CARBOLITE®
a VERDER company

TG GRADIENT TUBE FURNACE RANGE

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Výhrady k technickému řešení a nedostatkům

These compact split tube furnaces are specifically designed to provide a temperature gradient along the length of the heated zones. They use free radiating wire elements embedded within the insulation of the furnace body. The benefit of this design is its flexibility; with the use of tube adapters the same furnace can be used with a variety of tube diameters.

The furnace body is split into two halves and hinged at the rear; pneumatic dampening struts at either end provide a smooth opening action. The ability to open the furnace makes it easier for operators to exchange work tubes, or insert vessels, such as reactors, with end flanges that would make them difficult to insert into a non-split furnace.

The TG2 tube furnace includes a 25 mm long unheated zone barrier between the two 200 mm heated zones while the TG3 includes two 75 mm long unheated zone barriers between the three 150 mm heated zones. Each heated zone has its own temperature controller and thermocouple.

OVERVIEW

Maximální teplota
1200 °C

Ø pece
60, 125 mm

Topná délka
425, 600 mm

Number of heated zones
2 zones or 3 zones

Orientation
All models available orientated either horizontally or vertically

LEADING HEAT TECHNOLOGY

Carbolite's new tube 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, high-quality components and a sleek, modern aesthetic.

HIGH QUALITY HEATING ELEMENTS

- Excellent temperature uniformity
- Fast heat-up and cool-down rates
- Unsurpassed temperature uniformity along the entire heated length

HIGH QUALITY THERMAL INSULATION

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

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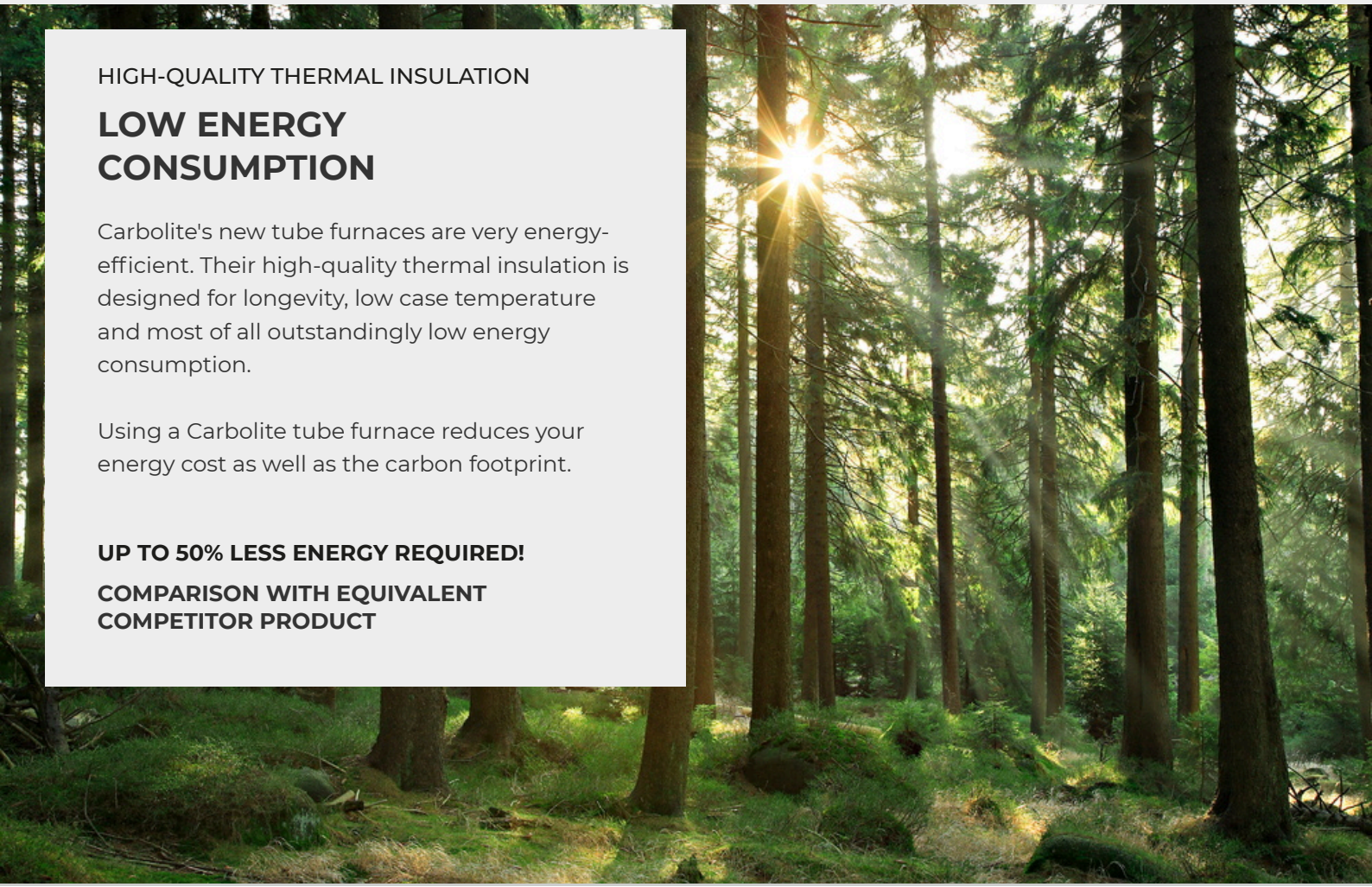
TEMPERATURE CONTROL & COMMUNICATIONS

EPC3016P1 Temperature controller

TG gradient furnaces are equipped with RS485 communications and a Carbolite EPC3016P1 programmable temperature controller with 24 segments for each heated zone as standard.

MOŽNOSTI

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



HIGH-QUALITY THERMAL INSULATION

LOW ENERGY CONSUMPTION

Carbolite's new tube furnaces are very energy-efficient. Their high-quality thermal insulation is designed for longevity, low case temperature and most of all outstandingly low energy consumption.

Using a Carbolite tube furnace reduces your energy cost as well as the carbon footprint.

UP TO 50% LESS ENERGY REQUIRED!

COMPARISON WITH EQUIVALENT COMPETITOR PRODUCT

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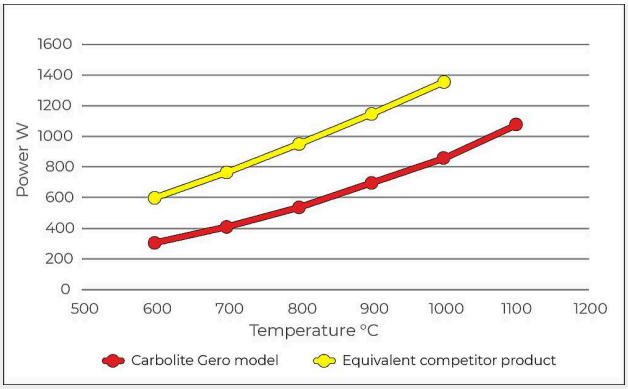

Energy consumption for exemplary Carbolite TS1 12/60/600 model (red) and equivalent competitor product (yellow); measured at each temperature after 2 hours soak.

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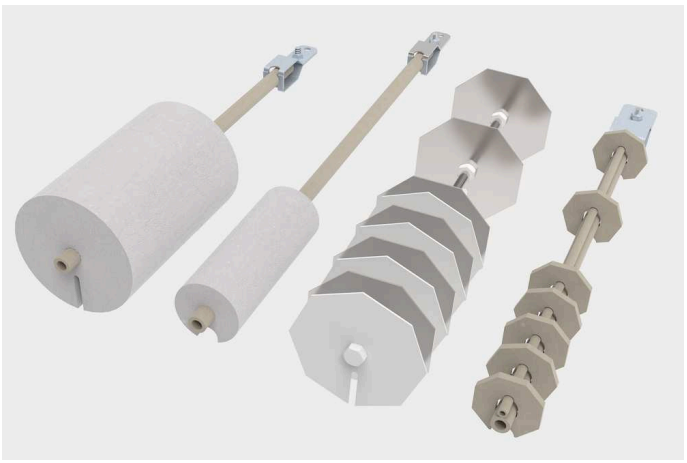
PŘÍSLUŠENSTVÍ

LARGE SELECTION OF WORK TUBES

Wide choice of tube diameters, lengths & materials



INSULATION PLUGS & RADIATION SHIELDS

Prevent heat loss & improve temperature uniformity

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MOUNTING CONFIGURATIONS

TG gradient tube furnaces are supplied mounted on top of the control box. The furnace body can easily be detached and separated for remote operation.

This configuration includes a 2 metre cable (furnaces with 125 mm Ø incl. plug and socket) between the furnace body and control box. This flexible arrangement allows for easy conversion to optional mounting arrangements e.g. attaching to a vertical stand, a mounting bracket or inside a fume cupboard.

FURNACE BODY ON TOP OF CONTROL BOX

Configuration for heated lengths up to 600 mm

DETACHABLE FURNACE BODY

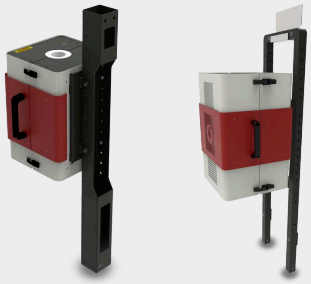
Easy conversion to optional mounting arrangements

OPTION: 4 M CABLE EXTENSION

4 m long extension results in a total of 6 m between furnace body and control box (125 mm Ø models include plug and socket)

OPTION: VERTICAL STAND

Vertical mounting stand for the furnace body



OPTION: MOUNTING BRACKET

Used to mount the furnace body to customer equipment

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MODIFIED ATMOSPHERE & VACUUM EQUIPMENT

Carbolite tube furnaces may be equipped with many different options to accommodate modified atmosphere and/or vacuum applications.

MOŽNOSTI

- A range of additional work tubes, end seals and complete work tube packages
- Vacuum packages with a choice of rotary vane pumps or turbomolecular pumps
- Inert gas package modules allow for the use of up to 3 non-reactive gases (available with either manual or automatic control)

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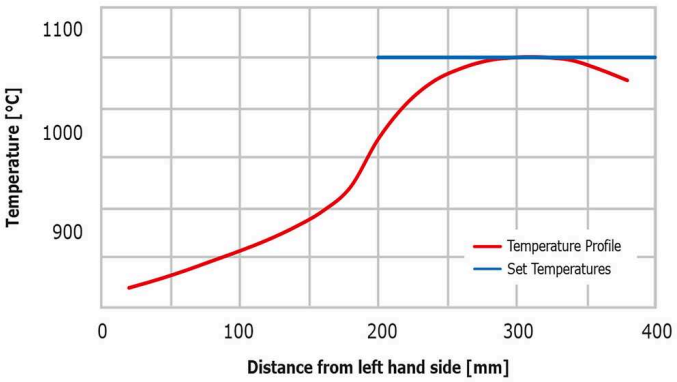
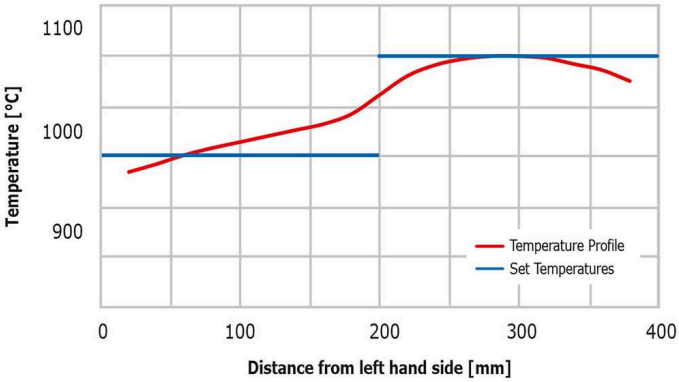
HEAT TREATMENT IN A GRADIENT TUBE FURNACE

A sample could be moved between two temperature zones to achieve a desired heat cycle without waiting for a single zone furnace to heat or cool.

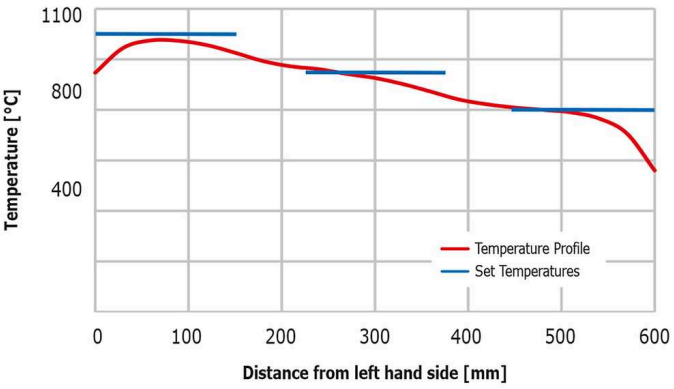
Temperature Gradient, Horizontal TG2 12/125/425.
80 mm OD worktube.
Setpoints: **zone 1: off, zone 2: 1100 °C**



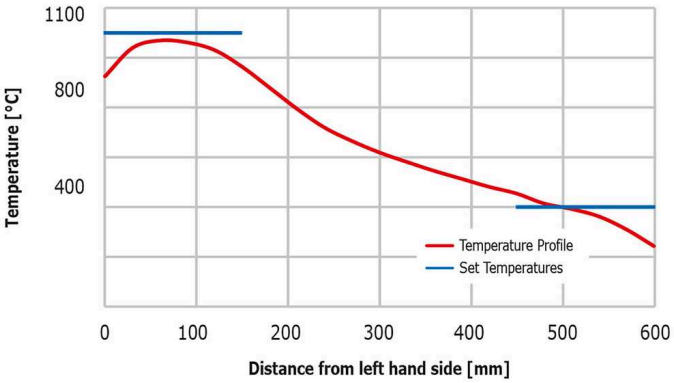
Temperature Gradient, Horizontal TG2 12/125/425.
80 mm OD worktube.
Setpoints: **zone 1: 1000 °C, zone 2: 1100 °C**



Temperature Gradient, Horizontal TG3 12/60/600.
60 mm OD worktube.
Setpoints: **zone 1: 1100 °C, zone 2: 950 °C, zone 3: 800 °C**



Temperature Gradient, Horizontal TG3 12/60/600.
60 mm OD worktube.
Setpoints: **zone 1: 1100 °C, zone 2: off, zone 3: 400 °C**



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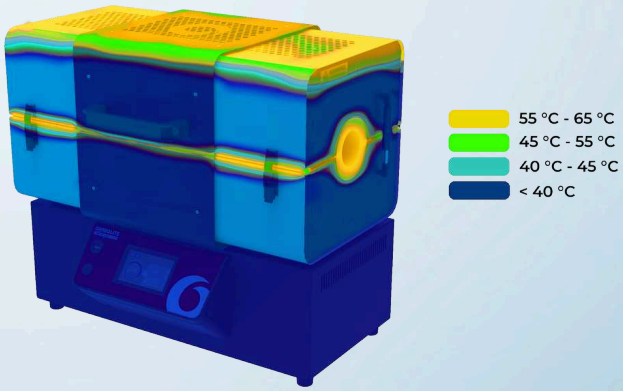
TS SPLIT TUBE FURNACE RANGE

THAT'S COOL! LOW CASE TEMPERATURE

Carbolite tube furnaces are designed with user safety in mind.

The robust construction and high-quality thermal insulation ensure that external case temperatures are much lower than other models.

Not only does this help mitigate the risk of injury to the operator, the reduction in the amount of heat escaping the furnace ensures a comfortable working environment, and also means that less energy is wasted during use. When the heat is on, Carbolite can help you keep a cool head!



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	TG3 12/60/600	TG2 12/125/425
Maximální teplota (°C)	1200	1200
Počet topných zón	3	2
Doba ohřevu (min)	-	134
Furnace Ø (mm)	60	125
Heated lengths (mm)	600	425
Doporučená délka trubky pro použití ve vzduchu (mm)	880	750
Doporučená délka trubky pro použití s modifikovanou atmosférou (mm)	1050	1000
Rozměry: Vnější V x Š x H (mm)	575 x 795 x 480	665 x 665 x 575
Control Box H x W x D (mm)	230 x 785 x 480	230 x 655 x 480
Maximální výkon (W)	2000	1860
Váha (kg)	56	71

VEZMĚTE PROSÍM NA VĚDOMÍ

- Heat up time is measured to 100 °C below max, using an empty quartz tube & insulation plugs
- Heat up rate when using an optional ceramic work tube must be limited to 5 °C/min
- Holding power is measured at continuous operating temperature
- Temperature gradients are measured with insulation plugs fitted
- Maximum continuous operating temperature is 100 °C below maximum temperature
- All furnaces are equipped with thermocouple type N

TG GRADIENT TUBE FURNACE RANGE - FAQ

WHAT IS A GRADIENT TUBE FURNACE?

A gradient tube furnace is a split tube furnace with multiple heated zones, fitted with zone barriers. The zone barriers are pieces of insulation that fit between each heating element module, and help reduce the amount

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of heat transfer between heated zones.

HOW ARE THE GRADIENTS IN A GRADIENT TUBE FURNACE CONTROLLED?

Each heated zone is controlled by its own independent temperature controller, so it is possible to set different temperatures in each zone. The zone barriers reduce the amount of heat transfer between zones, increasing overall control and enabling the operator to create a temperature gradient across the heated length e.g., zone 1: 500°C, zone 2: 450°C, zone 3: 400°C.

WHICH APPLICATIONS REQUIRE A GRADIENT TUBE FURNACE?

There are many applications that require a gradient tube furnace, such as chemical vapour deposition (CVD), in which a substance is vaporised in the hottest zone, and transported along a work tube via a carrier gas, then condensed upon a substrate in the coolest zone. Gradient tube furnaces are ideal for this process, as each end of the furnace can operate at a different temperature, with a gradient of temperature between them.

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