
INTERNATIONAL
STANDARDS

COMPREHENSIVE
SAFETY FEATURES

NUMEROUS
OPTIONS

CHOICE OF
CONTROL SYSTEMS

CARBOLITE®

OAF 11/1/808P

applications

Burn off, Ashing, Loss on Ignition and Calcining are different names for the process of heating materials in air to leave only the non-combustible material.

Our BWF models are designed for burn off which is a cleaning process where a large airflow is the most important requirement, for example, removing wax from ceramic moulds before filling with molten metal.

Ashing, loss on ignition and calcining are analytical techniques where the samples are usually carefully weighed before and after heating. Whilst a large airflow is required, the air velocity is limited to ensure that fine powders are not disturbed.

Our OAF models provide excellent temperature uniformity and are designed to ensure that where several samples are heated simultaneously, all samples achieve the same temperature.

The most precise analysis techniques may be sensitive to Alumina or Silica ($A1_2O_3$ or SiO_2), in which case it is desirable to minimise the risk of dust from the chamber roof falling into the samples. For these applications we recommend our GSM model which has a Silica (fused Quartz) muffle including the back wall of the chamber. The GSM may also be offered for applications where the Silica muffle gives superior resistance to corrosive vapours.

outstanding features

*D*igital temperature control

Allows push button setting with 1°C resolution and day to day repeatability

*S*tylish and sturdy

The case is constructed from zinc coated steel and finished in a hard wearing two-tone stoved epoxy/polyester powder coating

*P*ositive break safety switch

Isolates the chamber from all power lines when the door is opened

*C*onvection cooling

An air gap between the insulation and the outer case promotes convected air flow for a cool outer case

*C*alibration

Access is provided to insert a calibrated thermocouple beside the control thermocouple inside the chamber

*C*hamber exhaust vent

Promotes the extraction of fumes generated by the process

*S*olid state control

Zero voltage power switching and rapid cycle time for smooth and reliable control

*D*oor action

A vertical counterbalanced door mechanism keeps the hot door insulation away from the operator when the door is opened

*S*ervice

Is aided by diagnostic warning lights, a removable front instrument panel, and easy access to the heating elements and thermocouple

*O*ptions

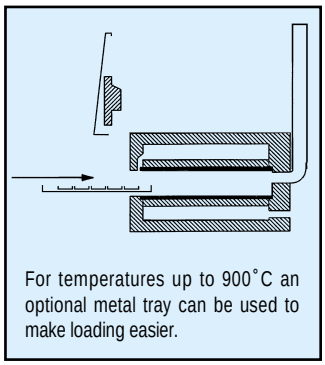
- Viewing port (glazed or unglazed)
- Load thermocouple port
- Temperature indicators
- Digital communications
- Overtemperature protection
- Calibration Certificates
- Gas inlets
- Flowmeters
- Tables
- Process Timers

OAF furnaces

Whilst the OAF furnaces - with a maximum operating temperature of 1100˚C - were originally designed for coal testing, they are now in use all around the world for ashing applications as diverse as food and plastics.

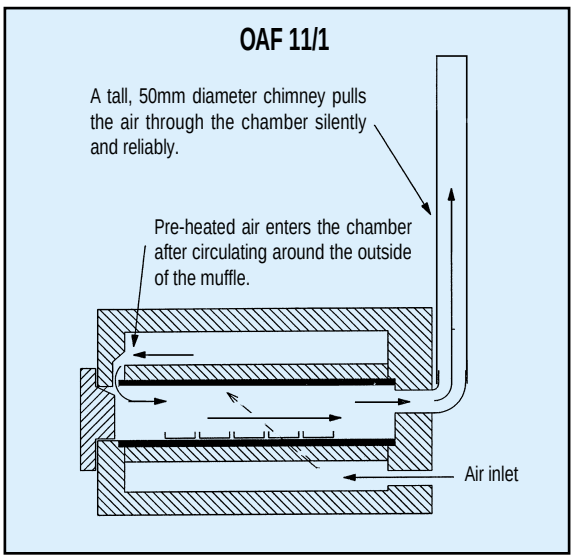
The OAF 11/1 has a large floor area which allows many samples to be accommodated and because of the low chamber height the airflow is held close over the samples to promote burning. The muffle element is extremely durable, giving good resistance to abrasion and in many cases resistance to vapour attack.

Good airflow is ensured by natural convection through the tall chimney. This gives 4-5 air changes per minute which is sufficient for fast ashing, but will not disturb the samples in the crucibles. The inlet air is preheated before it enters the chamber ensuring that the crucibles near the inlet are not chilled.



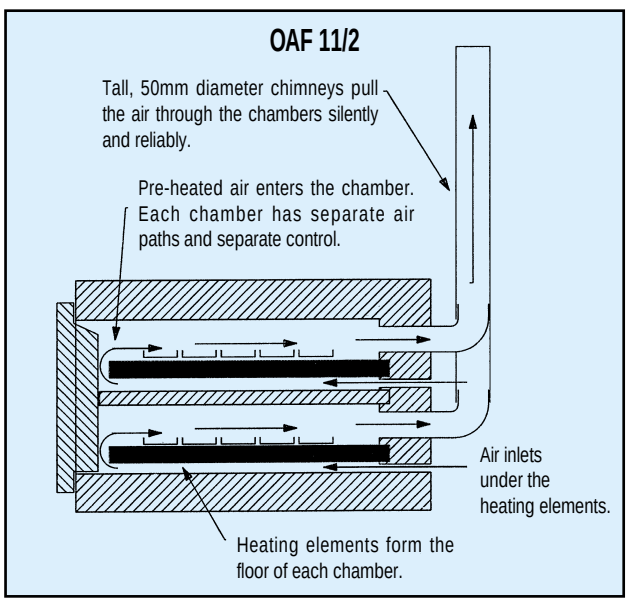
For temperatures up to 900˚C an optional metal tray can be used to make loading easier.

OAF 11/2 /808P



The OAF 11/2 provides twice the capacity of the OAF 11/1, but occupies only the same bench space. The furnace has two separate chambers one above the other and both chambers have their own airflow path and temperature controller. The lower chamber controller is normally configured to copy the temperature in the upper chamber. This means that adjustment to the set temperature of the upper chamber also affects the lower chamber and a time/temperature programmer fitted to the upper chamber will effectively control both chambers.

Both OAF furnaces comply with the following Industry Standards: BS 1016 pt 4, ISO 344 and 1171, ASTM D2361, D2795 and D3174.

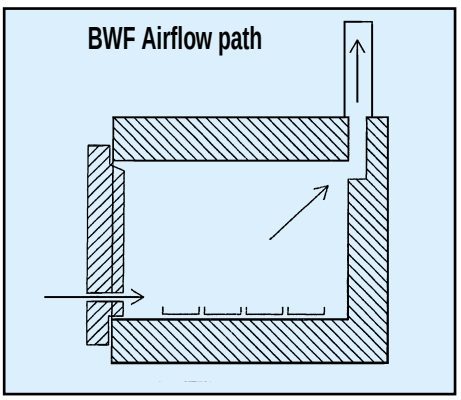


BWF furnaces

These models are heated by free radiating coiled wire heating elements housed in a high quality alumina based hard wearing element carrier. With the use of graded winding, the elements compensate for heat loss and optimise temperature uniformity within the chamber. The elements are located in the sides only and so are protected from contamination by accidental spillage. Hard wearing refractories around the chamber entrance and in the chamber base provide excellent resistance to everyday wear and tear. Airflow is provided by a tall chimney and air inlet holes in the door.

The BWF is often used for cleaning processes such as removing wax from ceramic moulds before being filled with molten metal.

The BWF furnaces are offered at 1100˚C and 1200˚C with a 13 litre capacity.



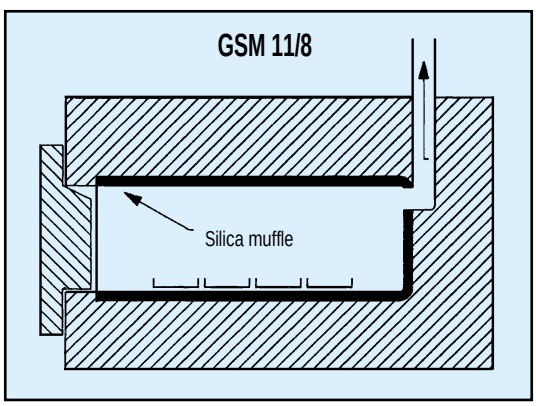
BWF 12/13/91

complete temperature **CONTROL**

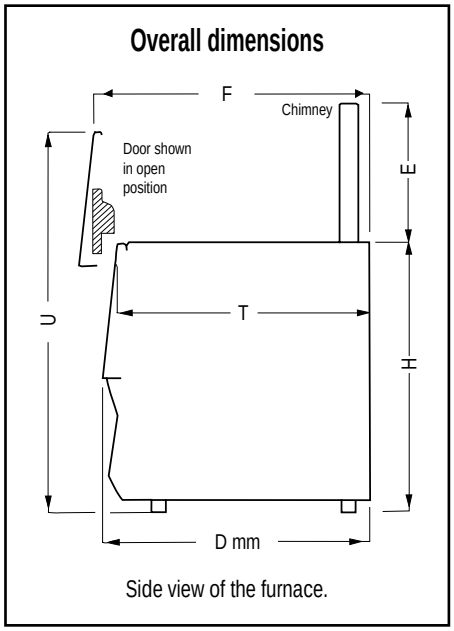
GSM furnaces

The most precise analysis techniques may be sensitive to Alumina or Silica dust ($A1_2O_3$ or SiO_2) and therefore the use of a Silica (fused Quartz) muffle minimises the risk of dust from the chamber roof falling into the samples. However, the door insulation is moulded ceramic fibre which may produce small dust particles and therefore dust cannot be entirely excluded.

The GSM - with a maximum operating temperature of 1100˚C - may also be offered for applications where the Silica (fused Quartz) muffle, with its integral back wall, gives superior containment of corrosive vapours - keeping them away from the heating element wire which is wound around the outside of the muffle. Alternatively, if an optional gas inlet into the muffle is specified, this design minimises gas leakages from the chamber.



product data



Model:		OAF 11/1	OAF 11/2	BWF 11/13	BWF 12/13	GSM 11/8
Max. Temp (˚C)		1100˚C	1100˚C	1100˚C	1200˚C	1100˚C
Internal Dimensions	(H)	90	2 x 60	200	200	120
(mm)	(W)	170	2 x 190	200	200	175
	(D)	455	2 x 400	325	325	345
External Dimensions	(H)	705	705	655	655	705
(mm) See diagram	(W)	505	505	435	435	505
	(D)	725	725	610	610	725
	(U)	1000	1000	905	905	1000
	(F)	760	760	685	685	760
	(E)	365	310	145	145	45
Max. Power (W)		3900	4500	3100	3100	3000
Holding Power (W)		1700	2400	1500	1700	1200
Nominal Heat Up TIme[4] (mins)		110*	130	60	70	90
Uniform Envelope[2] (mm)	(H)	55	40	120*	120*	85*
(at 800˚C±10˚C)	(W)	130	170	120*	120*	135*
	(D)	260	115	185*	185*	280*
Temperature Sensor		K	K	K	R	K
Net Weight (kg)		65	74	47	47	59
Electrical Supply Options		1 phase 2 phase	1 phase 2 phase	1 phase	1 phase	1 phase

1 phase = 220/240V 50/60Hz
2 phase permits connection to 380/415V 50/60Hz 3 phase and neutral supply. (One phase is not used.)
(*) - Estimated Performance. Please ask for confirmation if critical to your application.
([2]) - Uniformity graphs available on request. Based on 240v supply.
([4]) - To 100˚C below maximum temperature with empty chamber.

fume extraction

The 50mm diameter chimneys for these furnaces should not be sealed into an extraction system as this would produce an excessive airflow through the chamber. The chimney should discharge 10mm below a 100mm diameter opening into the extraction system so that it discharges at ambient pressure and the fumes are cooled by mixing with room temperature air.

chemical attack

Although these furnaces all have good ventilation which quickly removes any potentially corrosive vapours from the chamber, they may sometimes be damaged by chemical attack as a result of corrosive atmospheres generated by the process. The furnaces with muffle heating elements (GSM 11/8 and OAF 11/1) are considered the most resistant, but if you are uncertain please discuss your application with us.

Furnaces are mostly made from oxides of aluminium and silicon ($A1_2O_3$ and SiO_2). Even the wire heating elements have a protective alumina surface coating. These oxides can be chemically attacked by some materials. The most common ones are:

Low melting point metal oxides: Lead (Pb), Sodium (Na), Potassium (K); fluxes used in melting such as Lithium (Li) and Borax (B_2O_3); and case hardening salts eg Potassium Cyanide (KCN).

Sulphur (S) and its compounds.

Halogens: Chlorine (Cl), Fluorine (F) and Iodine (I)

Water (H_2O) vapour can cause problems where it condenses and its presence accelerates chemical attack by the materials listed above.

cleaning

Furnaces used for burning tend to accumulate soot (Carbon C) inside the chamber, in the chimney and in between the layers of insulation. We recommend cleaning the furnace each week by operating at 1000˚C for 30 minutes; this will burn away the soot.

temperature control systems

A choice of control systems is available including controllers which simply heat up the furnace and hold at one temperature indefinitely and more complex programming systems. Access to parameters is simple and easy to understand and is customised to present only those parameters which need to be viewed or adjusted.

Carbolite 201 Controllers

The 201 is a three term PID microprocessor controller with the facility of an adjustable single ramp rate to set point, either up or down. It is a high precision instrument exclusive to Carbolite and is jointly designed by Eurotherm and ourselves. This partnership allows us to offer a high performance controller with minimal overshoot at an economical cost.
The measured temperature is provided by large LED's located behind a wipe clean membrane panel. The setpoint is displayed and adjusted by pressing either the raise or lower button.

Eurotherm 2416 CC

The Eurotherm 2416 CC is an advanced setpoint programming temperature controller with eight segments, any of which can be a ramp, step or dwell. It is housed in a compact 1/16 din size measuring 48 x 48mm.
It provides precise control with the advanced PID control algorithm giving stable 'straight-line' control of the process. Power feedback is used to stabilise the output power and hence the controlled temperature against supply voltage fluctuations. The controller continually corrects for drift and this gives high stability and rapid response to process changes.

Eurotherm 2408 CP

The Eurotherm 2408 CP contains the same features as the 2416 CC, but with 16 segments and is housed in a 1/8 din size measuring 48 x 96mm high. The larger case allows for more options including storage of up to 20 separate programmes.

Overtemperature Protection

An independent overtemperature protection system may be justifiable to protect expensive heating elements or valuable furnace contents. Where the Carbolite 201 controller is the main controller, an overtemperature protection facility is integrated into the same display panel and incorporates an independent power supply and control circuit. When required with other main controllers, a separate Eurotherm 2132 digital controller is fitted. This unit is housed in a compact 1/32 din size measuring 24 x 48mm wide. The additional control unit uses a separate thermocouple and operates a contactor to shut down the furnace in the event of the set temperature being exceeded.

Communications Software

IPSC communicates with one programmer at a time and allows data logging. It also shows a graph of furnace temperature and set point on the computer screen and allows storage of programs on disc, and easy editing and error free downloading to the furnace programmer.

Other Options Additional control systems can be supplied and they include cascade control, multi-segment programmers and process timers. The Carbolite 201 controller is also available with an integral process timer. When the working setpoint is reached, a timed period starts and can either end with an audible alarm or to switch off the power at the end of the time period.

Standard Electrical Supply

When ordering, always quote the model, controller and the preferred type of electrical supply from the list. Please indicate the frequency (50 or 60 Hertz) and number of phases. For 3-phase supplies (where applicable), please state whether a neutral is available (if so, please quote both the phase-to-phase and the phase-to-neutral voltages, eg 380.220V). Typical single phase voltages are 100, 110, 200, 208, 220, 240 and 254V. 3-phase voltages **without** neutral are typically 220, 380, 415 and 440V. 3-phase voltages **with** neutral are typically 220/127, 380/220, 415/240 and 440/254.

Note

As a result of continuous product development, we reserve the right to change specifications and illustrations. In the unlikely event of one of our standard products not meeting your requirements, we have the capability to design and manufacture a unit specifically tailored to meet your needs.
Carbolite manufactures in compliance with the relevant safety standards to BS EN 61010-1: 1993 & 61010-2-010: 1995. All products carry the CE mark which indicates compliance with all relevant European safety directives; ie Low Voltage Directive and ElectroMagnetic Compatibility directive.

CE

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