Nabertherm

MORE THAN HEAT 30-3000 °C

Glass

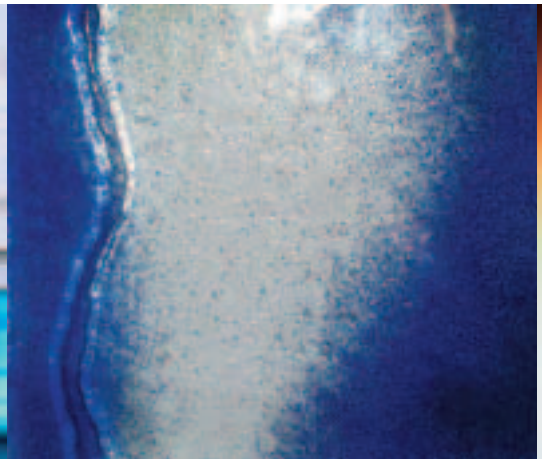


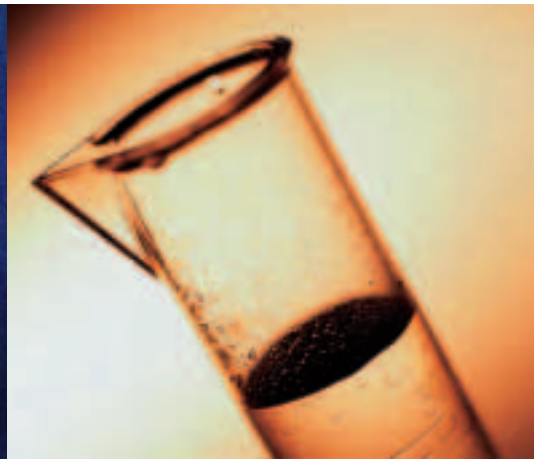



Furnaces and equipment for decorating, bending, slumping, tempering, fusing and other applications

www.nabertherm.com

Glass





Solutions – standard or custom made

With our broad range of standard products we have the right solution for your problem at a fair price. As a result of many years experience of working with international partners we will also find the right answer to your problem. Additionally, we are able to produce a custom-made furnace for you.

Made in Germany

With more than 300 employees Nabertherm has been developing and producing furnaces/kilns and equipment for the glass and ceramics sector and for the thermal treatment of metals and foundry technology for more than 50 years. We are experienced in laboratory as well as in industrial production. 150,000 customers in 100 countries around the world demonstrate our success. Why don't you too benefit from the renowned "Nabertherm Quality"?

As a furnace producer specialized in high temperature furnaces, our subsidiary GERO also has a solution for the area of tube furnaces and protective glass and vacuum operated furnaces beyond the catalogue range. Of course we also have large-scale solutions for you, and can offer "everything from one source."

Nabertherm engineering

Our product range is revised regularly, in order to always provide the latest expertise in furnace construction and electronic control. More than 20 design engineers constantly maintain and optimize our product line.

After sales service

Most spare parts are sent to all parts of the world within 24 hours – at fair prices, no matter how old the furnace is. Even thirty year old furnaces are serviced by us, including on-site repair.

Content

Chamber furnaces:
Hobby and artist work

N 140 E/G

N 200/G

N 140 E/G - N 280 E/G

Robust and economic series for glass or porcelain glazing. Ideal for artist work and small batches. Suitable for temperatures up to 900°C.

- heating from three sides
- protected heating coils located in grooves
- low connected power
- very good temperature distribution
- stand included in the price
- infinitely variable vent
- state-of-the-art control technology
- Controller S 3/C 3 with 2 storable programs (standard), Controller C 7/S 7 with adjustable cooling ramp (option)

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 140 E/G	900	465	580	575	140	660	750	1430	9	3 phase	220
N 210 E/G	900	500	580	690	210	710	750	1560	12	3 phase	270
N 280 E/G	900	550	580	830	280	760	750	1690	15	3 phase	300

[1] Notes on the supply voltage please see page 27

N 60/L Entry

N 60/L Entry - N 100/L Entry

These entry models are great value for money and are ideal for glass decorating. Charging the furnace is very easy, can be placed directly on a table (suitable insulation plate optionally available). A stand is also available as an option. The furnace is light, moveable and made of durable structured special sheet steel.

- heating from two sides
- heating elements on support tubes for free heat radiation
- special steel casing made of structured steel
- base as option
- Controller S3/ C3 with 2 storable programs (standard), Controller C7/ S7 with adjustable cooling ramp (option)

Modell	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 60/L Entry	1150	350	400	460	60	590	680	700	3,6	1 phase	82
N100/L Entry	1150	400	450	575	100	640	730	815	7,0	3 phase	100

[1] Notes on the supply voltage please see page 27

Glass trade and industry

N 100/G - N 2200/14

These high-quality chamber furnaces have proven absolutely reliable for regular daily use in the glass trade and industry for many years. They are ideal for cooling, bending/slumping and for decorating glass.

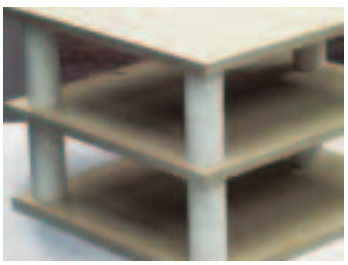
- heating from five sides to give an exceptionally good heat distribution
- available for 900°C for decorating, slumping/bending and cooling, and also for higher temperatures up to 1400°C for sintering special glass
- heating elements on support tubes permit free heat radiation and long service life
- two-tone casing in titanium/anthracite
- aperture in the middle of the roof allows good ventilation
- easy-to-operate air inlet flap, infinitely adjustable
- self-supporting roof arch provides high stability and maximum avoidance from dust
- double-wall, non-warping door with low exterior temperature without fibre seal (brick on brick, ground in by hand)
- handle for opening the door
- quick release for door
- multi-layer, fibre-free insulation made of lightweight refractory bricks and special backing insulation
- incl. stand up to model N 300/.. and models N 360/.. and N 500/..
- floor heating elements protected by SiC tiles, provide level stacking support
- Controller C 30 or C 40 for regulation

N 650

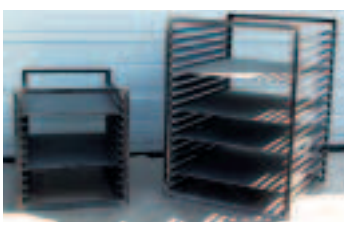
Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 100/G	900	400	530	460	100	660	1045	1430	7	3 phase	270
N 150/G	900	450	530	590	150	710	1045	1560	9	3 phase	290
N 200/G	900	500	530	720	200	760	1045	1690	11	3 phase	370
N 200/GS	900	400	1000	500	200	710	1270	840	16	3 phase	300
N 250/GS	900	500	1000	500	250	810	1270	855	18	3 phase	370
N 300/G	900	550	700	780	300	810	1215	1750	15	3 phase	410
N 360/GS	900	600	1000	600	360	910	1270	955	20	3 phase	500
N 450/G	900	600	750	1000	450	1010	1440	1815	20	3 phase	815
N 500/GS	900	600	1400	600	500	910	1670	955	22	3 phase	1000
N 650/G	900	700	850	1100	650	1120	1540	1925	26	3 phase	930
N 1000/G	900	800	1000	1250	1000	1290	1730	1830	40	3 phase	1680
N 1500/G	900	900	1200	1400	1500	1390	1930	1990	57	3 phase	2300
N 2200/G	900	1000	1400	1600	2200	1490	2130	2190	75	3 phase	2800
N 100	1280	400	530	460	100	660	1045	1430	9	3 phase	270
N 150	1280	450	530	590	150	710	1045	1560	11	3 phase	290
N 200	1280	500	530	720	200	760	1045	1690	15	3 phase	370
N 200/S	1280	400	1000	500	200	710	1270	840	18	3 phase	300
N 250/S	1280	500	1000	500	250	810	1270	855	20	3 phase	370
N 300	1280	550	700	780	300	810	1215	1750	20	3 phase	410
N 360/S	1280	600	1000	600	360	910	1270	955	22	3 phase	500
N 450	1280	600	750	1000	450	1010	1440	1815	30	3 phase	815
N 500/S	1280	600	1400	600	500	910	1670	955	24	3 phase	1000
N 650	1280	700	850	1100	650	1120	1540	1925	40	3 phase	930
N 1000	1280	800	1000	1250	1000	1370	1770	1850	57	3 phase	1800
N 1500	1280	900	1200	1400	1500	1470	1970	2010	75	3 phase	2500
N 2200	1280	1000	1400	1600	2200	1570	2170	2210	110	3 phase	3100
N 100/H	1340	400	530	460	100	690	1060	1430	11	3 phase	315
N 150/H	1340	450	530	590	150	740	1060	1560	15	3 phase	350
N 200/H	1340	500	530	720	200	790	1060	1690	20	3 phase	420
N 300/H	1340	550	700	780	300	840	1230	1750	27	3 phase	500
N 450/H	1340	600	750	1000	450	1120	1485	1825	40	3 phase	1040
N 650/H	1340	700	850	1100	650	1220	1585	1935	57	3 phase	1260
N 1000/H	1340	800	1000	1250	1000	1370	1770	1850	75	3 phase	2320
N 1500/H	1340	900	1200	1400	1500	1470	1970	2010	110	3 phase	2700
N 2200/H	1340	1000	1400	1600	2200	1570	2170	2210	140	3 phase	3600
N 100/14	1400	400	530	460	100	690	1060	1430	15	3 phase	345
N 150/14	1400	450	530	590	150	740	1060	1560	20	3 phase	400
N 200/14	1400	500	530	720	200	790	1060	1690	22	3 phase	610
N 300/14	1400	550	700	780	300	840	1230	1750	30	3 phase	575
N 450/14	1400	600	750	1000	450	1120	1485	1825	40	3 phase	1320
N 650/14	1400	700	850	1100	650	1220	1585	1935	57	3 phase	1560
N 1000/14	1400	800	1000	1250	1000	1380	1770	1870	75	3 phase	2500
N 1500/14	1400	900	1200	1400	1500	1480	1970	2030	110	3 phase	3000
N 2200/14	1400	1000	1400	1600	2200	1580	2170	2230	140	3 phase	3900

Extras:

Charging aids



Furniture suitable for 1300°C



obile furnace rack up to 850°C

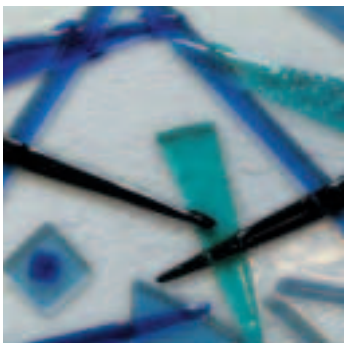
[1] Notes on the supply voltage please see page 27

Fusing furnaces

GF 920

GF 75 - GF 920

For fusing glass we offer the models GF 75 – GF 920. The powerful heating with infrared radiators in connection with the low-absorption fibrous insulation allows short heat-up and cool-down times.



- for temperatures up to 950°C
- insulation made of high-quality and low-absorption fibrous material and special backing insulation for short cycles
- infrared heating elements in the cover, high power and resistant to emissions from the products
- several ventilation ports with refractory dampers for faster cooling and for viewing the products
- with models GF 240 – GF 920 an additional infinitely variable ventilation port
- ideal temperature distribution
- robust housing, made of special corrosion-free steel in critical positions
- gas struts for easy opening and closing of the lid
- stand
- Controller C 30 with the facility for of programming cooling ramps; nine customer-specific programs can be stored

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
GF 75	950	500	500	300	75	850	750	570	3,6	1 phase	70
GF 90	950	600	500	300	90	950	750	570	5,5	3 phase	85
GF 240	950	1000	800	300	240	1450	1200	1270	12,0	3 phase	260
GF 420	950	1650	850	300	420	2100	1250	1270	18,0	3 phase	350
GF 600	950	2000	1000	300	600	2450	1400	1270	22,0	3 phase	540
GF 920	950	2100	1150	380	920	2550	1550	1350	27,0	3 phase	670

[1] Notes on the supply voltage please see page 27

Accessories:

- stand frame on wheels
- furnace tiles and supports for stacking the products
- parting compound to prevent adhesion to the hearth insulation
- fibre paper
- shelf on the stand

Air circulation furnace

N 60/65A

N 30/45A and N 120/85HA, N 15/65A

For temperature applications, where a very good temperature distribution is important, we recommend our air circulation furnaces. The horizontal air flow in the furnace chamber results in an exceptionally good temperature distribution at all charging levels.

- housing made of robust sheet steel
- high-quality, asbestos-free energy saving insulation
- heating from four sides
- maximum operating temperature up to 850 °C
- heating system with long service life
- temperature distribution up to ± 4 K
- short heating periods
- horizontal air circulation
- incl. a special perforated steel sheet shelf, further shelves optional
- Controller C 5in for regulation

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected wert/kW	Supply voltage[1]	Weight in kg
N 30/45	450	295	425	310	30	490	940	1220	2,4	1 phase	80
N 60/45A	450	355	500	390	60	540	1040	1320	3,2	1 phase	100
N120/45A	450	490	600	450	120	640	1140	1420	6,4	3 phase*	150
N 15/65A	650	295	340	150	15	500	880	440	2,4	1 phase	55
N 30/65A	650	250	370	300	30	550	980	1250	3,2	1 phase	120
N 60/65A	650	300	470	350	60	600	1080	1350	6,0	3 phase*	140
N120/65A	650	390	570	450	120	700	1180	1450	9,0	3 phase	195
N 30/85HA	850	250	370	300	30	600	770	1600	5,5	3 phase	130
N 60/85HA	850	300	470	350	60	710	860	1700	9,0	3 phase	225
N120/85HA	850	390	570	450	120	810	960	1800	13,0	3 phase	280

[1] Notes on the supply voltage please see page 27

* only 2 phases connected

N 120/65 DB

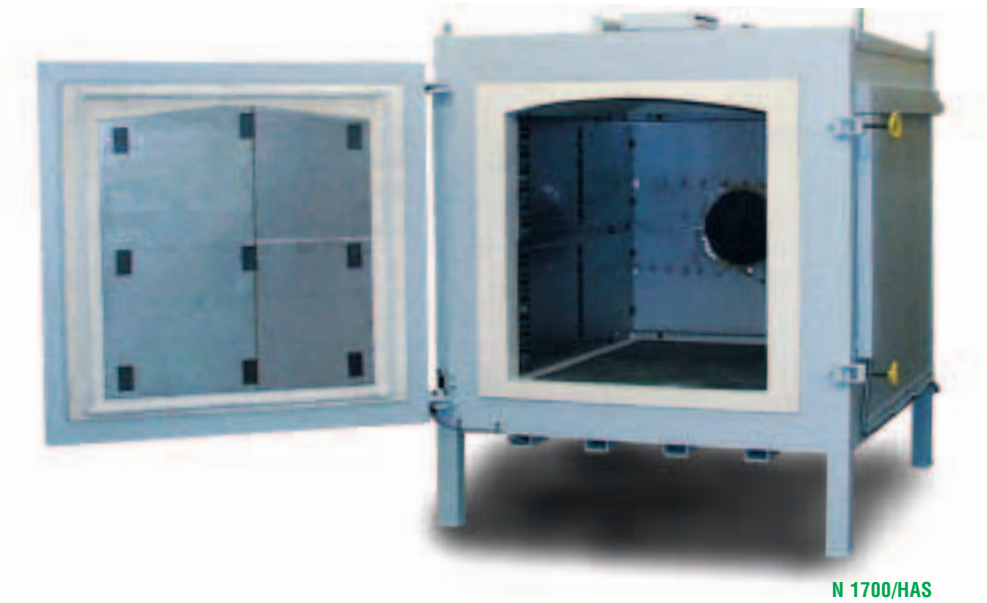
N 120/65 DB - N 500/65 DB

For special applications where the temperature distribution and a clean furnace chamber with minimal dust is important we recommend the models N 120/65DB - N 500/65DB. The furnace chamber is made of special steel 1.4541 and is sealed so that the furnace can be used under controlled atmosphere.

- horizontally circulating air for temperature distribution of ± 3 K and better
- welded gas-tight, double-walled housing with special door seal for operation with protective gas
- 3 shelves included
- additional rails for extra shelves available
- automatic control of vent flaps
- possibility for ventilation through ball valve
- protective gas inlet and outlet
- controller C 40 for regulation
- various extras upon request

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 120/65 DB	650	450	600	450	120	700	1180	1660	9	3 phase	260
N 250/65 DB	650	600	750	600	250	850	1330	1910	18	3 phase	440
N 500/65 DB	650	750	900	750	500	1000	1480	2060	27	3 phase	600

[1] Notes on the supply voltage please see page 27



N 1700/HAS

Switchgear for N 1700/HAS

N 1700/HAS

Cooling special glass, for example in the optical industry, requires an exceptionally good temperature distribution of ± 5K and better. These high requirements are met by combining multiple zone temperature control and horizontal air circulation. A cooling fan combined with air circulation provides good temperature distribution, even during the fast cooling phase.

Model	T_{max} °C	Inner dimensions in mm* w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 1700/HAS	750	1100	1400	1100	1700	1900	2500	2400	110	3 phase	2400

[1] Notes on the supply voltage please see page 27 *other sizes on request

N 352/AS

The chamber of the lift-off (hood-type) furnace N 352/AS has heating on four sides ensuring an excellent temperature distribution of ± 5K. The furnace is charged with a free-travelling bogie. The hearth reinforcement allows a max. charging weight of 500kg.

Model	T_{max} °C	Inner dimensions in mm* w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 352/AS	750	800	800	550	352	1800	1500	2600	18	3 phase	1600

[1] Notes on the supply voltage please see page 27 *other sizes on request

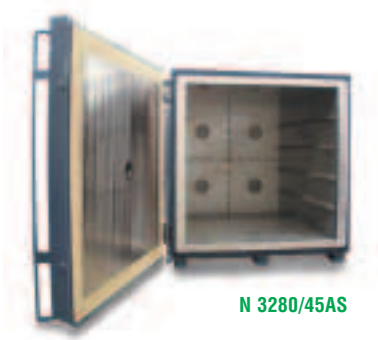
N 352/AS

N 3280/45AS

The combination of four high-power circulating-air fans in the rear wall of the furnace, an automatic air inlet and ventilation flaps gives an excellent temperature uniformity of ± 5K at temperatures up to 650°C. This ensures top quality of tempered components.

Model	T_{max} °C	Inner dimensions in mm* w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 3280/45AS	450	1350	1800	1350	3280	1800	2650	1900	50	3 phase	1100

[1] Notes on the supply voltage please see page 27 *other sizes on request



N 3280/45AS

Bogie hearth furnaces

W 1500/H with rails and door hinged on the left hand side

W 1000/G - W 7500/14

This tried and tested standard range of bogie hearth furnaces has impressive performance features and is suitable for most industrial glass processes, such as bending, slumping, tempering/cooling and decorating. Available in volumes up to 20,000 litres (20cu. m) and with special equipment versions, these models are part of our regular business.

- double-walled casing design made of galvanised sheet steel with rear ventilation
- heating from five sides: each side, door, rear wall and bogie, gives an excellent temperature distribution (standard furnace ± 10K, with multiple zone regulation, depending on application ± 5K or better is possible)
- free-moving and steerable bogie, runs on Pevolon casters; rail operation optionally available
- heating elements on support tubes provide free heat radiation and long service life
- exhaust flaps in the roof of the furnace for good ventilation and fast cooling
- bogie heating elements protected by SiC heat-conducting tiles that also provide level stacking support
- brick-lined roof arch, self-supporting and robust
- modern temperature regulation available with various controllers
- numerous versions available on request adapted to suit the process (see Accessories and Extras)
- high-quality, asbestos-free and energy saving insulation

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
W 1000/G	900	800	1600	800	1000	1400	2350	1780	40	3 phase	3000
W 1500/G	900	900	1900	900	1500	1500	2650	1910	57	3 phase	3500
W 2200/G	900	1000	2200	1000	2200	1600	2950	2020	75	3 phase	4000
W 3300/G	900	1000	2800	1200	3300	1600	3550	2220	110	3 phase	5300
W 5000/G	900	1000	3600	1400	5000	1600	4350	2420	140	3 phase	7500
W 7500/G	900	1000	5400	1400	7500	1600	6150	2420	185	3 phase	9100
W 1000	1280	800	1600	800	1000	1470	2400	1780	57	3 phase	3000
W 1500	1280	900	1900	900	1500	1570	2700	1910	75	3 phase	3500
W 2200	1280	1000	2200	1000	2200	1670	3000	2020	110	3 phase	4000
W 3300	1280	1000	2800	1200	3300	1670	3600	2220	140	3 phase	5300
W 5000	1280	1000	3600	1400	5000	1670	4400	2420	185	3 phase	7500
W 7500	1280	1000	5400	1400	7500	1670	6200	2420	235	3 phase	9100
W 1000/H	1340	800	1600	800	1000	1470	2400	1780	75	3 phase	3500
W 1500/H	1340	900	1900	900	1500	1570	2700	1910	110	3 phase	3800
W 2200/H	1340	1000	2200	1000	2200	1670	3000	2020	140	3 phase	4400
W 3300/H	1340	1000	2800	1200	3300	1670	3600	2220	185	3 phase	5500
W 5000/H	1340	1000	3600	1400	5000	1670	4400	2420	235	3 phase	8000
W 7500/H	1340	1000	5400	1400	7500	1670	6200	2420	370	3 phase	10000
W 1000/14	1400	800	1600	800	1000	1470	2400	1780	75	3 phase	3500
W 1500/14	1400	900	1900	900	1500	1570	2700	1910	110	3 phase	3800
W 2200/14	1400	1000	2200	1000	2200	1670	3000	2020	140	3 phase	4400
W 3300/14	1400	1000	2800	1200	3300	1670	3600	2220	185	3 phase	5500
W 5000/14	1400	1000	3600	1400	5000	1670	4400	2420	235	3 phase	8000
W 7500/14	1400	1000	5400	1400	7500	1670	6200	2420	370	3 phase	10000

[1] Notes on the supply voltage please see page 27

Bogie hearth furnaces with air circulation

W 1200/AS in special-size

W 1000/GA - W 2200/A

If a furnace with disturbed atmosphere can be employed for your process, we recommend our bogie hearth furnaces with air circulation.

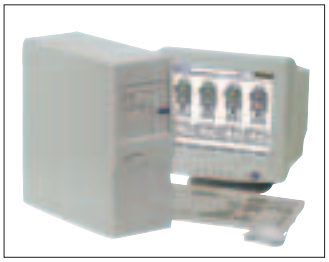
- bogie hearth furnace with free travelling steerable bogie
- high-quality, multi-layer insulation
- high-quality resistance wire coils, mounted on support tubes
- heating on both sides and bogie
- interior liner made of high-alloy special steel
- circulating air fan in the roof of the furnace
- entry of the circulated air through the hearth grid
- high rate of ventilation
- excellent temperature distribution (± 7 K)
- furnace housing made of aluminized sheet steel
- regulation with controller C 40
- automatic switching of the fan to protect the fan motor

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
W 1000/GA	550	800	1600	800	1000	1450	2400	2300	40	3 phase	2000
W 1500/GA	550	900	1900	900	1500	1550	2750	2400	56	3 phase	2200
W 2200/GA	550	1000	2200	1000	2200	1650	3000	2500	75	3 phase	2500
W 1000/A	750	800	1600	800	1000	1450	2400	2300	40	3 phase	2000
W 1500/A	750	900	1900	900	1500	1550	2750	2400	56	3 phase	2200
W 2200/A	750	1000	2200	1000	2200	1650	3000	2500	75	3 phase	2500

[1] Notes on the supply voltage please see page 27

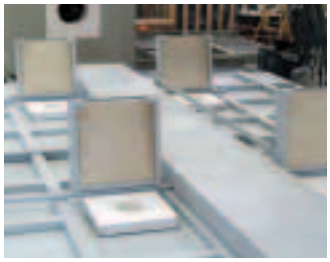
Accessories for bogie hearth furnaces, optional

cross-transfer system



PC control

fan cooling



automatic control of ventilation flaps

Tube furnaces

R 360/2400/12

Rotary furnace for continuous operation

R 200/2000/11 - R 600/2500/12

Nabertherm produces special tube furnaces to meet customer specifications for tempering long rods or tubes of glass or silica glass, or for mounting in continuous glass drawing facilities. The diameter of the tube and heated length are freely selectable to suit the products to be tempered. Heated lengths of several metres can easily be catered for if requested.

- multi-layer, high-quality insulation with inner lining of lightweight brick, fibre insulation is available as an option
- resistance wire coils on ceramic support tubes, freely radiating into the furnace chamber
- single-zone or multiple-zone versions available
- easy-to-open lift-up lid for maintenance, such as exchanging heating elements
- control gear in a separate cabinet
- T_{max} 1200 - 1400 °C possible
- available with and without process tube

Model	T_{max} °C	Inside tube diameter mm	Heated length mm	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
R 200/2000/11	1100	200	2000	550	2200	450	36	3 phase	1600
R 360/2400/12	1200	360	2400	900	2700	800	40	3 phase	1800
R 200/1800/12	1280	200	1800	650	2200	550	45	3 phase	1400
R 600/2500/12	1280	600	2500	1500	3050	1400	72	3 phase	2500

[1] Notes on supply voltage, please see page 27

Top-loading furnaces

S 14500

S 576 - S 14500

Top loading furnaces can be employed in many ways, they are especially suitable for tempering large and/or heavy parts. The furnace can be charged using a crane.

- heating from five sides: 4 sides and the hearth
- hearth heating elements protected by SiC tiles
- optional: side heating elements protected by SiC tiles when using a crane (photo)
- electro-hydraulic powered furnace lid (photo)
- furnace lid insulated with high-quality fibre material, wide opening for crane-charging
- high charge weight
- multi-layer insulation with lightweight refractory bricks on the hot face
- control system to suit process requirements
- intermediate and larger sizes also available

Side heating elements protected by SiC plates

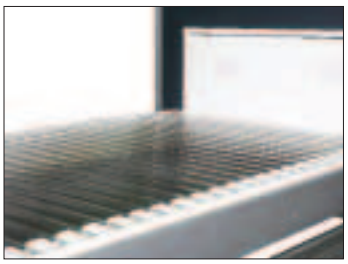
Electro-hydraulic powered furnace lid

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
S 576	1280	1600	600	600	576	2580	1350	1400	36	3 phase	1500
S 650	1280	2600	500	500	650	3580	1250	1300	40	3 phase	1700
S 750	1280	3000	500	500	750	3980	1250	1300	57	3 phase	1800
S 1470	1280	3000	700	700	1470	3980	1450	1500	75	3 phase	2200
S 1720	1280	3500	700	700	1715	3480	1500	1500	75	3 phase	2500
S 2200	1280	4500	700	700	2205	5480	1450	1500	110	3 phase	3200
S 3840	1280	6000	800	800	3840	6980	1550	1600	140	3 phase	4500
S 5500	1280	4500	1100	1100	5445	5480	1900	2100	185	3 phase	5900
S 14500	1280	5700	2300	1100	14450	7100	3300	2200	370	3 phase	14100

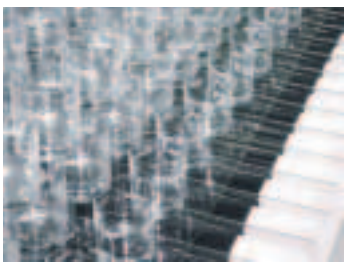
[1] Notes on supply voltage, please see page 27

Fast-fire decorating kilns

IR 500/90



Reflectors in the furnace table



IR 500/90 - IR 1000/90

Fast-fire exchangeable table for decorating glass and porcelain at maximum temperatures of 900°C. The infrared heating heats only the surface of the charged products. The resulting fast heat-up and cool-down times make this kiln ideal for rapid production of small batches. The exchangeable table system also shortens the turn round time, as one table can be charged while the other is in the kiln.

- infrared heating elements and reflectors in the furnace chamber
- fibre insulation for fast firing cycles (depending on the application and temperature typically three hours from cold to cold)
- exchangeable tables with rollers for easy manual movement
- automatic ventilation flap in the roof of the furnace
- modern, functional design
- control by state-of-the-art Nabertherm controller C 40

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
IR 500/90	900	1600	900	350	500	6000	1400	1300	36	3 phase	1100
IR 1000/90	900	3200	900	350	1000	12000	1400	1300	72	3 phase	2000

[1] Notes on supply voltage, please see page 27

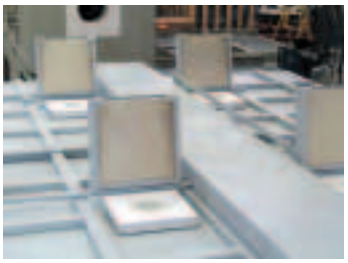
Top-hat furnaces

HG 3000

HG 750 - HG 3000

Nabertherm supplies a special series of top-hat (lift-off) furnaces, models HG 750 – HG 3300, for slumping and bending glass. Top and bottom heating ensures good temperature distribution which cannot be achieved by gas-firing. The models listed below are standard sizes. We can also supply top-hat furnaces with dimensions tailor-made to customers' requirements.

- T_{max} 900 °C
- simple charging from all four sides
- the hood can be completely removed by crane
- no bed plate necessary
- high-quality insulation, low connected power and very low energy consumption
- heating elements on support tubes allow free heat radiation and good temperature distribution
- hearth heating elements covered by SiC tiles
- heating is controlled in multiple zones for optimum adaptation to the process requirements
- table and hood heated (from the roof), both heating systems are controlled separately
- table heating can be switched off for fusing applications

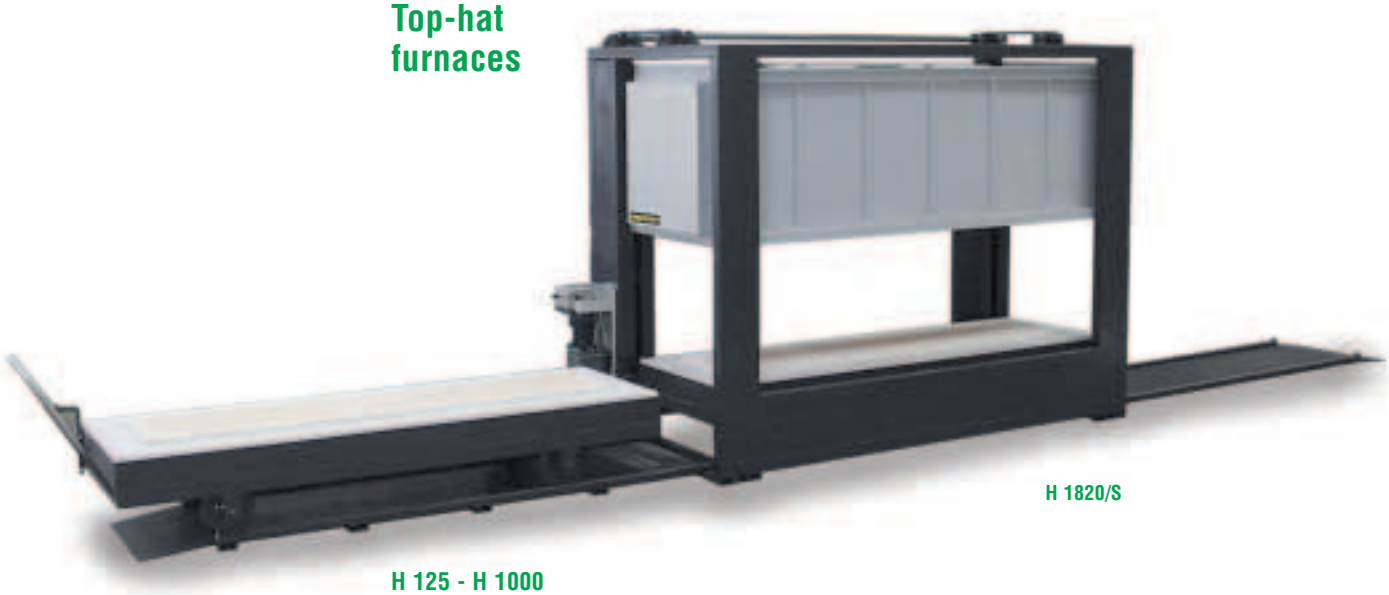


Ventilation flaps, optional

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
HG 750	900	2100	1200	300	756	2550	1800	1350	35	3 phase	1200
HG 1000	900	1750	1000	550	960	2200	1450	1600	33	3 phase	1500
HG 1500	900	2100	1250	550	1440	2550	1700	1600	44	3 phase	2000
HG 2200	900	2450	1500	550	2020	2900	1950	1600	55	3 phase	2500
HG 3000	900	3000	2200	400	2640	3500	2700	1450	75	3 phase	3400

[1] Notes on supply voltage, please see page 27

Top-hat furnaces



H 1820/S

H 125 - H 1000

This is an ideal range of furnaces for most fields of glass technology such as bending/slumping or cooling glass. The furnace can be charged from three sides. Due to the electro-hydraulic powered furnace hood, it can be moved with practically no vibration.

H 250

- T_{max} 1280 °C
- very uniform temperature distribution due to heating from five sides
- high-quality, multi-layered insulation
- heating elements on ceramic support tubes permit in free heat radiation to the furnace chamber
- electro-hydraulic powered hood with safety hydraulic fluid
- hearth heating elements protected by SiC tiles
- easy charging from three sides
- working height of table: 800 mm
- hood safety switch
- turn-key delivery with controller C 30 (H 125 - H 250) or controller C 40 (H 500 - H 1000)

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
H 125	1280	800	400	400	125	1330	1100	1900	12	3 phase	1250
H 250	1280	1000	500	500	250	1530	1200	2100	18	3 phase	1400
H 500	1280	1200	600	600	500	1730	1300	2200	36	3 phase	1800
H 1000	1280	1600	800	800	1000	2130	1500	2700	48	3 phase	2800

[1] Notes on supply voltage, please see page 27

H 1080

H 730/F

To save time and energy these top-hat furnaces can also be equipped with mobile hearths. These hearths are moved manually on tracks or if desired electrically. The major advantage is that one bogie can be charged while the other is in the furnace. When changing the bogie the heat remains in the hood so that the retained heat can be used for the next cycle. The furnaces have been used successfully for many years for tempering silica glass tubes and bars.

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
H 730/F	1280	600	600	600	729	900	900	900	84	3 phase	2500

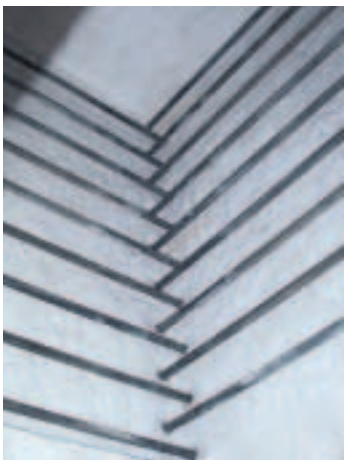
[1] Notes on supply voltage, please see page 27

HC 665

HC 700 - HC 1500

Ideal furnaces for tempering and sintering at temperatures up to 1500 °C.

- casing formed from electrolytically treated steel plate, coated in two colours
- fast heating time and uniform temperature distribution due to the hood being heated on four sides by SiC rods producing excellent firing results
- optimum protection of the products from contamination by heating elements
- high connected power for fast cycle times
- hood insulation by fibre material ensuring fast heat up and cool down with low energy consumption
- table built of light weight refractory bricks allow heavy loads and a firm level stacking surface
- electro-hydraulic powered hood gives vibration-free raising and lowering
- heating controlled by thyristors
- various models for maximum operating temperatures up to 1500 °C
- control system adapted to suit process requirements



Hood heated all around

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
HC 665	1400	1100	550	1100	1400	2350	2050	4000	186	3 phase	3000
HC 1275	1400	850	1000	1500	1275	2100	2500	4400	180	3 phase	4100
HC 1440	1400	840	2400	840	1440	2100	3900	3560	400	3 phase	4700
HC 1500	1400	1000	1000	1500	1500	2250	2500	4400	190	3 phase	5300
HC 1280	1450	800	1600	1000	1280	2050	3100	3900	151	3 phase	4200
HC 700	1500	800	800	1100	700	2050	2300	4000	100	3 phase	3100
HC 1400	1500	800	1600	1100	1400	2050	3100	4000	151	3 phase	4500

[1] Notes on supply voltage, please see page 27

Pull-out table, optional

HT 16/17

High-temperature furnaces, fibre insulated

HT 04/16 - HT 450/17, HT 04/18 - HT 40/18

Universally applicable for heat treating glass at temperatures up to 1800 °C

Due to the rugged design these high temperature furnaces are suitable for use both in the laboratory and for production when utmost precision is essential.

- available for T_{max} 1600, 1750 or 1800 °C
- furnace capacity from 4 to 450 litres
- high-quality molybdenum disilicide (Mo Si_2) heating elements
- parallel motion swing door guided by a chain enabling the door to be opened and closed safely without damaging the fibre insulation. Safe closing of the door by screw lock.
- special sealing of the door ensures low heat loss and optimizes the temperature distribution
- selectable temperature limit to protect the products
- furnace chamber lined with top quality durable fibre material
- controller C 42 for temperature regulation
- extras such as inert gas inlet or cooling fan available on request

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
HT 04/16	1600	150	150	150	4	610	470	1400	5	3 phase	120
HT 08/16	1600	150	300	150	8	610	610	1400	8	3 phase	160
HT 16/16	1600	200	300	260	16	710	650	1500	12	3 phase	200
HT 32/16	1600	200	600	260	32	710	930	1550	18	3 phase	350
HT 40/16	1600	300	350	350	40	810	710	1700	12	3 phase	350
HT 64/16	1600	400	400	400	64	1020	840	1700	18	3 phase	470
HT 128/16	1600	400	800	400	128	1020	1250	1750	28	3 phase	900
HT 160/16	1600	500	550	550	160	890	1270	1900	21	3 phase	890
HT 276/16	1600	500	1000	550	276	890	1720	1900	36	3 phase	1200
HT 450/16	1600	500	1150	780	450	890	1870	1900	36	3 phase	1500
HT 04/17	1750	150	150	150	4	610	470	1400	5	3 phase	120
HT 08/17	1750	150	300	150	8	610	610	1400	8	3 phase	160
HT 16/17	1750	200	300	260	16	710	650	1500	12	3 phase	200
HT 32/17	1750	200	600	260	32	710	930	1550	18	3 phase	350
HT 40/17	1750	300	350	350	40	810	710	1700	12	3 phase	350
HT 64/17	1750	400	400	400	64	1020	840	1700	18	3 phase	470
HT 128/17	1750	400	800	400	128	1020	1250	1750	28	3 phase	900
HT 160/17	1750	500	550	550	160	890	1270	1900	21	3 phase	890
HT 276/17	1750	500	1000	550	276	890	1720	1900	36	3 phase	1200
HT 450/17	1750	500	1150	780	450	890	1870	1900	36	3 phase	1500
HT 04/18	1800	150	150	150	4	610	470	1400	5	3 phase	120
HT 08/18	1800	150	300	150	8	610	610	1400	9	3 phase	160
HT 16/18	1800	200	300	260	16	710	650	1500	12	3 phase	200
HT 32/18	1800	200	600	260	32	710	930	1550	18	3 phase	350
HT 40/18	1800	300	350	350	40	810	710	1700	12	3 phase	350

[1] Notes on supply voltage, please see page 27

High-temperature furnaces, insulated with lightweight refractory bricks for melting tests

HFL 16/16

The HFL 16/16 model was especially developed for processes in which the fibre insulation could be heavily attacked or even destroyed by aggressive gases and vapours. This furnace is lined with a high quality special brick insulation. This insulation is considerably more durable against aggressive gases. Thus the furnace is ideal for glass melting tests.

- high quality insulation with lightweight refractory bricks
- low connected power, low heat loss
- door swivelled to the side with parallel motion
- molybdenum disilicide ($MoSi_2$) heating elements
- switchgear and control system in a separate wall cabinet
- reproducible accuracy of ± 2 K
- integral exhaust hood

HFL 16/16

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
HFL16/16	1600	200	300	270	16	720	900	1520	12	3 phase	500

[1] Notes on supply voltage, please see page 27

Top-hat furnaces

HT 64/17 LT - HT 400/17 LT

These high-temperature lift-off furnaces can be equipped with one or two hearths. Depending on the design, the hearths may be charged from three sides thus reducing the set-up times. Double hearth furnaces with automatic exchange reduce the cycle times still further.

- T_{max} 1750 °C
- simple, practical charging from up to three sides
- high quality Al_2O_3 fibre insulation and Kanthal Super heating elements ensure fast heating and cooling times
- automatic control of exhaust vents
- excellent temperature accuracy due to the special location of the heating elements
- double walled casing with fan cooling resulting in low exterior shell temperature
- reinforced hearth to bear heavy loads
- heating controlled by thyristors with starting circuit to protect the heating elements
- electro-hydraulic powered lifting of the furnace hood without vibration

HT 400/17LT with two hearths

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
HT 64/17LT	1750	400	400	400	64	920	1050	2100	26	3 phase	480
HT 166/17LT	1750	550	550	550	166	1100	1250	2250	42	3 phase	800
HT 276/17LT	1750	1000	500	550	276	2000	1400	2300	50	3 phase	1000
HT 400/17LT	1750	1200	600	550	400	2100	3500	2300	72	3 phase	1300

[1] Notes on supply voltage, please see page 27

Extras

- version with two hearths instead of one table
- automatic hearth exchange for version with two hearths
- air ventilation by fan for cooling, or with air preheater for purging (provides better clearing of the furnace chamber when gases are emitted during the heating-up process)
- inert gas inlet with silicone sealing of the furnace casing
- catalytic exhaust air cleaner
- scavenging air preheating for debinding in the lower temperature range

Laboratory furnaces
Chamber-furnaces

LH 15/12

LH 15/12 - LH 120/14

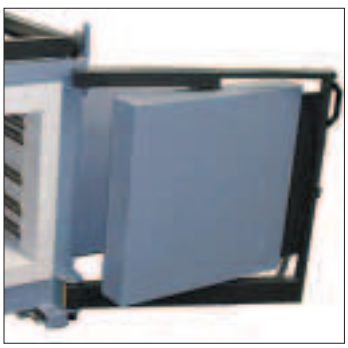
High-quality test or small production kiln for the glass industry

- heating on five sides for an exceptionally good temperature distribution
- available up to 900 °C for decorating, slumping/bending and cooling, and also for higher temperatures up to 1400 °C for sintering and tempering special glass
- heating elements on support tubes allow free heat radiation and long service life
- short heat-up times due to high connected power
- two-tone casing in titanium/anthracite
- handle for opening the door
- side exhaust vent with bypass connection for exhaust duct
- self-supporting arched roof provides high stability and maximum protection from dust
- double-wall, non-warping door with low exterior temperatures without fibre seal (brick on brick, ground in by hand)
- quick release door
- infinitely variable ventilation port
- multi-layer, fibre-free insulation made of lightweight refractory bricks and special backing insulation
- stand frame
- floor heating protected by SiC tile
- casing powder coated
- turn-key delivery with controller C 30

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
LH 15/12	1200	250	250	250	15	550	750	1170	5	3 phase*	150
LH 30/12	1200	320	320	320	30	620	820	1240	7	3 phase*	170
LH 60/12	1200	400	400	400	60	700	970	1320	8	3 phase	260
LH 120/12	1200	500	500	500	120	800	1070	1420	12	3 phase	340
LH 15/13	1300	250	250	250	15	550	750	1170	7	3 phase*	150
LH 30/13	1300	320	320	320	30	620	820	1240	8	3 phase*	170
LH 60/13	1300	400	400	400	60	700	970	1320	11	3 phase	260
LH 120/13	1300	500	500	500	120	800	1070	1420	15	3 phase	340
LH 15/14	1400	250	250	250	15	550	750	1170	8	3 phase*	150
LH 30/14	1400	320	320	320	30	620	820	1240	10	3 phase*	170
LH 60/14	1400	400	400	400	60	700	970	1320	12	3 phase	260
LH 120/14	1400	500	500	500	120	800	1070	1420	18	3 phase	340

[1] Notes on supply voltage, please see page 27

* only 2 phases connected



Parallel swivel door

Extras

- All models are available with a parallel swivel door for opening when hot. In addition to typical ceramic processes other laboratory processes can also be carried out with this furnace.
- To reduce the heat-up and cooling times the insulation can also be made of ceramic fibre instead of light refractory bricks. In this case the corner bricks are still laid with mortar in order to locate the heating element support tubes for free heat dissipation.

Glass plate test kiln

N 40/14

N 40/14

This kiln was designed to test different types of glass plates such as fire protection glass. In addition to the kiln door, there is a second frame which can be swung in front of the inner chamber into which the test plate is placed. This door is fixed with a special mechanism. The kiln chamber is flat and is heated by element coils supported on ceramic tubes mounted only on the back wall so that the heat radiates directly onto the glass surface. The kiln achieves exceptionally short cycle times due to the very small chamber volume and high power input.

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
N 40/14	1400	400	150	600	36	1000	600	1800	36	3 phase	250

[1] Notes on supply voltage, please see page 27

Gradient furnace

GR 1300/13

Why make things complex and time consuming when a simple and efficient solution is available? This was the principle behind Nabertherm's gradient furnace model GR 1300/13. It provides six results in one test. The furnace chamber is 1300 mm long divided into six zones each with a length of 166 mm. Each zone is independently heated and controlled by a seperate thermocouple. For temperature control there is one master controller C 40 and five C 6 slave controllers which follow the program set in the C 40. This control system permits a maximum temperature gradient of 400 °C over the total length of the heating chamber.

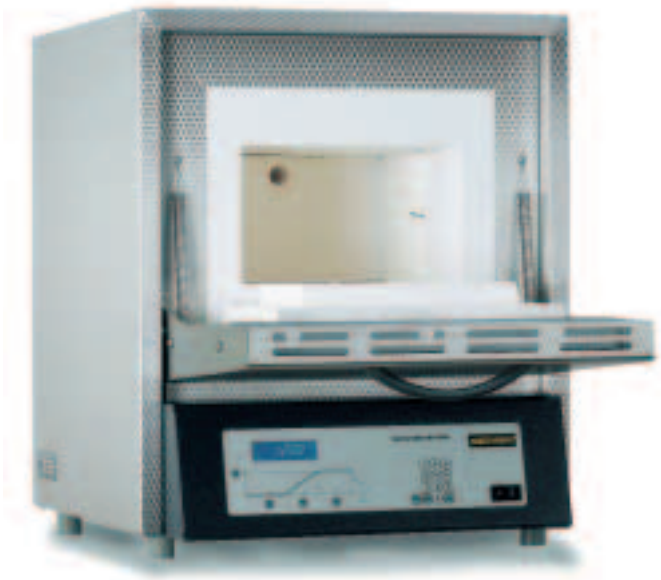
GR 1300/13

- heated length 1300 mm
- T_{max} 1300 °C
- multi-layer high grade insulation
- heating elements supported on ceramic tubes enabling free heat radiation in the kiln chamber
- top charging or from the end door
- separate control of the six heating zones
- temperature gradient 400 °C over the entire length of the heating chamber, each zone can be individually controlled
- switching and control system built into the bottom section of the kiln
- turn-key delivery including C 40 controller and five zone controllers C6z

Model	T_{max} °C	Inner dimensions in mm w	d	h	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
GR1300/13	1300	1300	100	60	1660	740	1345	18	3 phase	300

[1] Notes on supply voltage, please see page 27

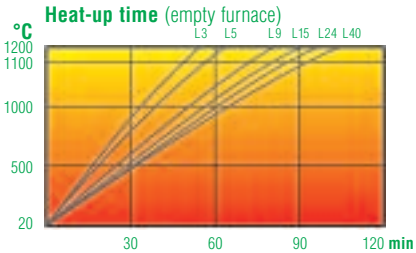
Laboratory furnaces
Box-type furnaces



L 15/11

L 3/12

Air inlet



L 3/11 - L 40/12

The balance between functional excellence and a visually attractive design, coupled with an optimum price/performance ratio, convinces several thousand new customers annually to choose these furnaces.

- double walled casing for low external temperatures and stability
- controllable air vent in the door (see illustration)
- rust-proof structured steel casing
- exhaust opening in the back wall
- optionally available with exhaust flue, exhaust flue with fan or with catalyst
- hardened vacuum fibre insulating module
- alternatively also available with durable brick insulation
- ceramic heating plates with integral resistance coils, easy to change and reasonably priced
- digital PID controller B 170 with adjustable ramp, hold temperature + hold time as standard, optional controller P 320 with 9 programs each with 4 ramps + hold time
- silent, electronic relay
- available for T_{max} up to 1100 or 1200 °C

Model	T_{max} °C	Inner dimensions in mm w	d	h	Volume in litres	Outer dimensions in mm w	d	h	Connected power/kW	Supply voltage[1]	Weight in kg
L 3/11	1100	160	140	100	3	380	370	420	1,2	1 phase	20
L 5/11	1100	200	170	130	5	440	470	520	2,4	1 phase	35
L 9/11	1100	230	240	170	9	480	550	570	3,0	1 phase	45
L 15/11	1100	230	340	170	15	480	660	570	3,6	1 phase	55
L 24/11	1100	280	340	250	24	560	640	650	4,5	3 phase*	75
L 40/11	1100	320	490	250	40	600	790	650	6,0	3 phase*	95
L 3/12	1200	160	140	100	3	380	370	420	1,2	1 phase	20
L 5/12	1200	200	170	130	5	440	470	520	2,4	1 phase	35
L 9/12	1200	230	240	170	9	480	550	570	3,0	1 phase	45
L 15/12	1200	230	340	170	15	480	660	570	3,6	1 phase	55
L 24/12	1200	280	340	250	24	560	640	650	4,5	3 phase*	75
L 40/12	1200	320	490	250	40	600	790	650	6,0	3 phase*	95

[1] Notes on supply voltage, please see page 27

* only 2 phases connected

Tube furnaces

R 30/250/12, single zone

R 60/750/13, triple zone

R 30/250/12 - R 100/1000/13

With our wide range of tube furnaces most laboratory requirements are covered.
Complete with work tube made of Silimantin 60 and two end plugs, this furnace suits many standard laboratory applications.

- rust-proof structured steel casing
- tube diameters from 30 to 100 mm, heated lengths from 250 to 1000 mm
- Silimantin 60 work tube with two end plugs as standard
- silent, electronic relay
- digital PID controller B 170 as standard
- optional controller P 320 with 9 programs each with 8 segments
- optional three-zone design with controller C 40 as master controller and 2 zone controllers C6z (from 750 mm heated length, with 1300 °C models)
- available for T_{max} 1200 °C or 1300 °C

Rotary kilns and hinged tube furnaces available. Please ask for our brochure.

Model	T_{max} °C	Outer dimensions in mm b	t	h	Tube-Ø mm	Heated length mm	Uniform Zone +/-5K mm	1-zone regulating system[1]	3-zone regulating system[1]	Connected power/kW	Weight in kg
R 30/250/12	1200	400	240	490	30	250	125	1 phase	-	1,2	20
R 40/250/12	1200	400	240	490	40	250	125	1 phase	-	1,2	20
R 30/500/12	1200	650	240	490	30	500	250	1 phase	-	1,8	25
R 40/500/12	1200	650	240	490	40	500	250	1 phase	-	1,8	25
R 60/750/12	1200	1000	360	640	60	750	375	1 phase	-	3,6	80
R 80/750/12	1200	1000	360	640	80	750	375	1 phase	-	3,6	80
R 100/1000/12	1200	1300	420	730	100	1000	500	3 phase	-	6,0	170
R 30/250/13	1300	400	240	490	30	250	125	1 phase	-	1,2	35
R 40/250/13	1300	400	240	490	40	250	125	1 phase	-	1,2	35
R 30/500/13	1300	650	240	490	30	500	250	1 phase	-	1,7	48
R 40/500/13	1300	650	240	490	40	500	250	1 phase	-	1,7	48
R 60/750/13*	1300	1000	360	640	60	750	375	3 phase	3 phase	4,0	120
R 80/750/13*	1300	1000	360	640	80	750	375	3 phase	3 phase	4,0	120
R 100/1000/13*	1300	1300	440	730	100	1000	500	3 phase	3 phase	6,0	230

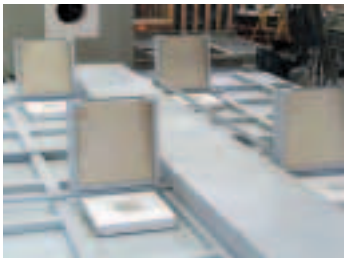
[1] Notes on supply voltage, please see page 27

*These models also available with triple zones.

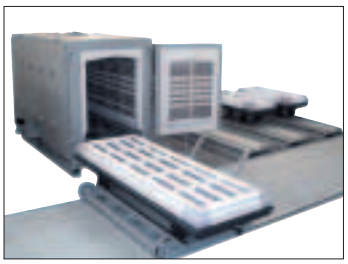
Accessories and extras

To meet the demands customers place on a furnace, we offer numerous useful accessories and extras.
By selecting from our wide range of accessories you can optimise a standard furnace to suit your processes:

- Fan cooling
  To reduce cooling times and scavenge the kiln chamber with clean air. Either controllable with a simple potentiometer for speed preselection, or linearly using an electronic control system (photo)



- Multiple zone control to enhance the temperature distribution
- Removable bogies for pre-loading top-hat furnaces
- Automatic control of the exhaust air flaps for better ventilation of the kiln chamber and to shorten cycle times (photo)
- Catalytic afterburning system for organic waste gases

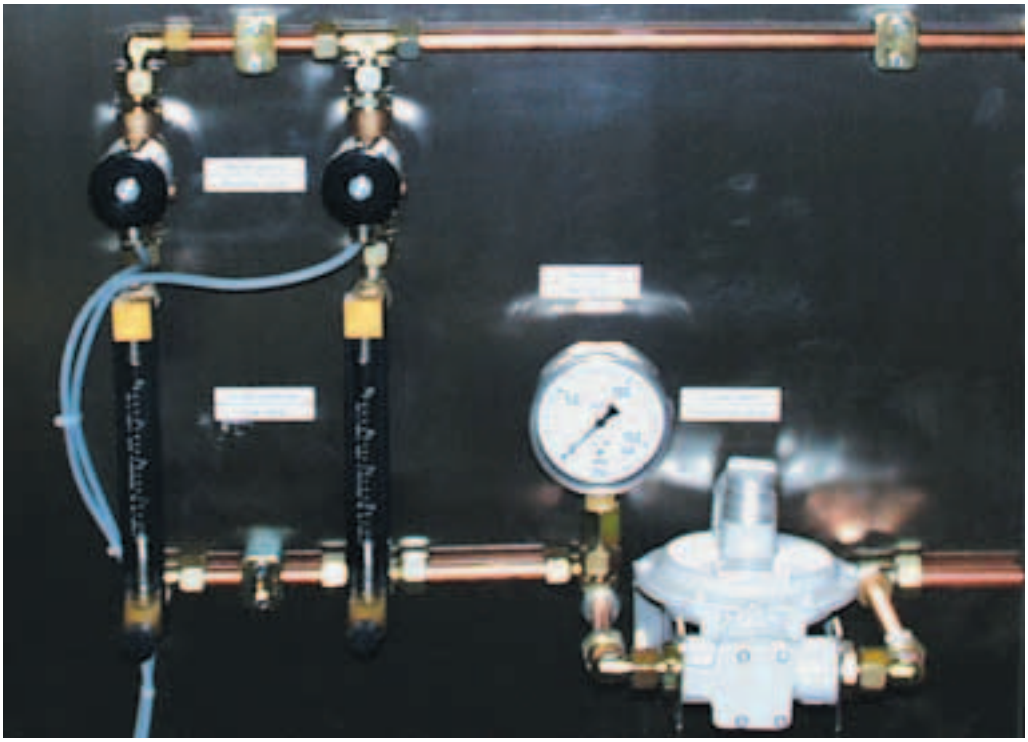


- Rails and flanged wheels
  Furnace bogies with flanged wheels running on tracks. Optionally with side transfer facility and parking stations to exchange bogies easily. Bogies can also be electrically powered (photo)
- Electro-hydraulic lifting door for opening the kiln when hot or for space saving (photo)

Further extras on request. Please contact us.

W 2640/GS with thermal afterburning system

Gas purge systems



For work done under controlled atmospheres we supply gas purging systems. These are basically available for all types and models, customized to suit the respective process conditions.

Gas system consisting of

- pressure reducer (from 10 mbar to 300 mbar)
- flow meter
- solenoid valves for low and high gas flows can be regulated by a controller
- additional timer for setting the pre-purge time for large gas flows
- automatic/manual selection switch and pilot lights

Purge systems available for

- air
- nitrogen
- argon
- forming gas (95% Nitrogen/5% Hydrogen)

Other gases on request.

Measuring and regulating technology

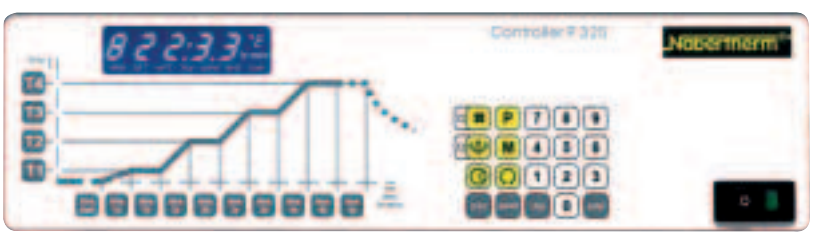
Regulating technology

Developing adapted furnace control systems is valued highly at Nabertherm. The top priority of every development is to make the furnace easy to use and provide maximum protection of the products, operator and the furnace itself. Depending on the furnace model, we offer a wide range of customized control systems to suit most requirements.

The **controllers C 30** and **C 40** (integrated controller) were especially developed for heat treating glass. Both controllers enable nine customer-specific temperature programs each with 18 segments that may be saved. Heating ramps can be programmed as can hold times and controlled cooling ramps. Through the programmable alarm relay (C 40: 2 alarm relays) additional functions such as the use of cooling fans or an automatic exhaust air flap can be controlled.

Both controllers have an RS 422 interface port for controlling and documenting the processes on a computer. An upgradable software MV X.2 is optionally available to simultaneously control up to 16 furnaces from a single PC.

The **controller P 320** enables complex programs with up to 8 segments to be stored in 9 programs. Depending on the program, additionally an extra function (e.g. exhaust fan or catalyzer) can be activated. A programmable acoustic signal which sounds after the hold time is also standard as is the digital RS 422 interface.



On request we can equip the controllers with a temperature selection limiter to protect the products and the furnace. If the furnace exceeds the set safety temperature this limiter switches off the furnace's heating.

Certain heat treatments require a process-orientated control. Many customer problems are solved by using a programmable logic control system (PLC). The PLC not only controls the temperature in the furnace but also reliably monitors all movement and interlocking processes.

Inputs are made through a keyboard or touch panel with a display of the heating curves as a table or graph. Our development engineers also make user-friendliness a top priority for this powerful control system. Of course the package also includes process documentation on the PC.

We offer a selection of different temperature plotters to easily document process curves. During the process, data is continuously recorded and either printed out on paper or saved to disk . This data can later be evaluated with standard spreadsheet programs.

Temperature selection limiter TL 6


Furnace monitoring software


Temperature plotter

Mains voltages for Nabertherm furnaces

1-phase: All furnaces are available for voltages of 110 V - 240 V, 50 or 60 Hz.

3-phase: All furnaces are available for voltages of 200 V - 240 V or 380 V - 480 V, 50 or 60 Hz.


Control system with PLC

Nabertherm
MORE THAN HEAT 30-3000 °C

The whole world of Nabertherm: www.nabertherm.com

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