

Laboratory & Industrial **FURNACE**

Laboratory | Nuclear | R & D | Ceramic | Metal | Chemical | Educational Institute

www.tempsens.com

About The Company

800
EMPLOYEES

OVER
6500
CUSTOMERS

40+
YEARS
EXPERIENCE

SALES IN OVER
75
COUNTRIES
AROUND THE GLOBE

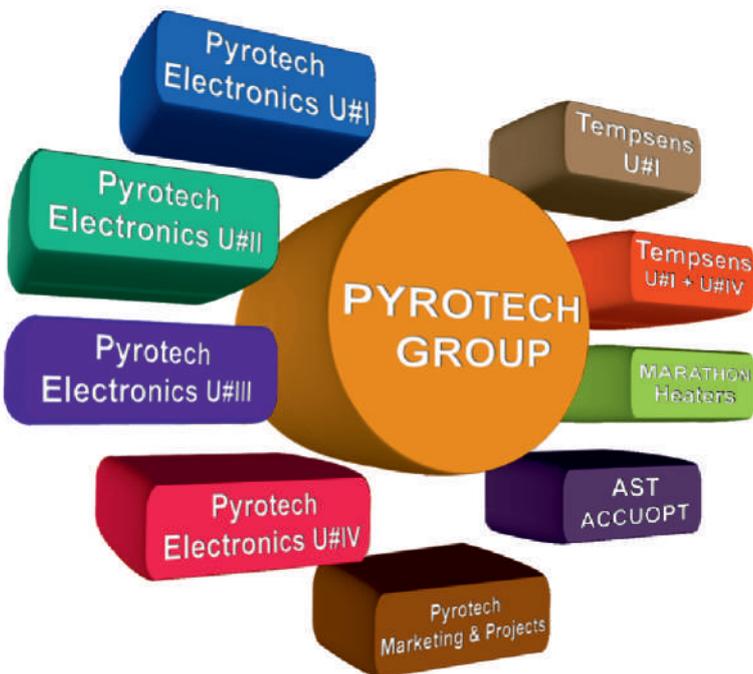
4 GLOBAL
LOCATIONS

4 PATENTS

~30%
YOY GROWTH

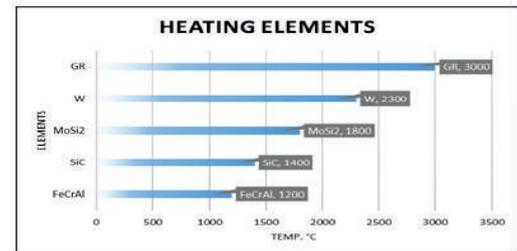


About Pyrotech Group



Since 1976, Pyrotech Group is leader in Automation & Control Equipments with highly diversified products range manufactured in different divisions- Panels, Enclosures, LVS, LIR/LIE, LED Lightening, Electronic products, Temperature Sensors and Modular furniture.

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What is Furnace?

A furnace is an electrically powered heating device used in scientific and industrial settings for a wide range of applications including materials testing, heat treatment, and research experiments.

These furnaces provide controlled heating environments with precise temperature regulation, allowing for consistent and repeatable results. They come in various sizes and configurations, from small benchtop models to large industrial units, and can reach temperatures exceeding 1800°C & 3000°C under inert gas environment.

Furnaces play a crucial role in scientific discovery, quality control, and process optimization across multiple fields including chemistry, materials science, and engineering.

Use of Furnace?

Furnaces are indispensable tools in scientific and industrial settings for several applications:

- High Temperature Process
- Precise Temperature
- Uniform Heating
- Versatility
- Safety
- Quality Control

Overall, Furnaces are essential tools for advancing scientific research, facilitating innovation, and maintaining quality standards across various industries.

Working principle of furnace

An electric heater is a device that converts electrical energy to heat energy. The heating elements is an electrical converter and works on the principle of joule heating. A current passing through resistor converts electrical energy into heat energy.

$$P = I^2 \times R$$

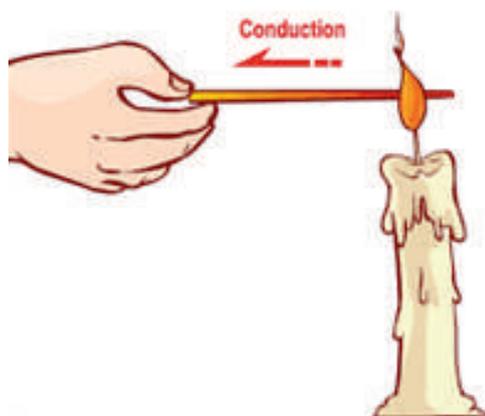
$$A\varepsilon\sigma T^4 = I^2 \times R$$

Methods of heat transfer

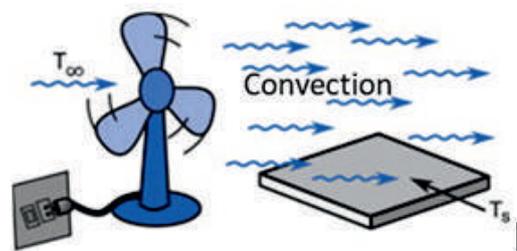
Heat transfer is the exchange of thermal energy between objects or system due to temperature difference.

There are three primary mechanisms by which heat transfer occurs: conduction, convection, and radiation.

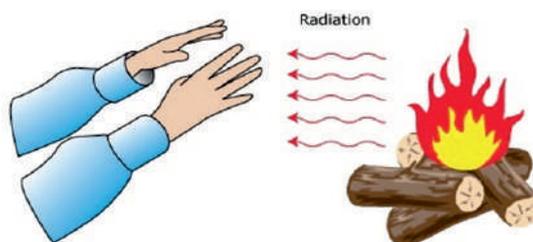
- **Conduction** is the transfer of heat through direct contact between objects.



- **Convection** is the transfer of heat by the movement of liquids or gases



- **Radiation** is the transfer of heat through electromagnetic waves, radiation does not require any medium for transfer.

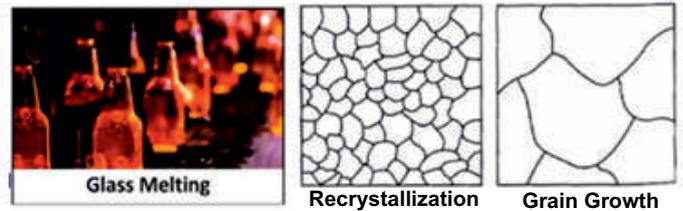


Conduction Heat Transfer	Convection Heat Transfer	Radiation Heat Transfer
$Q = \frac{-kA \Delta t}{dx}$	$Q = hA\Delta T$	$q = \sigma A(T_h^4 - T_c^4)$
Q = Heat flow K = Thermal conductivity dt = temperature difference dx = thickness	Q = Heat flow h = Convection Heat transfer A = Exposed surface area Δt = temperature difference	q = Heat transfer per unit time σ = Stefan Boltzmann Constant A = Area

Treatments in furnace

Furnaces are widely used in various scientific and industrial applications for tasks like:

- **Drying** : Eliminating moisture from samples.
- **Ashing** : Burning off components of a sample to determine its inorganic content.
- **Heat treating**: Modifying the physical properties of a material through controlled heating and cooling.
- **Annealing**: Relieving stress in glass or metal to make them less brittle.
- **Pyrolysis**: It is the thermal decomposition of organic materials in absence of oxygen.
- **Brazing**: It involves joining two metal components using a filler metal that melts at certain temperature.

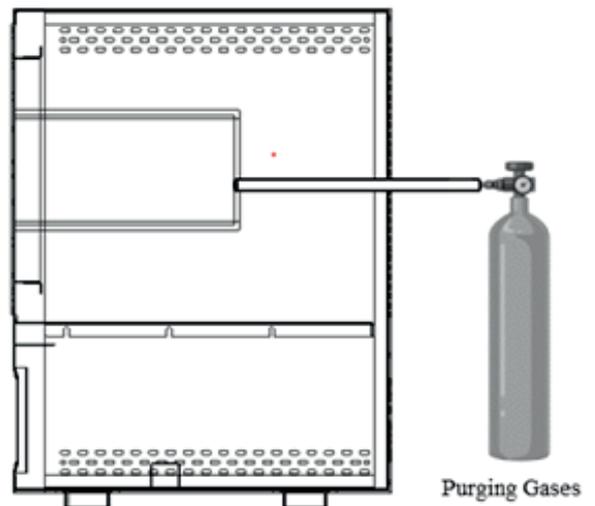


Environment, Heating Elements & Insulation in furnace

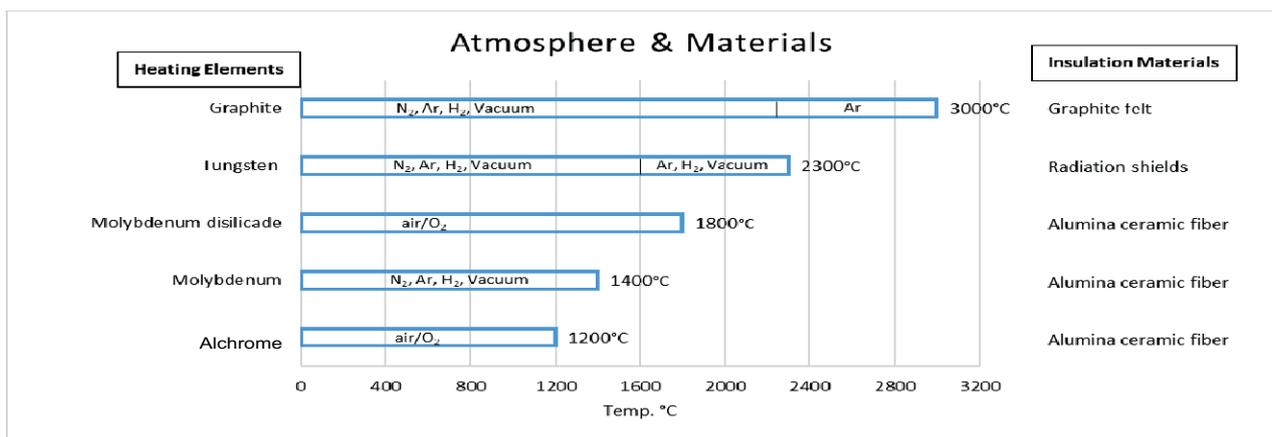
Many heat treatment processes have to be carried out in an artificially created environment. Creating environment helps in achieving the desired results which is not possible in normal environment.

There are three different insulation Alumina ceramic fiber, metallic radiation shields & graphite felt.

FeCrAl, MoSi₂, Mo, W & GR (Graphite) are the different heating element with different heating principles.



**Furnace with purging system
(Positive atmosphere)**



Types of Vacuum pumps

a) Turbomolecular pump

The turbomolecular pump comprises stators positioned between multiple high-speed rotors. When paired with a pre-vacuum pump they excel in achieving very high levels of atmospheric purity within the furnace chamber by efficiently extracting heavy, slow-moving particles like hydrocarbons.



Turbomolecular Pump

b) Oil diffusion pump

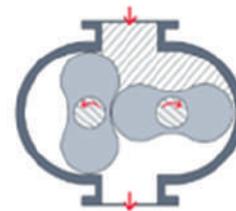
Oil diffusion pumps operate without any mechanical components. Their operation relies on the rapid downward movement of oil vapour, which effectively removes air molecules towards the pre-vacuum pump. While these pumps can attain high vacuum levels with a considerable pumping speed.



Oil diffusion Pump

c) Root pump

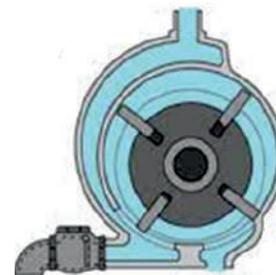
The roots pump is appropriate for heat treatment within the fine vacuum spectrum. Unlike greased vacuum chambers, it features two precisely manufactured plugs that rotate in close proximity to each other and the chamber walls, leaving minimal space. Utilization of a pre-vacuum pump is necessary when employing the roots pump.



Root Pump

d) Rotary Vane pump

The rotary vane pump, commonly employed as a pre-vacuum pump, is available in single or double stage configurations. The pump's vacuum chamber is lubricated with oil. While it can attain a rough vacuum, the double stage pump can nearly achieve a fine vacuum.



Rotary Vane Pump

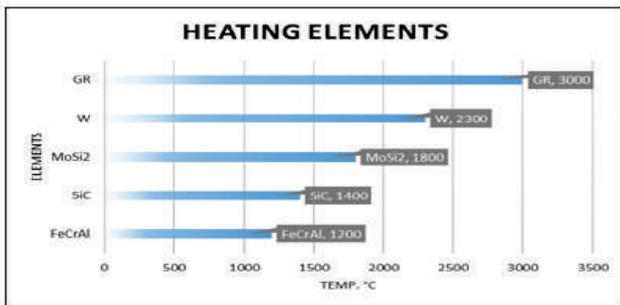
Typical pressure ranges, in mbar												
10 ⁻¹⁰	10 ⁻⁹	10 ⁻⁸	10 ⁻⁷	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³	10 ⁻²	10 ⁻¹	10 ⁰	10 ¹	10 ² atm
ULTRA-HIGH VACUUM			HIGH VACUUM				FINE VACUUM			ROUGH VACUUM		
										Claw P.		
										Diaphragm Pumps		
										Scroll Pumps		
										Multistage Roots Pumps		
										Rotary Vane Pumps		
										Screw Pumps		
										Mechanical Booster (Roots) Pumps		
			Diffusion Pumps									
			Turbomolecular Pumps									
			Cryo Pumps									
			Ion Getter Pumps									

USP of Tempsens Furnace

In reality, all three heat transmission mechanisms exist together. Due to this, designing a furnace with exceptional temperature homogeneity requires tedious computations and simulation. Tempsens has years of experience developing amazing heat transfer systems; some of the USP of our furnaces are

Heating elements

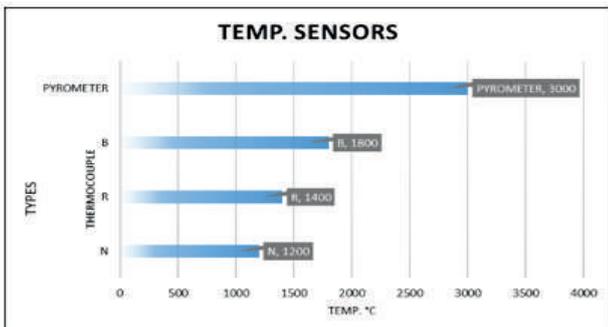
Tempsens uses variety of heating elements for their furnaces according to the temperature range and properties the element offers.



The heating elements can be a wire or a 'U' shaped elements providing exceptional resistance properties, precise temperature control and uniform heating, they are highly resistant to oxidation. Our heating elements provide faster heating rate.

Temperature sensors

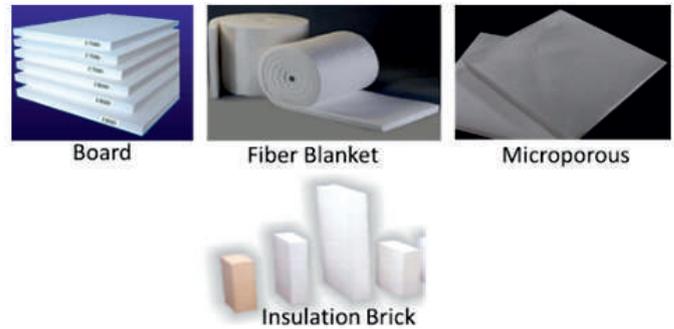
Tempsens make thermocouples are used to sense the temperature according to their types depending on the temperature.



Thermocouple comes with the break protection helps in preventing thermocouple failure runaway, our thermocouples are NABL certified.

Insulation material

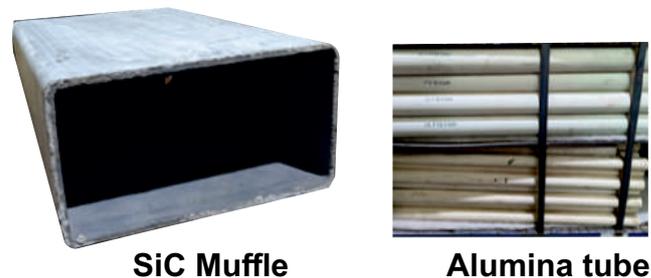
In Tempsens we use highly effective insulation material for our furnaces which helps in temperature uniformity.



Our insulation prevents heat loss to the environment increasing the efficiency and creating a workable environment by maintaining temperature near to ambient outside the furnace.

MOC of Furnaces

Life of the furnace is directly depended on construction material of furnace as in Tempsens we use high grade, better life cycle and reliable material for our furnaces.



Material used in construction of muffle are very energy efficient provide better uniformity and fast heating rates for large number of cycles.

Instruments

When it comes to instrumentation Tempsens provide the best in the industries instruments for reliability, safety, better controlling & easy availability.



We provide standard programmable controller, thyristor and programmable accessories for providing flexibility to our clients.

LABORATORY Furnace



The MF is a box type heat treatment laboratory equipment used to change physical properties of sample at very high temperature in an enclosed atmosphere surrounded by insulation with a door to seal the muffle during operation.

Tempsens Muffle Furnace designed with the needs of modern laboratories, research facilities, and industrial environments in mind, our muffle furnace combines cutting-edge features with robust construction to deliver consistent and reliable results, cycle after cycle.

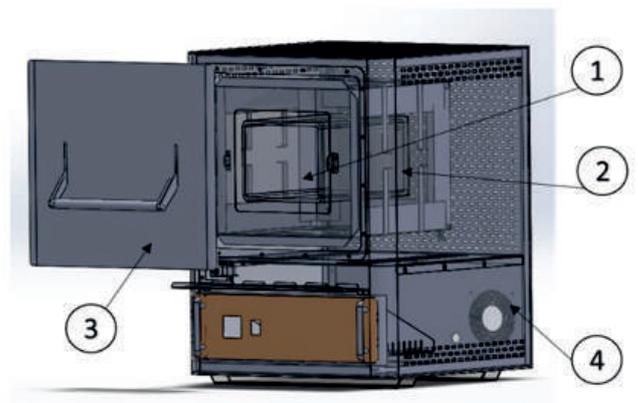
Explore the features, specifications, and applications of our product in the following pages, and discover why Tempsens Instruments is the preferred choice for all your thermal processing needs.



Muffle Furnace MF-312

Key features:

- Precise temperature control & Uniform heating.
- Our standard Muffle Furnace uses FeCrAl heating element for better life cycle.
- Muffle made of Silicon Carbide.
- Maximum operating temp 500°C to 1200°C.
- Side way opening door keeps heated surface away from the users.
- Door limit switch for making heating system off while door in open condition



MF-312 open view

Accessories:

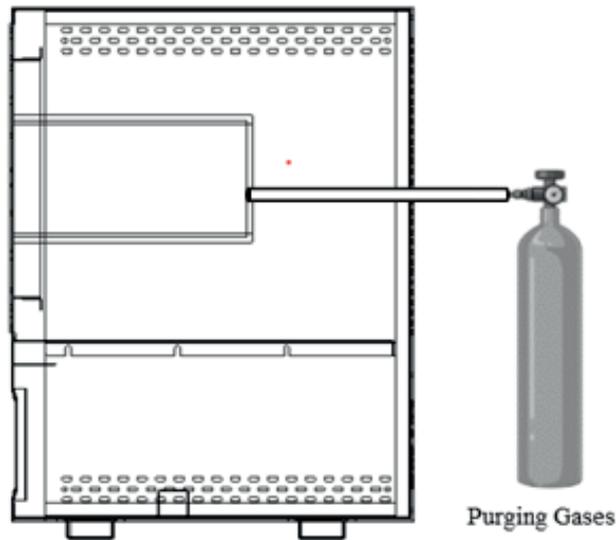
- Hand Gloves
- Crucible
- Tongs

- 1) SiC Muffle
- 2) Insulation material
- 3) Door
- 4) Body

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of MF:

- Annealing, soldering and enamelling.
- Hardening, tempering and stress relieving.
- Material testing, ash content determination.



MF with purging system

Technical Data:

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating element
MF 112	1200	100x100x150	N	FeCrAl
MF 312	1200	95x175x300	N	FeCrAl
MF 412	1200	150x175x300	N	FeCrAl
MF 512	1200	230x200x400	N	FeCrAl

High-temperature furnaces are capable of reaching higher temperatures from 1400°C up to 1800°C. HTF typically consists of heating elements located on both sides of the heating chamber to ensure good thermal uniformity. Process applications for a high-temperature furnace include sintering of high-temperature materials, glass melting, and high-temperature testing of ceramics, fusion and firing processes, and powder metallurgy processes.

Tempsens Furnace designed with the needs of modern laboratories, research facilities, and industrial environments in mind, our furnace combines features with robust construction to deliver consistent and reliable results

Explore the features, specifications, and applications of our product in the following pages, and discover why Tempsens is the preferred choice for all your thermal processing needs

Key features

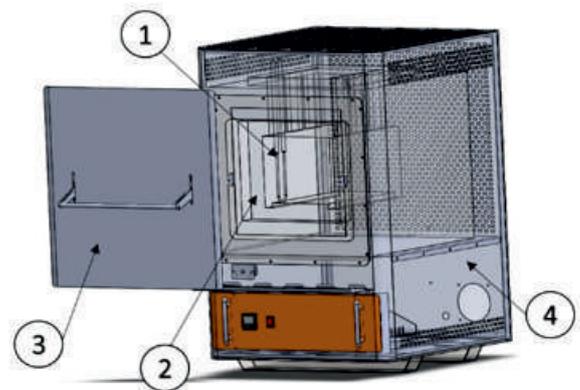
- Precise temperature control & Uniform heating.
- Maximum operating temp 1400°C to 1800°C.
- Side way opening door keeps heated surface away from the users.
- Door limit switch for making heating system off while door in open condition.

Accessories

- Hand Gloves
- Heating Element
- Crucible
- Tongs



High Temperature Furnace HTF-1600



HTF-1600 open view

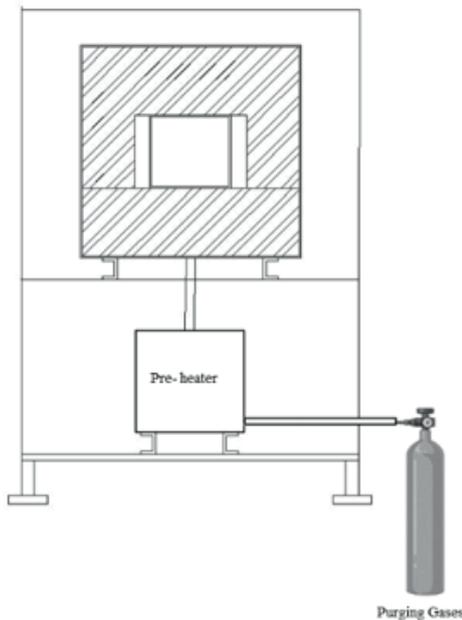
- 1) Heating element
- 2) Insulation material
- 3) Door
- 4) Body

Tailorization

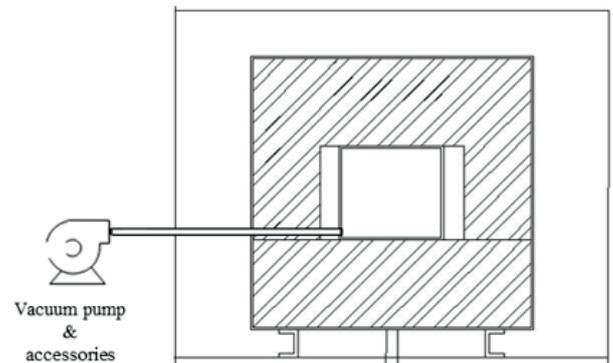
- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of HTF:

- Glass melting, high-temperature testing of ceramics, fusion and firing processes, and powder metallurgy processes
- Hardening, tempering and stress relieving.
- Material testing, ash content determination.



HTF with pre heater gas purging



HTF with vacuum pump

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
HTF 1400	1200	150x170x270	R	SiC
HTF 1600	1600	150x170x270	B	MoSi ₂
HTF 1800	1800	110x150x240	B	MoSi ₂

A tube furnace is an electric heating device used to conduct syntheses and purifications of inorganic compounds and occasionally organic compounds. One possible design consists of heating element that are placed near to ceramic tube such type can with stand 1800°C continuous temperature in a thermally insulated chamber. Temperature is controlled via feedback from a thermocouple.

Tempsens tube furnaces deliver exceptional temperature uniformity across the entire length of the heating zone with our advanced tube furnace designs, making them ideal for conducting materials research, semiconductor processing, or heat treatment applications, our furnaces deliver consistent and reliable results every time.

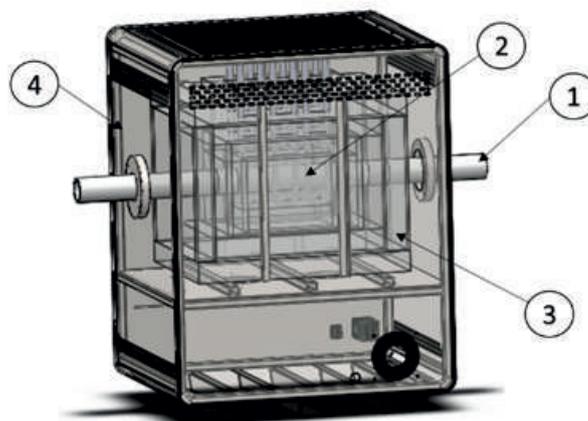
Tempsens tube furnaces built with innovation in mind, feature state-of-the-art heating elements, insulation materials, and control systems to ensure optimal performance and energy efficiency. Browse our catalogue to discover the full range of tube furnace solutions available from Tempsens.

Types:

- Split Tube Furnace – STF
- Vertical Split Tube Furnace – VSTF
- Rotary Split Tube Furnace – RSTF



Tube Furnace TF -1800



Inside view of TF-1800

- 1) Alumina Tube
- 2) Heating element
- 3) Insulation material
- 4) Outer body

Split Tube Furnace – STF

Tempsens Split Tube Furnace has a horizontal oriented chamber with a furnace body that splits into two halves. Ability to open furnace facilitates the operator to change the working tube easily.



Split Tube Furnace – STF

Vertical Split Tube Furnace – VSTF

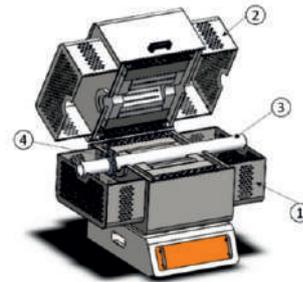
Tempsens Vertical Split Tube Furnace has a Vertical oriented chamber with a furnace body that splits into two halves. VSTF offers the best value for mechanical testing at different temperature with very slow and rapid heat-up rates. It is mounted on portable heavy duty stand that can be relocated as required.



Vertical Split Tube Furnace – VSTF

Rotary Split Tube Furnace – RSTF

Tempsens Rotary tube furnace material is fed continuously at the top of the pipe and then passed through a Heated Zone of the work tube that is maintaining a consistent temperature profile thus heats and mixes simultaneously in a controlled atmosphere and falls out of the pipe at the lower end.



Rotary Split Tube Furnace – RSTF

Key features:

- Maximum Operating Temperature: 1200°C / 1400°C / 1600°C / 1800°C.
- Accuracy: $\pm 1^\circ\text{C}$.
- High density Alumina / Quartz ceramic tubes.
- Easy installation & removal work tube.
- Easy to Inserts tube with flanges.
- Advanced Refractory interior, used in combination with energy efficient low thermal mass insulation.

Accessories:

- Hand Gloves
- Heating Element
- Crucible
- Tongs

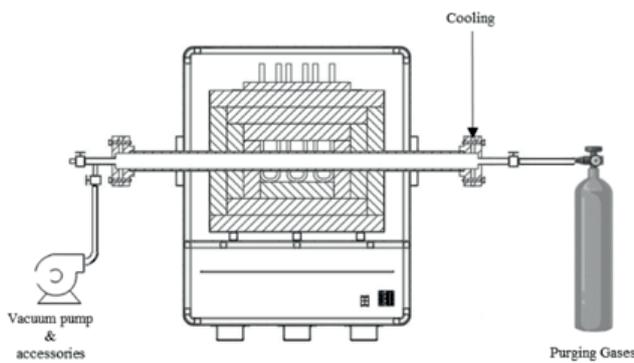
- 1) Bottom lid
- 2) Top lid
- 3) Tube
- 4) Rotating mechanism

Tailorization

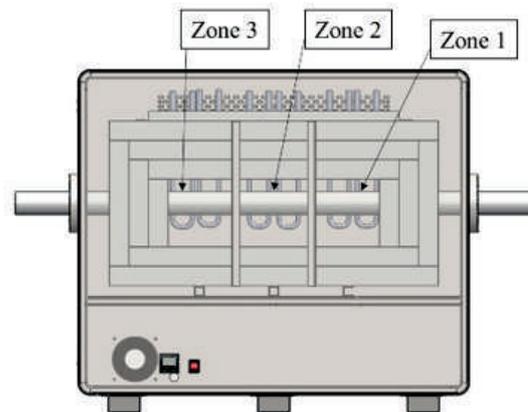
- Modifiable working environment to vacuum or particular gas (Ar, N₂, O₂, H₂, CO, etc.).
- Configuration of pumping unit, vacuum or other pumps.
- Programmable PID controller with RS-232/RS-485/Ethernet & Data logger software.
- Adjustable rotation speed & an adjustable tilt angle
- Option for water/air cooling.
- Multiple zone heating as per application of customer.
- Options of tube material Alumina, fused quartz, and Pyrex.

Applications of TF:

- Ageing, annealing, brazing, calcination, catalyst research.
- CIM, coating, CVD, degassing, drying, hardening, MIM, mini-plants, pyrolysis.
- Sintering, soldering, sublimation, synthesis, tempering, test fuel cells, thermocouple calibration



TF with pre vacuum & purging



Multi zone Tube Furnace

Technical Data:

Model	Max. Temp (°C)	Ceramic Tube* ØID x Hot zone length (mm)	Thermocouple Type	Heating element
TF 1200	1200	Ø50x200* & Ø80x250* Customized tube size available on request	N	FeCrAl
TF 1400	1400		R	SiC
TF 1600	1600		B	MoSi ₂
TF 1800	1800		B	MoSi ₂

Bottom loading furnaces are designed for uniform thermal distribution inside the chamber, easy loading and unloading of the sample with lifting arrangement. Bottom loading furnaces are best to gain a whole lot of heating-cooling cycles without sacrificing temperature uniformity and product quality.

Tempsens BLF furnaces are engineered to deliver unparalleled performance and reliability, making them the ideal choice for a wide range of heat treatment applications. From calcining, firing to sintering and brazing, our furnaces offer precise temperature control, uniform heating, and consistent results, ensuring superior quality and productivity in every operation



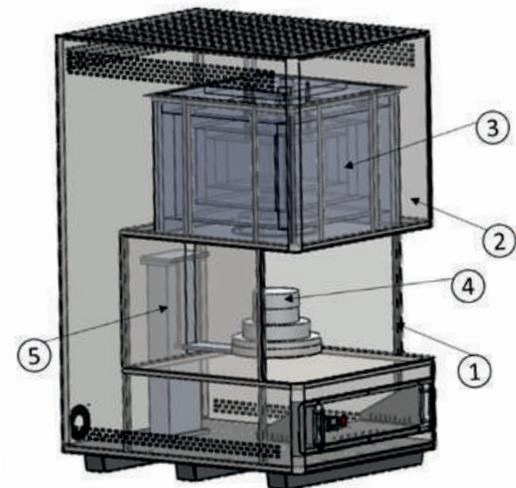
Bottom Loading Furnace- BLF-1800

Key Features

- Bottom lifting plate is fitted with DC motor based actuator to ensure smooth lifting and lowering operation.
- Maximum Operating Temperature: 1200°C / 1400°C / 1600°C / 1800 °C.
- High accurate test results under uniform temperatures.
- Motor driven lifting table with variable speed.
- Equipped with a drying as well as a forced cooling function.

Accessories

- Hand Gloves
- Heating Element
- Crucible
- Tongs



Inside view of BLF- 1800

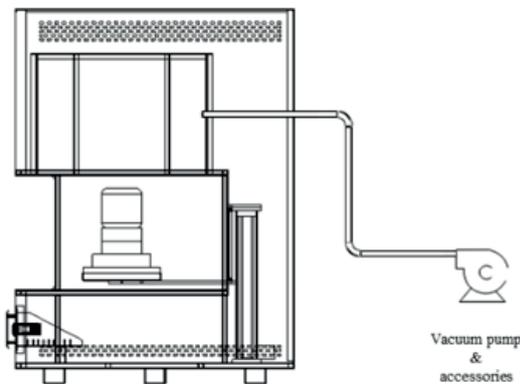
- 1) Frame
- 2) Body
- 3) Heating chamber
- 4) Tray
- 5) Lifting mechanism

Tailorization

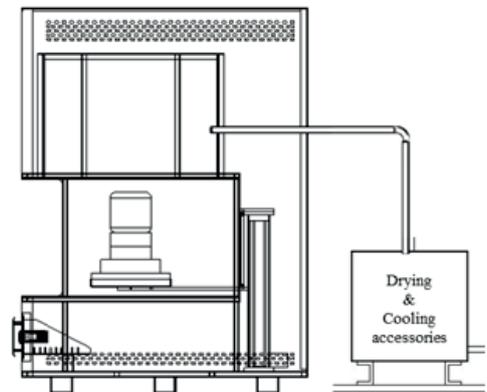
- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Options for drying as well as a forced cooling function.
- Option for water/air cooling.
- Available as per customer size requirement and application.

Applications of BLF:

- Calcining, firing and sintering oxide ceramic parts.
- Technical ceramics, co-fired substrate materials, capacitors, filters, thermistors, ferrites.
- Sintering translucent zirconia, dental ceramics operations, inlays, onlays, crowns, bridge.



BLF with vacuum pump



BLF with drying feature

Technical Data:

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating element
BLF 1200	1200	120X120X120 Customized size available on request	N	FeCrAl
BLF 1400	1400		R	SiC
BLF 1600	1600		B	MoSi ₂
BLF 1800	1800		B	MoSi ₂

Specially designed Dental BLF

Tempens innovative line of BLF consist specially designed furnace for dental application to meet the demanding requirements of modern dental laboratories, from sintering zirconia and lithium disilicide restorations to firing porcelain and glaze.



Dental Furnace – DF

Tempsens laboratory vacuum furnace is a specialized piece of equipment used for various high-temperature processes under controlled atmospheric conditions. It is commonly employed in materials science, metallurgy, and other fields where precise heating, cooling, and controlled environments are essential for research, development, and production.

Heating elements graphite, molybdenum (Mo) or tungsten (W) generates heat required for the process. Vacuum pump removes air and other gases from the chamber to create a controlled vacuum environment.

Tempsens make furnace offers you customization according to the needs of environment with various accessories on offer.

Key features

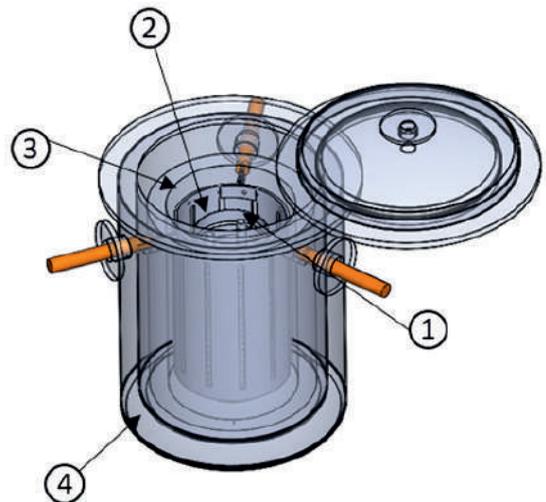
- Precise temperature control & Uniform heating.
- Rapid heating and energy efficient.
- Maximum operating temp 3000°C.
- Furnace can operate under high vacuum.
- Water cooled jacket, skin temperature near to ambient.
- Door limit switch for making heating system off while door in open condition.
- Automated material handling

Accessories

- Hand Gloves
- Retort
- Thermal protection cloth
- Chiller unit
- Lifting mechanism
- Vacuum pump



Vacuum Furnace LVF-3000



Inside view of LVF-3000

- 1) Retort
- 2) Heating element
- 3) Radiation shield
- 4) Cooling jacket

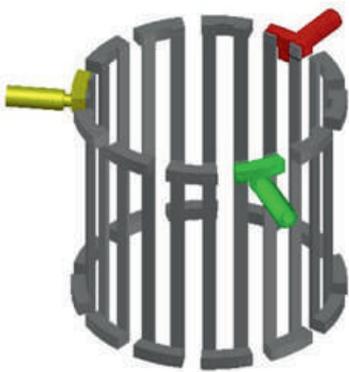
Tailorization

- Provision for gas purging application (Ar, N₂, H₂, etc.).
- Pre heating of gases.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Available in Front, Bottom and top loading.
- Available as per customer size requirement.

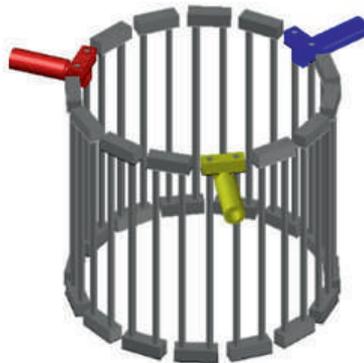
Applications of LVF:

- Materials processing, sintering, calcination.
- Degassing, pyrolysis, siliconization.
- Synthesis, sublimation, MIM, CIM.

Types of Heating Element



Strip Heater



Rod Heater



Mesh Heater

Technical Data

Model	Max. Temp (°C)	Capacity (L)	Temp. Sensor Type	Heating Element
LVF 1600	1600	4-7	C/D	Mo
LVF 2300	2300		Pyrometer/C	W
LVF 3000	3000		Pyrometer	Graphite

INDUSTRIAL Furnace



Tempsens Industrial ovens offers a range of precision electric ovens. Industrial ovens are designed for low temperature thermal treatments such as drying, heating and thermal testing in an air-flow assisted environment. Forced air convection (Hot Air Oven) is used to provide more effective drying and quicker heating, as well as improved temperature uniformity throughout the chamber. With a temperature range of 50 to 500°C.

At Tempsens, we understand the critical role of temperature control we offers precise temperature management, even airflow distribution. From small-scale batch processing to large-scale continuous production, Tempsens has the perfect oven solution to enhance your manufacturing capabilities.

Key features

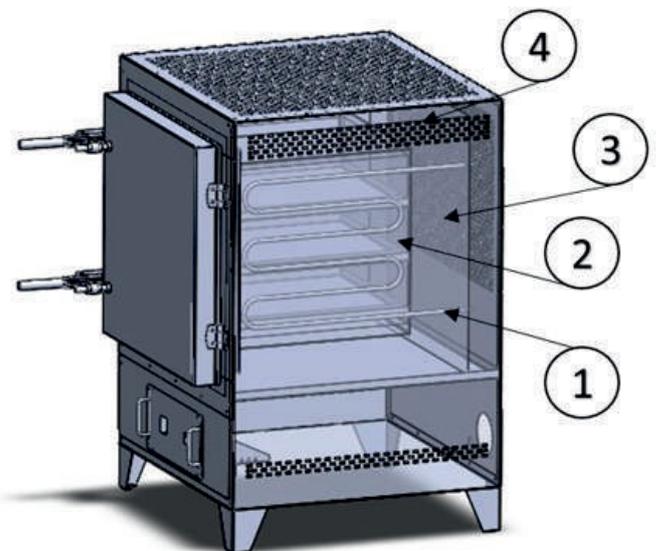
- Capacity – 4 to 40000 Liters.
- Temperature uniformity through out the chamber with forced air convection.
- Temperature range up to 500°C.
- Digital PID temperature controller.
- Safety controller for over-temperature protection.
- Tubular Heaters/NiCr are used as a heating element inside the oven for better uniformity

Accessories

- Hand Gloves
- Heating Element
- Crucible
- Tongs



Electric oven HB-500



Inside view of HB-500

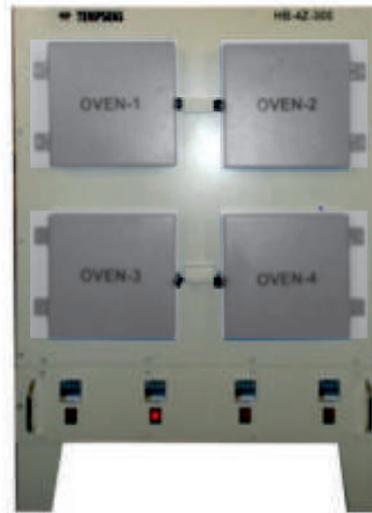
- 1) Heating element
- 2) Oven volume
- 3) Insulation
- 4) Body

Tailorization

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.
- Available in multiple zones.
- Conveyor or bogie type ovens

Applications of HB:

- Drying, heating and thermal testing
- Hardening, tempering and stress relieving.



4 Zone oven

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
HB 500	500	Customized size available on request	K	NiCr

Specially designed Conveyor Mesh Belt Dryer for Quartz material

It is specially designed to process quartz-based materials using a continuous conveyor belt system for quartz material treatment. The number of controlled Heating and cooling zone, length of the zone, belt width, Cabinet size, and Movement speed can varied based on the specific requirements of the materials and processes involved, contributing to the production of high-quality components and products in various fields.



Conveyor Mesh Belt Dryer CMB

Annealing is a heat treatment that modifies a material's physical and chemical characteristics to make it more ductile and reduce its hardness, improving its workability. It involves heating a material above its recrystallization temperature, maintaining a suitable temperature for an appropriate amount of time and then cooling.

Whether you're annealing metals, glass, ceramics, or other materials, Tempsens furnaces offer precise temperature management, uniform heating distribution, and customizable settings to meet your specific requirements.

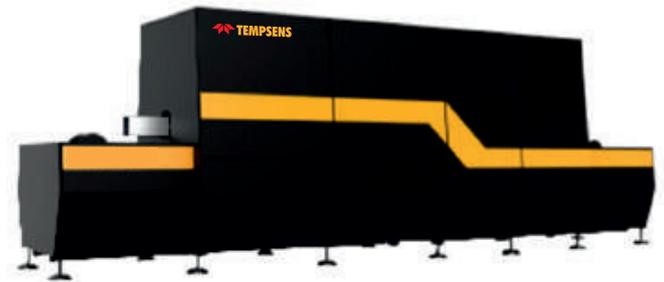
The furnace is typically constructed with a conveyor belt system that transports the material through various heating zones, designed for high-temperature applications.

Key features

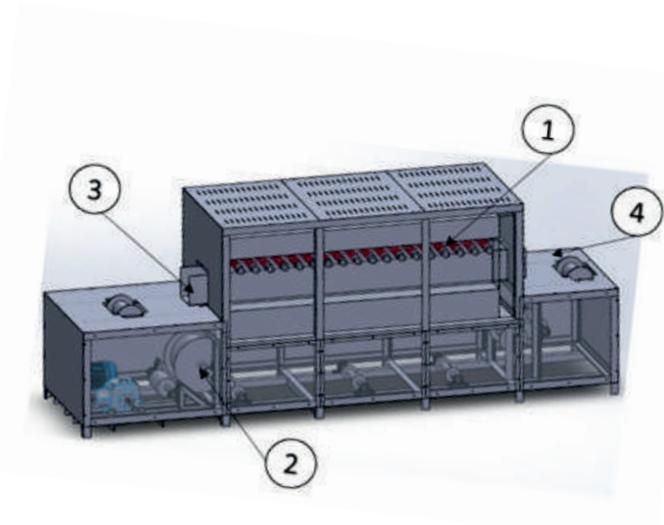
- Maximum operating temperature 1200°C.
- Heating Element: FeCrAl.
- Digital PID temperature controller
- Safety controller for over-temperature protection.
- Specially designed corrugated muffles (metallic) are used to withstand thermal expansion.
- Adjustable conveyor speed.

Accessories

- Hand Gloves.
- Heating Element.
- Thermal protection cloth



Annealing Furnace AF-1200



Inside view of AF-1200

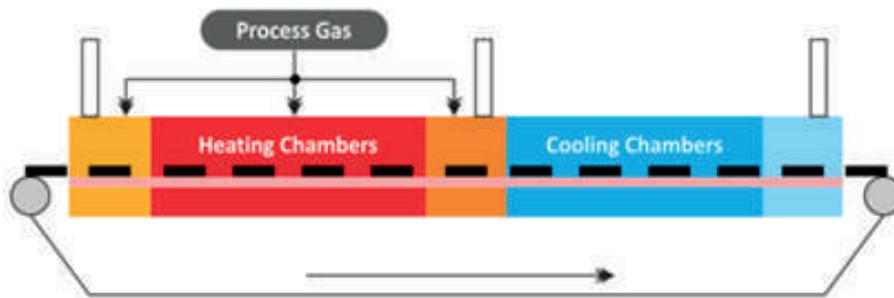
- 1) Heating element
- 2) Conveyor roller
- 3) Muffle
- 4) Body

Tailorization

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Feeding Zone & Cooling Zone temperature and length as per requirement of customer.
- Available in multiple heating zones.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of AF:

- Heat Treatment, annealing, sintering, drying and curing.
- Crystalline transformations, colour alteration, fusion



AF with different zones and gas purging

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
AF 1200	1200	Customized size available on request	N	FeCrAl

Cupellation is a refining process in metallurgy in which ores or alloyed metals are treated under very high temperatures and have controlled operations to separate noble metals, like gold, silver, from base metals like lead, copper, zinc, arsenic, antimony, or bismuth, present in the ore. When they are heated to high temperatures, the precious metals remain apart, and others react, forming slags or other compounds.

During cupellation process fresh air enters into the furnace atmosphere and an exhaust air system guides hazardous vapour/gases directly to exhaust without exposing.

Tempsens make cupellation furnaces are specialized equipment designed for the cupellation process, providing a controlled environment for the separation of precious metals from base metals and impurities. They are indispensable tools in the refining and assaying of precious metals, contributing to various industries where high-purity gold and silver are required.

Key features

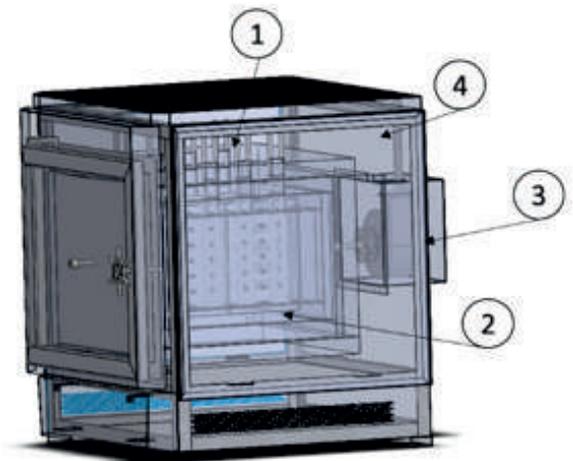
- Maximum operating temperature 1200°C.
- Silicon carbide heating elements protected by silicon carbide tiles.
- A controlled & preheated airflow entering the Furnace atmosphere.
- Digital PID temperature controller
- Safety controller for over-temperature protection.

Accessories

- Hand Gloves
- Heating Element
- Thermal protection cloth
- Exhaust fan



Cupellation Furnace TCF-15CF



Inside view of TCF-15CF

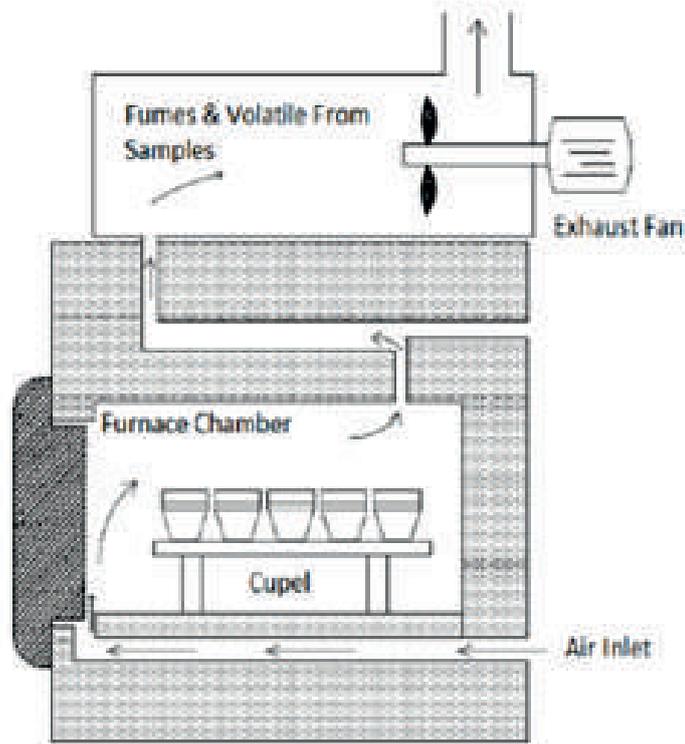
- 1) Heating element
- 2) Insulation
- 3) Exhaust fan
- 4) Body

Tailorization

- Pre heating of air.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of TCF:

- Fire assay test, cupellation, precious metal refining.
- Crystalline transformations, colour alteration, fusion.



TCF with guided extraction system

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
TCF 15CF	1200	150x230x270	R	SiC
TCF 50CF	1200	210x250x350	R	SiC
TCF 100CF	1200	250x400x600	R	SiC

A pit type sealed retort furnaces are of a cylindrical design vertically erected with a positive sealing mechanism on top. The job or charge is loaded into a retort which functions as the chamber of the furnace and the retort is heated.

Pit furnaces are constructed with a deep, pit-like chamber where the material to be heat-treated is placed. The chamber may be lined with firebrick or ceramic fiber to withstand high temperatures. The furnace is typically cylindrical or rectangular in shape, with openings for loading and unloading the material.

Tempsens innovative Pit Furnace is a benchmark for precision, reliability, and efficiency, advanced control systems, our Pit Furnace ensures consistent and uniform heat treatment results, guaranteeing superior quality for your products.

Key features

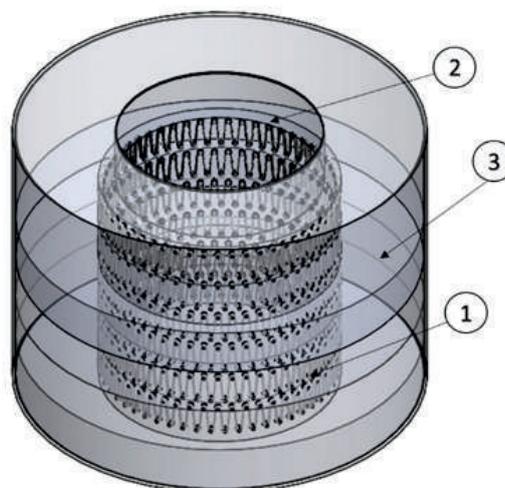
- Maximum operating temperature 1200°C.
- FeCrAl heating elements.
- Digital PID temperature controller
- Safety controller for over-temperature protection.

Accessories

- Hand Gloves
- Heating Element
- Retort
- Thermal protection cloth



Pit Furnace PF-1200



Inside view of PF-1200

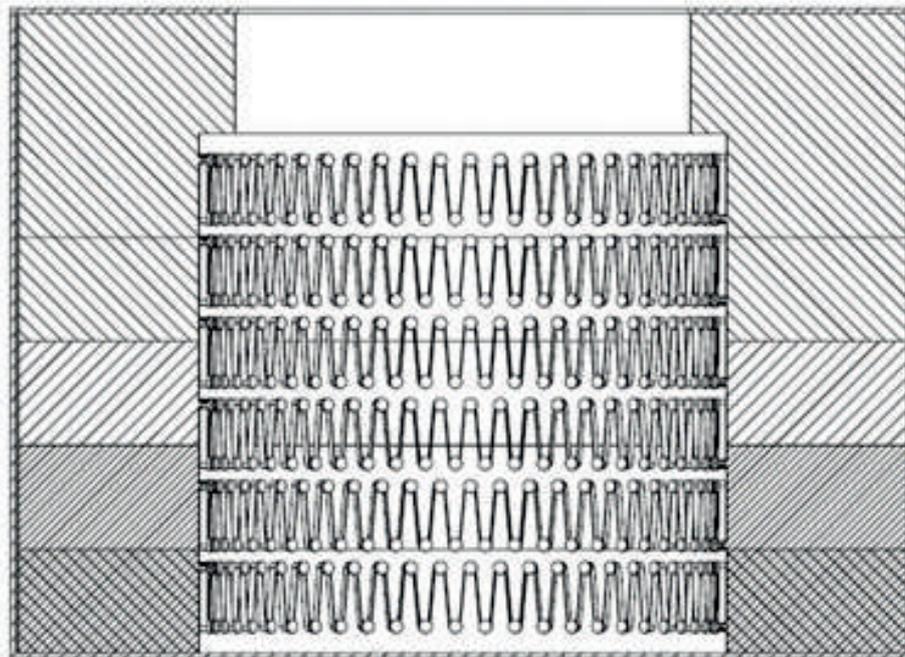
- 1) Heating element
- 2) Retort
- 3) Insulation

Tailorization

- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of PF:

- Annealing / Annealing under protective atmosphere.
- Carbonitriding, carburizing, decarb annealing.
- Hardening, stress relieving, wire annealing.
- Normalizing, case hardening.



PF with customized Pit size

Technical Data

Model	Max. Temp (°C)	Dimension internal ØID x D (mm)	Thermocouple Type	Heating Element
PF 1200	1200	Customized size available on request	N	FeCrAl

Chamber furnaces are capable of reaching higher temperatures from 900°C up to 1800°C. CF typically consists of heating elements located on sides of the heating chamber to ensure good thermal uniformity. Process applications for a high-temperature chamber furnace include sintering of high-temperature materials, glass melting, and high-temperature testing of ceramics, fusion and firing processes, and powder metallurgy processes.

Tempsens Furnace designed with the needs of modern Industries, refractory bricks based construction or lightweight ceramic fiber board insulation, our furnace combines features with robust construction to deliver consistent and reliable results.

Key features

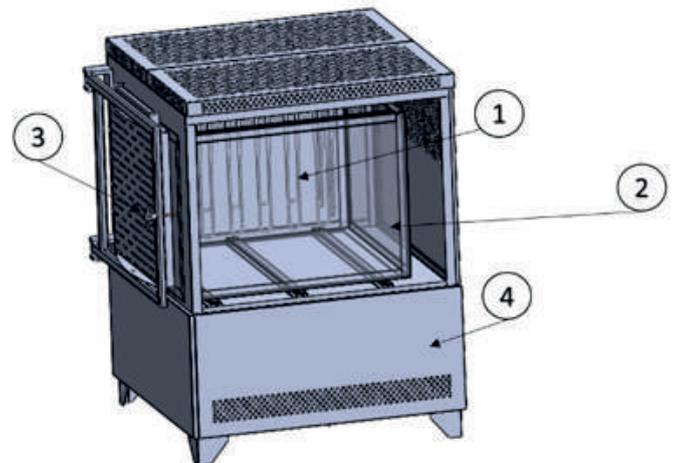
- Precise temperature control & Uniform heating.
- Maximum operating temp 900°C to 1800°C.
- Side way opening door keeps heated surface away from the users.
- Door limit switch for making heating system off while door in open condition

Accessories

- Hand Gloves
- Heating Element
- Thermal protection cloth
- Tongs



Chamber Furnace CF-1800



Inside view of CF-1800

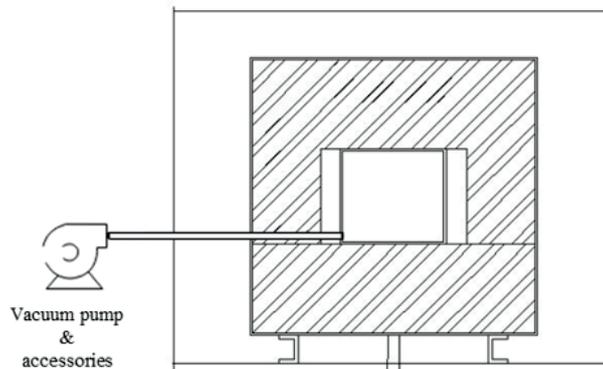
- 1) Heating element
- 2) Insulation material
- 3) Door
- 4) Body

Tailorization

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of CF:

- Annealing, Hardening,
- Billet Heating, Die Heating, Debinding, Mould / Core Heating.
- Tempering, Normalizing, Pre-sintering & Sintering, Wire Annealing.



CF with vacuum pump

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
CF 900	900	Customized size available on request	K	NiCr
CF 1200	1200		N	FeCrAl
CF 1400	1400		R	SiC
CF 1600	1600		B	MoSi ₂
CF 1800	1800		B	MoSi ₂

Specially Designed High Temperature Fast Heating & Fast Cooling Furnace

High Temperature Fast Heating & Cooling Series are commonly used in heat treatment, stress relieving of metals and alloys, sintering ceramics.

A fast cooling furnace or quenching furnace, is an industrial heating device to quickly cool materials after they have been subjected to high temperatures. Blowers provides ambient air directly into the furnace for very rapid heating and cooling

Key features

- Precise temperature control & Uniform heating.
- Maximum operating temp 900°C to 1800°C.
- It has great advantages in the work with batch type material loading
- It offers fast heating & near to 30 min cooling Cycle.

Specially Designed High Temperature Front Loading Furnace

High temperature front loading furnaces are capable of reaching higher temperatures $\approx 1750^{\circ}\text{C}$, specially used to stabilize the microstructure of ceramic material, rapid cooling prevent growth of undesirable crystal phase.

These high temperature front loading furnaces are specially designed for heavy and large material loading. The loading, unloading and opening and closing of doors can be controlled manually or through PLC

Key features

- Precise temperature control & Uniform heating.
- Fast heating & fast cooling.
- PLC controlled programmable exhaust for controllable inlet-outlet



Fast Heating & Cooling Furnace



Front Loading Furnace

The term "Bogie" refers to a wheeled carriage or platform that supports the materials being processed. The bogie hearth furnace operates by loading materials onto the bogie, which is then pushed or withdrawn from the furnace chamber. The materials are subjected to the prescribed temperature and hold times to achieve the desired metallurgical.

Tempsens BHF consists of a solid housing made of a profile steel/steel sheet construction. The furnace bottom is constructed as shuttle, covered with well heat conducting boards and is being moved trackless with a steering gear. Below the shuttle guiding rails are installed for facilitate the running in of the shuttle.

The bogie system consists of tracks, wheels, and a motorized drive mechanism that enables the movement of the loaded bogie into and out of the furnace chamber



Bogie Hearth Furnace BHF-1600

Key features

- Precise temperature control & Uniform heating.
- Maximum operating temp 1600°C.
- Automatic Swivel door or vertical lifting door.
- Heavy rails for shuttle travel.
- Door limit switch for making heating system off while door in open condition

Accessories

- Hand Gloves
- Heating Element
- Thermal protection cloth
- Tray
- Chimney

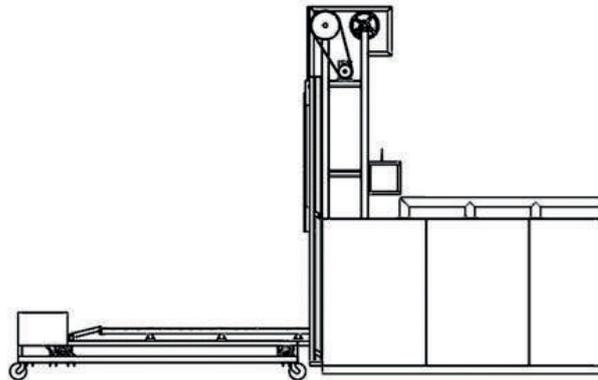
- 1) Heating element
- 2) Door
- 3) Bogie
- 4) Insulation

Tailorization

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.

Applications of BHF:

- Annealing, Hardening, Stress Relieving.
- Post weld heat treatment, Heat treatment, waste management.
- Tempering, Normalizing, Pre-sintering & Sintering, Wire Annealing, Incinerator.



Bogie Hearth Furnace with automatic loading

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Thermocouple Type	Heating Element
BHF 900	900	Customized size available on request	K	NiCr
BHF 1200	1200		N	FeCrAl
BHF 1400	1400		R	SiC
BHF 1600	1600		B	MoSi ₂

Specially designed Industrial Bottom Loading Furnace

The BLF-I comes with smooth bottom lifting arrangement, it is widely used for firing and sintering of advanced ceramics, the raising hearth that carries the material is subject to minimal vibration while lifting and lowering. BLF-I offers high temperature accuracy of $\pm 1^\circ\text{C}$ with highest temperature of 1800°C



Industrial Bottom Loading Furnace BLF-I

Tilt pouring furnaces are used in metal casting industry for melting and pouring molten metal into moulds or casting cavities. It is designed with a tilting mechanism that allows the crucible or container holding the molten metal to be tilted and poured easily and precisely

Tempsens make Tilt pouring furnaces specially designed to be used in foundries for various metal casting process like Die casting, Sand casting, Investment casting or different types of Nonferrous metal casting, metalworking shops, and manufacturing facilities where precision casting is essential. Their ability to tilt and control the pouring angle ensures consistent casting quality and minimizes defects in the finished products

Key features

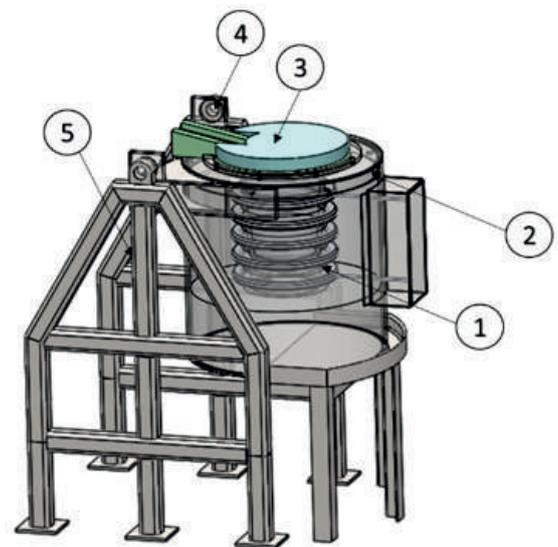
- Precise temperature control & Uniform heating.
- Maximum operating temp 1600°C.
- Melting Capacity up to 100 Kg.
- Reduced Dross Formation.
- Hydraulic tilting.
- Skin temperature below 70°C.
- Easy to maintain and repair.

Accessories

- Hand Gloves
- Thermal protection cloth



Tilt Pouring Furnace TPF-1600



Inside view of TPF-1600

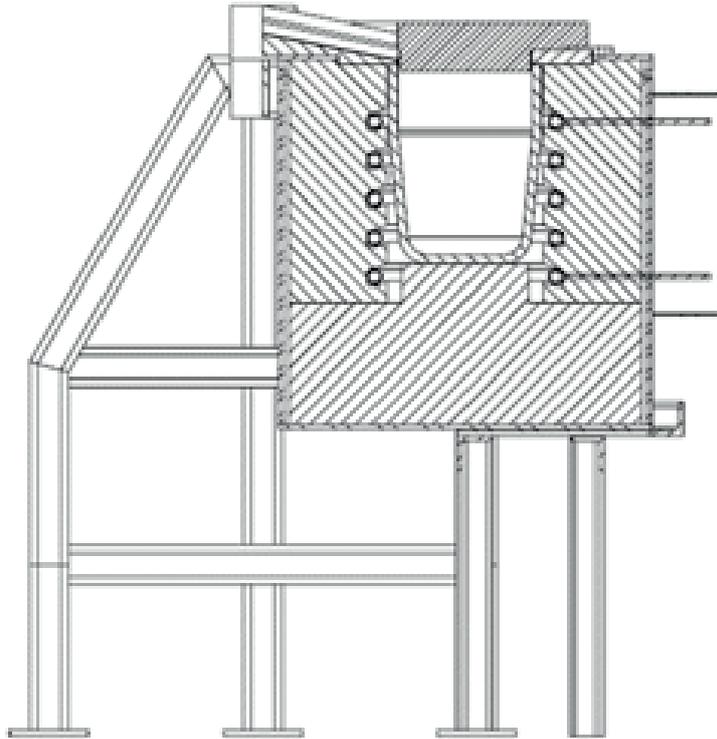
- 1) Heating element
- 2) Body
- 3) Cover
- 4) Hinge
- 5) Structure

Tailorization

- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for water/air cooling.
- Available as per customer size requirement.

Applications of TPF:

- Glass Industries, Foundries, Die Casting.
- Investment Casting, Non-Ferrous Metal Casting.
- Continuous casting, laboratory casting.



TPF with Customized size

Technical Data

Model	Max. Temp (°C)	Dimension internal Ø IDxD (mm)	Thermocouple Type	Heating Element
TPF 1200	1200	Customized size available on request	N	FeCrAl
TPF 1400	1400		R	SiC
TPF 1600	1600		B	MoSi ₂

A microwave furnace is a specialized type of furnace that utilizes microwave energy for heating dielectric materials. Unlike traditional furnaces that rely on conduction or convection heating methods, microwave furnaces use electromagnetic radiation in the microwave frequency range to generate heat within the material being processed.

When microwaves are emitted into the chamber, they penetrate the material and cause its molecules to rapidly oscillate, generating heat. This process is known as dielectric heating.

Tempsens make microwave furnace uses high frequency magnetrons for precise and fast heating, build within a high grade metal body.

Key features

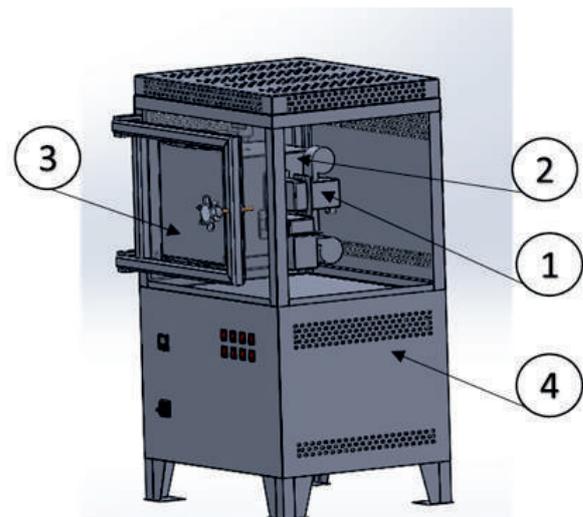
- Precise temperature control & Uniform heating.
- Rapid heating and energy efficient.
- Maximum operating temp 1600°C.
- Skin temperature near to ambient.
- Door limit switch for making heating system off while door in open condition.

Accessories

- Hand Gloves
- Tray
- Thermal protection cloth



Microwave Furnace MWF-1600



Inside view of MWF-1600

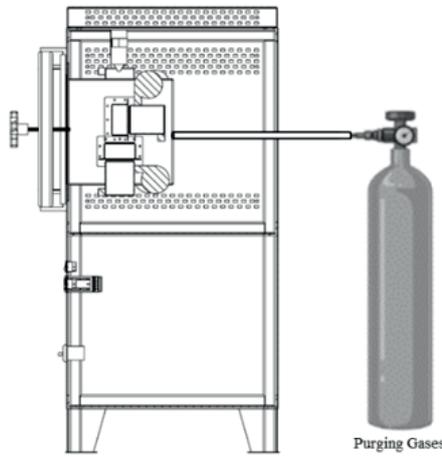
- 1) Magnetron
- 2) Chamber
- 3) Door
- 4) Body

Tailorization

- Provision for gas purging application (Ar, N₂, O₂, H₂, CO, etc.).
- Pre heating of gases.
- Pre vacuum and heat treatment under vacuum is available with vacuum pump.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Option for air cooling.
- Available as per customer size requirement.

Applications of MWF:

- Dielectric materials processing, sintering, calcination.
- Drying, pasteurization, and sterilization.
- Semiconductor manufacturing



MWF with gas purging

Technical Data

Model	Max. Temp (°C)	Dimension internal HxWxD (mm)	Temp. Sensor Type	Heating Element
MWF 1600	1600	Customized size available on request	Pyrometer	Megnetron

Specially designed Hybrid Microwave Furnace

Tempsens innovative line of MWF consist a hybrid model combining three modes convection, radiation heating & microwave heating. In convection mode air is heated using heater element placed inside the body. Both the process combines transfers heat at very fast rate to the workpiece.



Hybrid Microwave Furnace HMWF

Vacuum furnaces offers a controlled environment crucial for various industrial applications. Operating within a vacuum or controlled atmosphere, these furnaces facilitate precise heat treatment, sintering, brazing, and annealing of materials, ensuring superior quality and performance.

At its core, a vacuum furnace consists of a sealed chamber designed to withstand high temperatures and varying pressures. This chamber can be evacuated to create a vacuum or filled with specific gases such as nitrogen or argon, depending on the process requirements. Within this controlled environment, heating elements uniformly raise the temperature of materials to precise levels, devoid of the oxidizing or contaminating effects of ambient air.

Key features

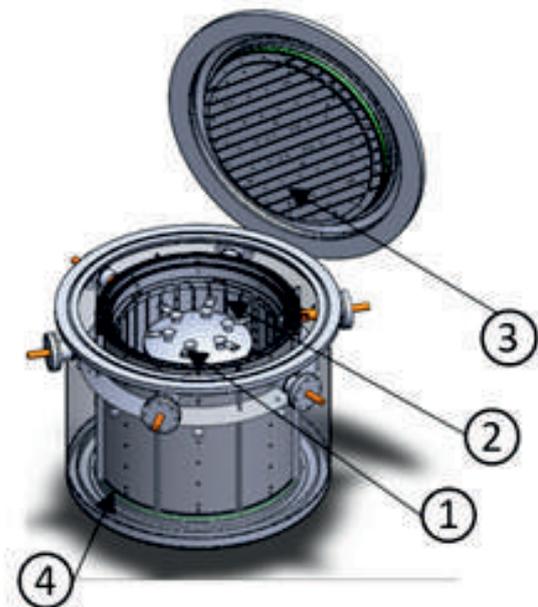
- Precise temperature control & Uniform heating.
- Rapid heating and energy efficient.
- Maximum operating temp 3000°C.
- Water cooled jacket, skin temperature near to ambient.
- Door limit switch for making heating system off while door in open condition.
- Automated material handling.

Accessories

- Hand Gloves
- Retort
- Thermal protection cloth
- Chiller unit
- Lifting mechanism
- Vacuum pump



Vacume Furnace VF-3000



Inside view of VF-3000

- 1) Retort
- 2) Heating element
- 3) Insulation
- 4) Cooling jacket

Retort

A retort ensure the materials are subjected to the desired conditions within the vacuum furnace, they are shielded from contamination by gases or other substances present in the vacuum chamber. The design of a retort can help distribute heat evenly to the materials inside, ensuring uniform processing and minimizing the risk of hot spots or uneven heating.



Retort

Chiller unit

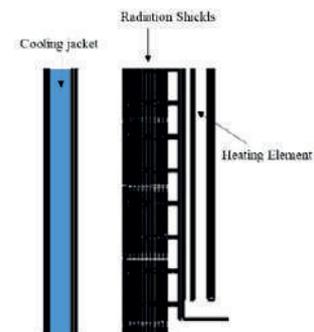
One of the primary functions of the chiller unit is to maintain precise temperature control within the vacuum furnace. This is critical for ensuring consistent heat treatment processes and achieving desired material properties. Cooling is crucial for maintaining the integrity of the vacuum within the furnace



Chiller unit

Metallic Radiation shields

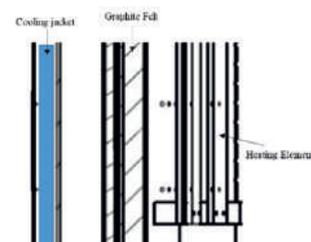
The metallic shield works as an insulation between heating element and inner jacket.



Radiation shield

Graphite insulation felt

Graphite insulation has very low thermal conductivity making it efficient to use, provide insulation in high temp vacuum furnace.



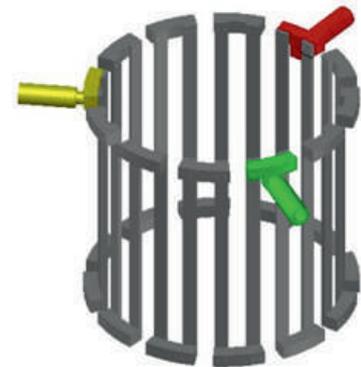
Graphite Felt

Types of Heating Element

Heating elements play a crucial role in generating the high temperatures required for various heat treatment processes. These heating elements are carefully designed and selected to withstand the harsh operating conditions within the vacuum chamber. Here are types of heating elements in vacuum furnaces

a) Strip type heating element

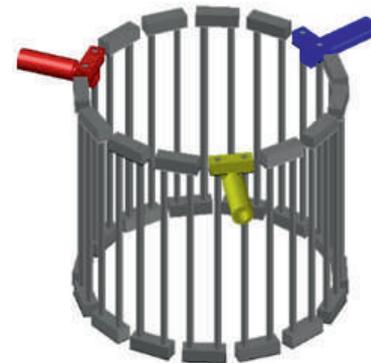
Strip-type heating elements consist of flat, elongated strips usually made from materials such as Molybdenum (Mo), Tungsten (W) or Graphite. These strips are arranged in a pattern within the furnace chamber to provide even heating across the workpiece or load



Strip Heater

b) Rod type heating element

Rod-type heating elements consist of cylindrical rods made from materials such as Molybdenum (Mo), Tungsten (W) or Graphite. These rods are typically arranged in a pattern within the furnace chamber, often in a grid or spiral configuration, to provide uniform heating.



Rod Heater

c) Mesh type heating element

Mesh-type heating elements consist of a woven or knitted mesh structure made from materials such as Molybdenum (Mo), Tungsten (W). The mesh is typically arranged in a grid pattern or wrapped around supporting rods to form a heating panel



Mesh Heater

Tailorization

- Provision for gas purging application (Ar, N₂, H₂ etc.).
- Pre heating of gases.
- Programmable PID controller with RS-232/458/Ethernet & Data Logging software.
- Available in Front, Bottom and Top loading.
- Available as per customer size requirement.

Applications of VF:

- Materials processing, sintering, calcination.
- Aerospace industry, Automobile industry.
- Semiconductor manufacturing, medical device manufacturing



**Front Loading
Vacuum furnace**

Technical Data

Model	Max. Temp (°C)	Capacity (L)	Temp. Sensor Type	Heating Element
VF 1600	1600	Customized size available on request	C/D	Mo
VF 2300	2300		Pyrometer/C	W
VF 3000	3000		Pyrometer	Graphite

Accessories

Tempsens make furnaces offers various accessories some of them shown below



Hand gloves to grab hot materials



Tong to pick hot crucible



Heating Element



Crucible



Vacuum pump



Gas purging accessories



Rotameter



Thermocouple

Instruments

Tempsens offers a wide range of instruments with controlling options depending on the type of heat treatment.

Thyristor Controller



They are basically used to control Power and monitor the working of heaters and variable applications in a production line. To ensure complete compatibility synchronization of both heating unit and control system is preferable.

Safety controller



The furnace is fitted with a fix set safety controller which is set to the temperature, at which the furnace heating will be switched off when temperature set on the safety controller is being exceeded

Eurotherm controller



In the process of heat treatment heating and cooling cycle has to be carried out to operate the furnace for a longer time. 3216 controller offers one program with maximum of 8 different segments.

SCADA control



Controlling the movement of the movable parts through PLC. HMI screen show the updated environment inside the furnace.

About The Company

Tempsens is a part of PYROTECH Group, which was established in 1976 by four tech-savvy technocrats. Tempsens has carved its niche in bringing technology and engineering together in the field of Thermal and cable solutions.

After the initial beginning with Thermocouples and RTDs, Tempsens has increased its product basket to Wires, Cables, Non-Contact Pyrometers, Thermal Imagers, Heaters, Furnaces and Calibration equipment etc. Tempsens has been adding innovative products in its domain area.

Our mission is to lead the Thermal and Cable industry with Passion, Innovation, Excellence & Reliability.

With covered area of 4,00,000 sq. ft. in head office India and plants in Germany, Indonesia and Middle East, we today are the largest and most innovative company in our domain.

Tempsens is an ISO 9001:2015, ISO 14001:2015, ISO 45001: 2018, ATEX, IECEX certified company with five NABL Accredited Laboratories.

Tempsens has earned the customer reputation worldwide of being a preferred vendor for its custom built and innovative solutions; quick delivery, high technical standards and outstanding quality.



Tempsens Instruments U# I



Tempsens Instruments U# II



Tempsens Instruments U# II Cable Plant



Tempsens Instruments U# IV Cable Plant



Marathon & AST Plant



Tempsens GmbH - Germany



Pt. Tempsens Asia Jaya - Indonesia



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