CARBOLITE®
a VERDER company

HTF - WYSOKOTEMPERATUROWY, LABORATORYJNY PIEC KOMOROWY

Seria pieców komorowych Carbolite HTF została zaprojektowana z myślą o precyzji i wydajności, oferując temperatury do 1800°C. Piece te są idealne do różnych procesów, w tym spiekania, wyżarzania, kalcynacji i innych obróbek termicznych. Każde urządzenie z serii HTF jest zbudowane z wysokiej jakości materiałów i wykorzystuje zaawansowaną technologię termiczną, aby zapewnić równomierny rozkład ciepła, optymalną kontrolę temperatury i długotrwałą wydajność.

Whether you're involved in research and development, quality control, or production in sectors such as ceramics, metallurgy, electronics, or materials science, the HTF chamber furnace range is designed to meet your specific requirements. With a focus on user-friendly operation, safety, and efficiency, these furnaces are equipped with intuitive controls, robust safety features, and energy-saving capabilities.

PRZEGLĄD

Maksymalna temperatura
1700, 1800°C

Control thermocouple
Type B

Configuration
Bench mounted : 4, 5, 8 & 10 litre
Floor standing : 27, 64,128, 165 litre

Furnace useable volume
1700°C: 5, 10, 27, 64,128,165 litre
1800°C: 4, 8, 27, 64,128, 165 litre

HTF - WYSOKOTEMPERATUROWY, LABORATORYJNY PIEC KOMOROWY

LEADING HEAT TECHNOLOGY

Carbolite's HTF furnace range is at the pinnacle of furnace design. The culmination of over 80 years of experience in thermal engineering; combining the latest technological developments with solid construction and high-quality components.

Kliknij by obejrzeć film

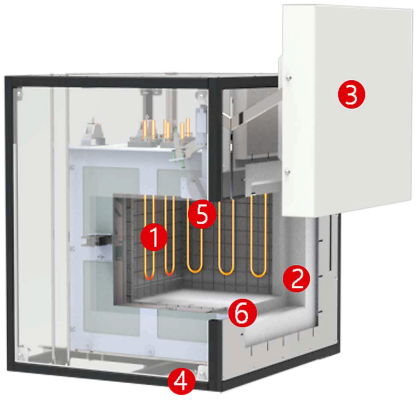
HEATING ELEMENT:

- Excellent temperature uniformity
- Fast heat-up and cool-down rates
- Unsurpassed temperature uniformity

HIGH QUALITY THERMAL INSULATION

- Low energy consumption
- Low external case temperature
- Designed for longevity

INSIDE HTF CHAMBER FURNACES



View inside the 1700 °C and 1800 °C HTF chamber furnace:

1. Heating elements (MoSi2)
2. Ceramic fibre insulation
3. Front door
4. Supporting frame
5. Thermocouple
6. Usable space

MoSi2U-shaped heating elements are installed in a vertical, hanging position within the HTF. The heat is insulated using ceramic fiber boards,

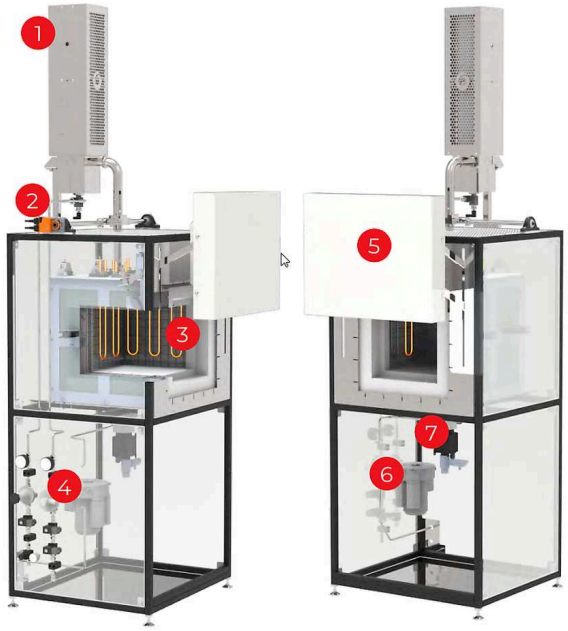
layered with an appropriate thickness to enhance temperature uniformity. The maximum temperature of these boards is chosen based on the furnace's maximum temperature requirements. Water cooling is unnecessary due to the low thermal conductivity of the insulation material. The system is externally cooled by ambient air convection within the outer case.

MoSi2 heating elements are ideal for high-temperature processes, as they naturally form a protective oxide layer at elevated temperatures. The HTF chamber furnace is distinguished by its exceptional temperature uniformity and compact design.

HTF PART IDENTIFICATION

OPTIONAL DEBINDING AND SINTERING WITH PRE-HEATED AIR FLOW AND GAS FLAME AFTER BURNER

1. Gas fired afterburner
2. Motorised damper
3. Molybdenum disilicide elements
4. Gas controls
5. Automatic door
6. Side channel blower
7. Air preheater



HTF CHAMBER FURNECES

FEATURES & OPTIONS

The HTF high temperature furnace range comprises 1700 °C and 1800 °C models.

The four smaller models are bench mounted and the larger units are floor-standing. These furnaces may be customised in order to satisfy specific customer requirements, e. g. the addition of debinding options for ceramic binder burn-off applications.

STANDARD FEATURES:

- 1700°C & 1800°C maximum operating temperature
- From 4 to 165 litre capacities
- High quality molybdenum disilicide heating elements
- Vertical lift door keeps heated surface away from the user
- Manual door operation on the 4 to 10 litre models
- Electrical door actuation on the 27 to 165 litre models
- Advanced refractory interior, used in combination with energy efficient low thermal mass insulation
- Programmable EPC3016P1 controller
- Over-temperature protection
- Ethernet communications
- Fan cooling for low external case temperature
- Motorised exhaust vent

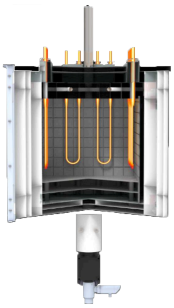
OPTIONS:

- A range of sophisticated digital controllers, multisegment programmers and data loggers with digital communication options is available - more information about controllers
- Inert gas inlet
- 100mm flowmeter for inert gas
- Solenoid valve with manual switch
- Solenoid valve with automatic switch
- Fast cooling comprising an air blower and utilising the standard motorised exhaust vent
- Debinding and sintering with pre-heated air flow
- Debinding and sintering with pre-heated air flow and gas flame after burner
- Sheathed thermocouple calibration port
- Unsheathed thermocouple calibration port through back wall of chamber (Ø 12 mm)
- Unsheathed thermocouple calibration port through centre of door (Ø 12 mm)

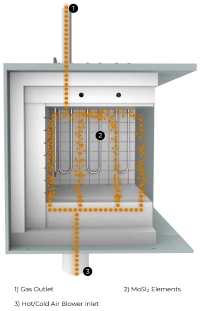
DEBINDING & SINTERING

Carbolite HTF furnaces may be equipped with debinding and sintering options to accommodate a range of technical ceramic applications A thermally induced decomposition and evaporation of the binder occurs due to gas flow through the HTF furnace during the debinding phase. The gas flow guides vapours to leave the sample.

The sintering of oxide ceramics in an HTF 1700°C or 1800°C furnace is a critical process in materials engineering, essential for achieving optimal mechanical and structural properties in ceramic components. This high-temperature sintering, particularly relevant for materials like alumina and zirconia, optimizes microstructural characteristics, enhancing performance in demanding applications.



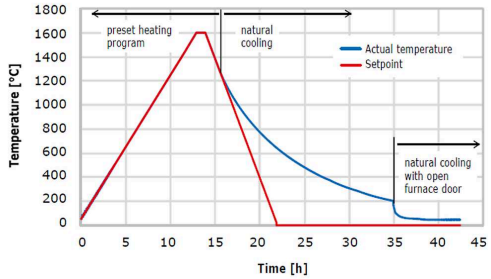
High quality MoSi2 heating elements and preheated air inlet.



Optimised pre-heated air flow for efficient binder removal.

For safe combustion of binder gases an active propane gas afterburner can be provided.

SINTER RUN IN HTF 18/64



Disclaimer: The information presented shows typical performance. Furnace load ~ 8kg.

Loading: The ceramic is placed on a sintering tray in the HTF furnace, using a tray that withstands high temperatures without reacting with the ceramic.

Ramp-Up: The furnace's temperature is methodically increased to 1800°C, with a controlled profile to prevent thermal shock and ensure even heating, possibly pausing at certain temperatures for stress relief.

Soak: At 1800°C, the ceramic undergoes a critical soak, allowing particles to merge through diffusion, enhancing density and growth.

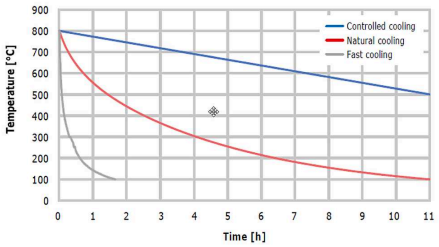
Cool Down: Following the soak, the furnace cools to room temperature at a rate that prevents thermal stress, avoiding cracks or deformation in the ceramic.

COOLING OPTIONS

The cool down phase in sintering oxide ceramics, is crucial for maintaining structural integrity and achieving desired properties. By utilising the HTF furnace's pre-heated air inlet blower options the user gains flexibility for their sintering processes. This feature allows precise control of cooling from sintering temperatures (1700 or 1800°C) to room temperature, preventing thermal gradients and associated stresses that could damage the ceramic.

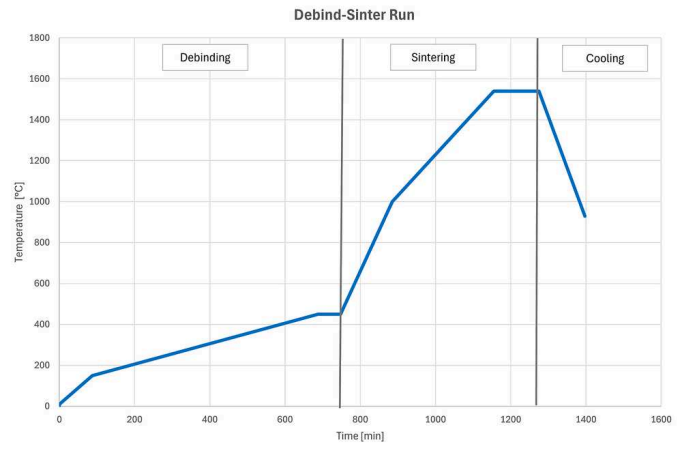
For complex shapes or materials prone to thermal shock, step cooling can be used. With the HTF furnace step cooling can be optimised to minimize thermal stress risks by holding at intermediate temperatures to equalize internal and external temperatures. The HTF furnace can be used to tailor the cool down to each ceramic's needs ensures high-quality components with optimal properties.

COOL DOWN RATES FOR HTF 17/ 430



USUWANIE LEPISZCZA I SPIEKANIE PRZY UŻYCIU HTF

During the heat treatment process, the 3D-printed components were treated in the same furnace. The X-shaped sample experienced a weight loss of approximately 6.5%, while the rectangular-shaped sample showed a weight loss of about 11.1%.



TEMPERATURE UNIFORMITY

The HTF furnaces ensures exceptional temperature uniformity with its advanced design, high-quality elements, and superior thermal insulation for minimal heat loss and even heat distribution.

Advantages of investing in a Carbolite furnace:

- Efficient removal of binder due to a high airflow
- Great temperature uniformity at low temperatures due to the air pre-heater
- Safe handling of binder by using the thermal afterburner
- Unique uniformity at high temperatures due to an optimized heating element arrangement
- Air blowers can be used for fast cooling to minimize run times

CC-T1 kontroler z ekranem dotykowym

HTF - WYSOKOTEMPERATUROWY,
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KONTROLA TEMPERATURY I KOMUNIKACJA

HTF furnaces are equipped with ethernet communications and a programmable controller with 24 segments as standard: :

- Single zone furnaces fitted with Carbolite EPC3016P1 controller
- Over-temperature protection to protect valuable contents and for unattended operation

OPCJE:

- A range of sophisticated digital controllers, multi-segment programmers and data loggers is available.

	HTF 17/5	HTF 17/10	HTF 18/4
Maksymalna temperatura (°C)	1700	1700	1800
Czas nagrzewania do temperatury maksymalnej	50	44	65
Wymiary: Wewnętrzne: Wys. x Szer. x Głęb.	158 x 150 x 225	232 x 200 x 225	140 x 140 x 190
Wymiary: Zewnętrzne Wys. x Szer. x Głęb. (z otwartymi drzwiami)	565 x 830 x 650 (850)	565 x 830 x 650 (850)	565 x 830 x 650 (850)
Konfiguracja	Do umiejscowienia na stole	Do umiejscowienia na stole	Do umiejscowienia na stole
Pojemność (litry)	5	10	4
Moc maksymalna (W)	4050	5920	4650
Digital Ethernet Comms	Standard	Standard	Standard
Termopara typu	B	B	Pt20%Rh/Pt40%Rh
Waga (kg)	109	133	115

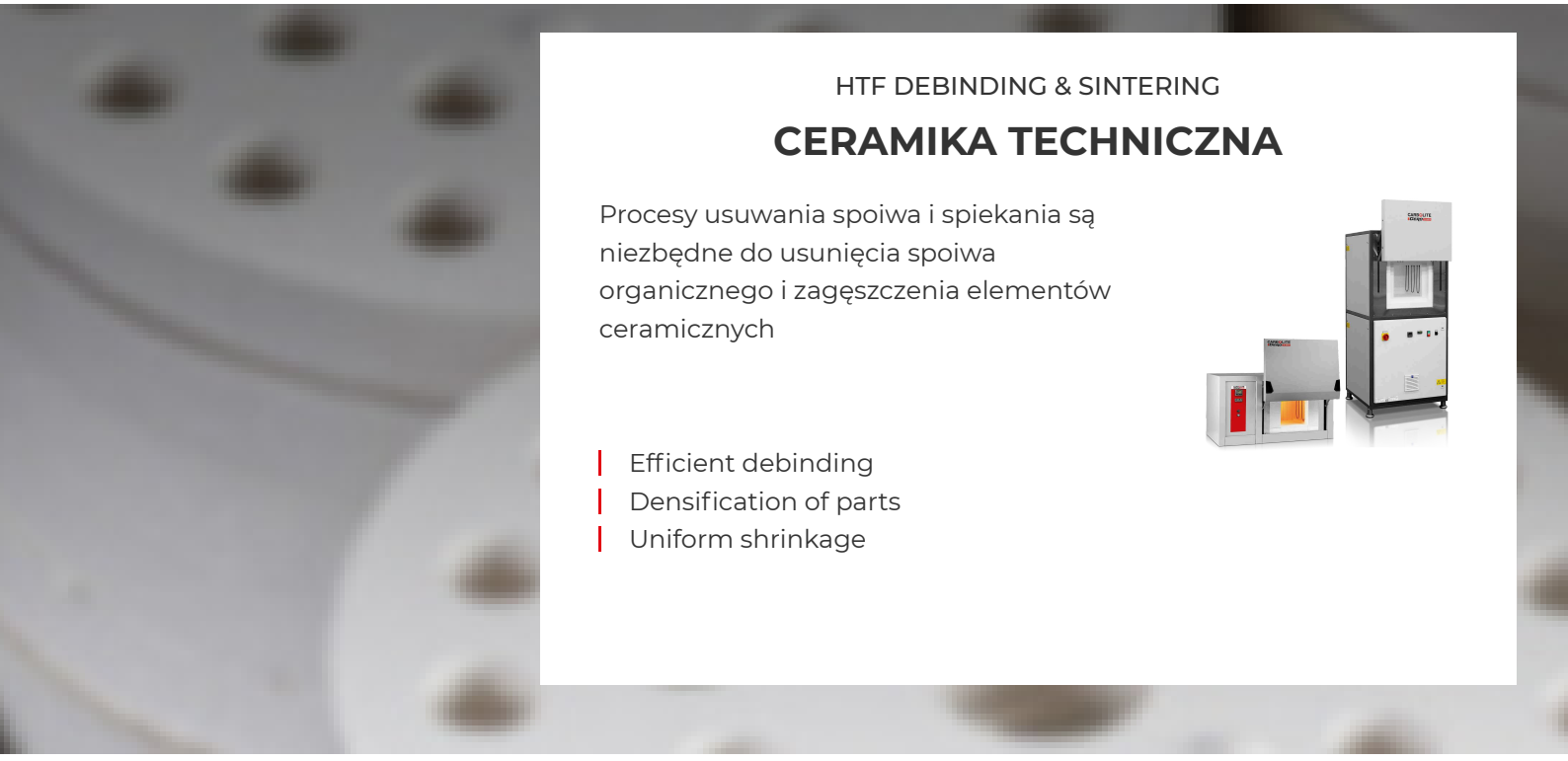
	HTF 18/8	HTF 17/27	HTF 17/64
Maksymalna temperatura (°C)	1800	1700	1700
Czas nagrzewania do temperatury maksymalnej	56	--	--
Wymiary: Wewnętrzne: Wys. x Szer. x Głęb.	210 x 190 x 190	300 x 300 x 300	400 x 400 x 400
Wymiary: Zewnętrzne Wys. x Szer. x Głęb. (z otwartymi drzwiami)	565 x 830 x 650 (850)	1835 x 900x 1000 (1950)	2530 x 1150 x 1490
Konfiguracja	Do umiejscowienia na stole	Floor standing	Floor standing
Pojemność (litry)	8	27	64
Moc maksymalna (W)	6200	10000	16000
Digital Ethernet Comms	Standard	Standard	Standard
Termopara typu	Pt20%Rh/Pt40%Rh	B	B
Waga (kg)	128	355	555

	HTF 18/27	HTF 18/64	HTF _/128
Maksymalna temperatura (°C)	1800	1800	1700,1800
Czas nagrzewania do temperatury maksymalnej	--	--	--
Wymiary: Wewnętrzne: Wys. x Szer. x Głęb.	300 x 300 x 300	400 x 400 x 400	400 x 400 x 800
Wymiary: Zewnętrzne Wys. x Szer. x Głęb. (z otwartymi drzwiami)	1835 x 900x 1000 (1950)	2530 x 1150 x 1490	2000 x 1000 x 1500
Konfiguracja	Floor standing	Floor standing	Floor standing
Pojemność (litry)	27	64	128
Moc maksymalna (W)	10000	16000	40000
Digital Ethernet Comms	Standard	Standard	Standard
Termopara typu	B	B	B
Waga (kg)	355	555	--

	HTF _/165
Maksymalna temperatura (°C)	1700,1800
Czas nagrzewania do temperatury maksymalnej	--
Wymiary: Wewnętrzne: Wys. x Szer. x Głęb.	550 x 550 x 550
Wymiary: Zewnętrzne Wys. x Szer. x Głęb. (z otwartymi drzwiami)	2450 x 1400 x 1400 (door open)
Konfiguracja	Floor standing
Pojemność (litry)	165
Moc maksymalna (W)	40000
Digital Ethernet Comms	Standard
Termopara typu	B
Waga (kg)	--

Uwaga

- Maksymalna temperatura pracy jest 100 oC niższa niż maksymalna temperatura urządzenia.
- Heat up rate is measured to 100°C below maximum, using an empty chamber
- Chemical reaction between the heating elements and zirconia may discolour the zirconia. Processing advice or alternative elements are available; please enquire.



HTF DEBINDING & SINTERING

CERAMIKA TECHNICZNA

Procesy usuwania spoiwa i spiekania są niezbędne do usunięcia spoiwa organicznego i zagęszczenia elementów ceramicznych

- Efficient debinding
- Densification of parts
- Uniform shrinkage

PIECE DO USUWANIA LEPISZCZA

NOTA APLIKACYJNA

Modern Solutions for Safe Debinding of Ceramic Parts Carbolite has developed sophisticated safety concepts for safe debinding of ceramic parts.

HTF FURNACES FAQ

WHAT MAKES THE 1700 & 1800°C CHAMBER FURNACE RANGE IDEAL FOR THERMAL TREATMENTS?

The 1700 & 1800°c furnace range, designed for precision and performance, excels in processes like sintering, annealing, and calcination. Built with top-notch materials and incorporating advanced thermal technology, it ensures uniform heat distribution, optimal temperature control, and durability. Ideal for sectors such as ceramics, metallurgy, and electronics, it meets diverse research, quality control, and production needs.

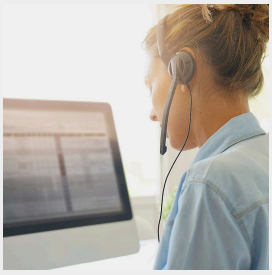
HOW DOES THE 1700 & 1800°C FURNACE RANGE ENSURE TEMPERATURE UNIFORMITY AND EFFICIENCY?

Featuring high-quality molybdenum disilicide heating elements and advanced thermal insulation, the furnace range achieves excellent temperature uniformity, quick heat-up and cool-down rates, while reducing energy consumption. These components contribute to the furnaces' efficiency and consistent heating capabilities, ensuring low external case temperatures and longevity.

CAN 1700 & 1800°C CHAMBER FURNACES BE CUSTOMIZED FOR SPECIFIC APPLICATIONS?

1700 & 1800°C furnaces offer customization for specific requirements, including debinding options for ceramic binder burn-off. Available in both bench-mounted and floor-standing models, each furnace can be tailored for precise technical needs, providing flexibility and precision for various applications.

SKONTAKTUJ SIĘ Z NAMI W CELU UZYSKANIA BEZPŁATNEJ KONSULTACJI



Niezależnie od tego, czy jest to produkt standardowy, czy w pełni zindywidualizowane rozwiązanie, Carbolite przez lata wyprodukował tysiące rozwiązań w zakresie suszenia i zrealizował projekty na całym świecie.
Skontaktuj się z nami, aby uzyskać bezpłatną konsultację i porozmawiaj ze specjalistą ds. produktu, aby znaleźć najbardziej odpowiednie rozwiązanie dla Twoich potrzeb!

PARAMETRY TECHNICZNE

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	HTF 18/27	HTF 18/64	HTF _/128
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Digital Ethernet Comms	Standard	Standard	Standard
Termopara typu	B	B	B
Waga (kg)	355	555	--

	HTF _/165
Maksymalna temperatura (°C)	1700,1800
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Konfiguracja	Floor standing
Pojemność (litry)	165
Moc maksymalna (W)	40000
Digital Ethernet Comms	Standard
Termopara typu	B
Waga (kg)	--

Uwaga

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