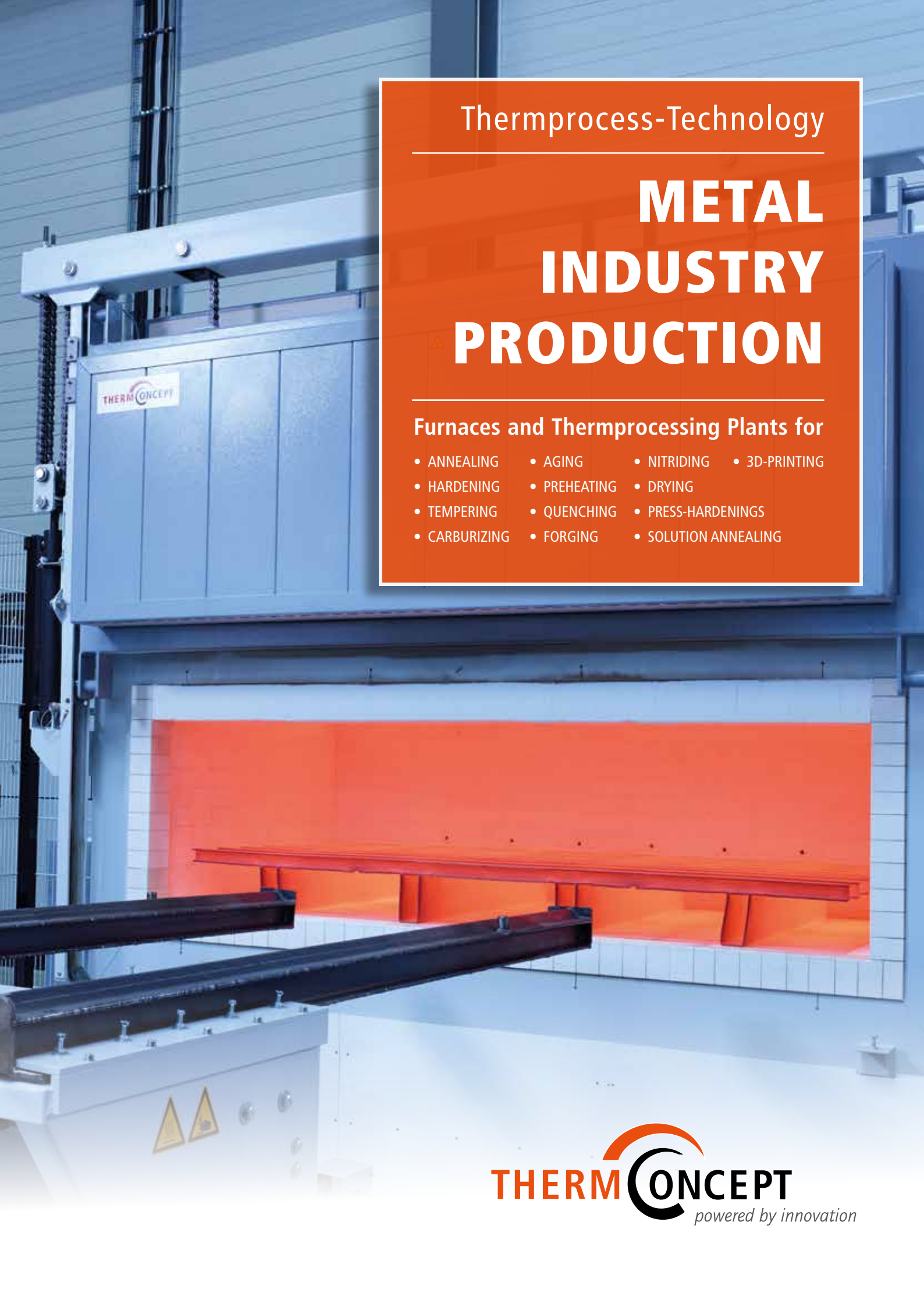

Thermprocess-Technology

METAL INDUSTRY PRODUCTION

Furnaces and Thermprocessing Plants for

- ANNEALING
- HARDENING
- TEMPERING
- CARBURIZING
- AGING
- PREHEATING
- QUENCHING
- FORGING
- NITRIDING
- DRYING
- PRESS-HARDENINGS
- SOLUTION ANNEALING
- 3D-PRINTING

THERMCONCEPT
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Experts in furnaces

THERMCONCEPT develops, designs and manufactures furnaces and industrial systems for a broad range of applications in production and R&D. Many of our employees have decades of experience in the field of furnace construction. We use the resulting expertise every day to plan and realize an optimal furnace solution.

Engineering

Our highly qualified engineers and technicians, hard- and software engineers and mechanics work out cost-effective and reliable solutions. A close contact to the user enables us to design furnaces that are practical to operate. Our aim is to provide crucial technical and economic benefits.

Fast and flexible

Many applications can be solved with our standard furnace range. Your advantages: Sophisticated equipment, proven in practice with excellent price/performance ratio and short delivery times. Of course we also deliver furnace systems especially tailored to your application. In close coordination with you a furnace system is created, which will meet your demanding tasks reliably and economically.

Automation and Industry 4.0

The need for automation in all areas of production is increasing constantly. THERMCONCEPT supplies adapted automated systems for batch handling. We are just as familiar with linear handling as we are with robot supported systems.

For monitoring, control and regulation of heat treatment processes we use sophisticated software and hardware components. Machine communication and technical assistance worldwide is part of our service profile.

Global Sales and Service Network

THERMCONCEPT furnaces prove their worth in daily use at satisfied customers in many countries around the world. Our international distribution network guarantees our customers individual support, fast reaction times and qualified service on site.

THERMCONCEPT *powered by innovation*

THERMCONCEPT furnaces and industrial heat treatment plants stand for:

- TOP quality and sophisticated technology
- Practical and service-friendly constructions
- Customer-specific and application-oriented solutions
- Highest possible thermal efficiency and economy
- Environmentally compatible materials
- Professional service, plant support and assurance of a reliable operation

THERMCONCEPT is your partner for high performance furnaces and plants for versatile and demanding applications in production and research.

CONTENTS

THERMCONCEPT
powered by innovation

INDUSTRIAL THERMPROCESSING PLANTS

for application temperatures from 50 - 1300 °C

THERMCONCEPT manufactures industrial furnaces and plants for a wide range of applications and a temperature range from 50 - 1300 °C. You have the choice between different furnace types, electrically heated and gas-fired systems and furnace systems operating under inert gas. The main areas of application are heat treatment of steel materials, non-ferrous metals, plastics and fibre-reinforced composite materials.

Gas-heated bogie hearth furnace for stress relieving of welded structures

Preheating furnace with robot supported charging for press-hardening of sheet metals

Heat treatment of Steel materials

Annealing in air and under protective gas:

- Solution annealing
- Coarse grain annealing
- Soft annealing
- Recrystallisation annealing
- Diffusion annealing

Hardening and quenching:

- in water
- in cold air
- in oil
- in polymers
- in salt

Tempering:

- in air
- in inert gas
- in salt

Carburizing, nitriding, boriding, soldering:

- in annealing or gas boxes

Preheating processes

- Welding
- Forging
- Hot forming
- Deposition welding
- Press hardening
- Platinum warming
- Mould preheating
- Workpiece heating

Heat treatment of non-ferrous metals (Aluminium, Titanium, Copper, ...)

- Solution annealing
- Tempering
- Artificial ageing
- Ageing
- Recovery annealing
- Quenching and tempering
- Hydrogen annealing
- Soft annealing

Heat treatment of fiber composite materials, plastics, rubber, silicone, PTFE, EN 1539

- Curing
- Tempering
- Drying
- Preheating
- Vulcanization
- Conditioning
- Lacquer drying

Thermal cleaning

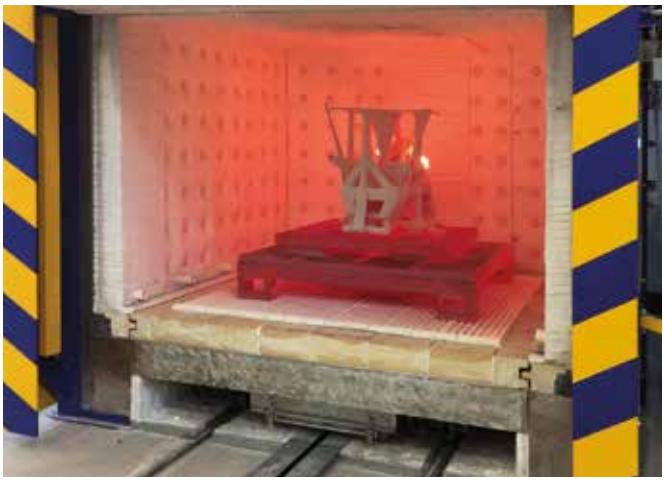
- Electric and gas-fired furnace systems
- With integrated exhaust gas aftertreatment

3D - printing and additive manufacturing of ceramics, metals, glass, plastics

- De-binding
- Melting out
- Sintering
- Hardening
- Curing
- Stress-relieving
- Solution annealing
- Tempering

Fully automatic quenching and tempering system for aluminium components (solution annealing furnace, water bath, aging furnace)

Electrically heated furnace plant (volume. 84m³) for vacuum tempering of structural components for railway vehicles made from innovative composites



Gas-fired bogie hearth furnace for de-waxing and firing of investment casting moulds, with integrated thermal post-combustion

Production line consisting of 4 high-temperature tube furnaces for de-binding and sintering of ceramics after 3D printing

KU 15/06/A

KU 70/06/A

AIR CIRCULATION CHAMBER FURNACES

KU 40/04/A – KU 800/06/A

T max. 450 °C and 650 °C

- Air-circulation chamber furnaces up to 450 °C and 650 °C, especially suitable for tempering, aging, preheating, drying, shrinking, baking, testing …
- Rugged housing constructions made from high-quality steel sheets
- Swing door hinged on the right side
- Inner air baffle made of heat resistant stainless steel, with a long service life, extremely durable and corrosion resistant
- Standard version with 2 pairs of sliding ledges for optional trays
- High-quality heating elements with long service life, uniform and fast heat transfer, mounted in the air flow of the air circulation system
- Powerful horizontal air circulation guarantees an even temperature distribution up to +/- 5 K according to DIN 17052
- High-quality insulation for low energy consumption and low electricity costs.
- Base frame included in standard scope of supply
- KU 15/06/A as a compact workbench furnace, designed in combination with the hardening system HS 1 (see page 68), without base and slide-in ledges

Options:

- Pneumatic lift door with hand or foot switch
- Automatic supply and exhaust air flap control for furnace ventilation
- Automatic cooling system for forced cooling
- Bores and feedthroughs as access to the kiln chamber
- Gas boxes for heat treatment under protective gas and suitable charging trolleys for easy handling
- Inspection windows
- Eurotherm Controller with recorder function, interfaces and documentation software
- Calibration of thermocouple and controller at different temperatures
- Control of the heating elements via solid state relays (SSR)
- Customer-specific modifications and designs

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KU 40/04/A	450	300 x 400 x 300	35	570 x 1050 x 1270	3,2	400 3/N	115
KU 70/04/A	450	350 x 500 x 400	70	620 x 1150 x 1370	6,4	400 3/N	130
KU 140/04/A	450	450 x 600 x 500	135	720 x 1250 x 1470	9,6	400 3/N	205
KU 270/04/A	450	600 x 750 x 600	270	870 x 1450 x 1620	12,8	400 3/N	370
KU 540/04/A	450	750 x 900 x 800	540	1020 x 1600 x 1820	19,2	400 3/N	540
KU 800/04/A	450	800 x 1250 x 800	800	1050 x 1900 x 1820	24,0	400 3/N	850
KU 15/06/A	650	300 x 350 x 150	15	500 x 900 x 440	2,4	230 1/N	50
KU 40/06/A	650	300 x 400 x 300	35	580 x 1070 x 1270	4,0	400 3/N	125
KU 70/06/A	650	350 x 500 x 400	70	630 x 1170 x 1370	8,0	400 3/N	140
KU 140/06/A	650	450 x 600 x 500	135	730 x 1270 x 1470	12,0	400 3/N	220
KU 270/06/A	650	600 x 750 x 600	270	920 x 1570 x 1610	16,0	400 3/N	390
KU 540/06/A	650	750 x 900 x 800	540	1080 x 1620 x 1820	27,0	400 3/N	560
KU 800/06/A	650	800 x 1250 x 800	800	1180 x 1920 x 1820	35,0	400 3/N	895

*Width without control cabinet (+ 260 mm), height incl. base frame; loading height: approx. 900 mm | Other sizes on request

AIR CIRCULATION CHAMBER FURNACES

KU 40/07/A – KU 800/08/A

T max. 750 °C and 850 °C

- Air-circulation chamber furnaces, suitable for almost all processes up to 850 °C where high temperature accuracy is required, such as tempering, aging, preheating, shrinking, testing…
- Rugged housing made of high-quality sheet steel with swing door hinged on the right side
- Inner air-baffle made of heat-resistant stainless steel, extremely durable and corrosion-resistant, with long service life
- Equipped with 2 pairs of sliding ledges, trays for charging on several levels optionally available
- Models up to 750 °C in semi-gastight design suitable for operation with non-flammable protective gases such as argon or nitrogen
- Multi-sided heating with powerful horizontal air circulation for uniform temperature distribution up to +/- 3 K according to DIN 17052 (750 °C models)
- High-quality heating elements with long service life, mounted in the air flow of the air circulation system
- High-quality insulation for low energy consumption and low electricity costs
- Base frame included in standard scope of delivery

Air-circulation chamber furnace up to 750 °C also available in low-dust design with completely covered insulation.

Air-cirulation chamber furnace with gas box and fork-lift stacker

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KU 40/07/A	750	300 x 400 x 300	35	680 x 1180 x 1430	5,2	400 3/N	290
KU 70/07/A	750	350 x 500 x 400	70	730 x 1280 x 1530	10,4	400 3/N	360
KU 140/07/A	750	450 x 600 x 500	270	810 x 1380 x 1650	14,0	400 3/N	580
KU 270/07/A	750	600 x 750 x 600	270	1040 x 1730 x 1800	21,0	400 3/N	770
KU 540/07/A	750	750 x 900 x 800	540	1190 x 1880 x 2010	28,0	400 3/N	920
KU 800/07/A	750	800 x 1250 x 800	800	1240 x 2180 x 2010	40,0	400 3/N	1105
KU 40/08/A	850	300 x 400 x 300	35	850 x 1360 x 1470	6,0	400 3/N	290
KU 70/08/A	850	350 x 500 x 400	70	900 x 1460 x 1570	9,0	400 3/N	360
KU 140/08/A	850	450 x 600 x 500	135	1000 x 1560 x 1670	15,0	400 3/N	580
KU 270/08/A	850	600 x 750 x 600	270	1150 x 1710 x 1770	20,0	400 3/N	770
KU 540/08/A	850	750 x 900 x 800	540	1330 x 1910 x 2125	30,0	400 3/N	970
KU 800/08/A	850	800 x 1250 x 800	800	1380 x 2260 x 2125	40,0	400 3/N	1340

*Width without control cabinet (+ 260 mm), height incl. base frame; loading height: approx. 900 mm | Other sizes on request

AIR CIRCULATION CHAMBER FURNACES

KT 1000/02/A – KT 8000/04/A

T max. 250 °C and 450 °C

- Furnaces for maximum temperatures of 250 °C and 450 °C, e.g. for drying and preheating of large batches
- All furnaces with horizontal or vertical airflow, electrically heated
- Robust design with double-walled housing, inside covering of insulation and air guide box made of heat-resistant stainless steel
- Furnace door designed as single-wing or double-wing swing door
- High-quality insulation with low heat losses and power consumption. In addition inside covered with metal sheets to prevent charge from dust contamination
- Powerful air-circulation fans for high air exchange and optimum temperature distribution of up to +/- 5 K according to DIN 17052 inside the usable chamber
- Manual exhaust air flaps

Options:

- Pneumatic, electric or hydraulic lift door
- Entry ramp/drive-in-tracks for ground level entry with charging trolley
- Individually adapted charging trolleys with and without shelving system
- Rail-bound charging carriages with electric drive
- Automatic supply and exhaust air flap control for furnace ventilation
- Air inlet fan for smooth furnace chamber ventilation and atmosphere exchange
- Automatic cooling system for forced cooling and air exchange
- Inspection window and furnace chamber lighting
- All models also available with indirect gas heating
- Optical/Acoustic Signals
- Second door instead of furnace rear wall
- Connections for vacuum pump and thermocouples

Technical Data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KT 1000/02/A	250	1000 x 850 x 1200	1020	1700 x 1400 x 1750	17,0	400 3/N	670
KT 1500/02/A	250	1000 x 850 x 1850	1570	1800 x 2100 x 2400	20,0	400 3/N	810
KT 2000/02/A	250	1100 x 1500 x 1200	1980	1900 x 2900 x 1750	27,0	400 3/N	1100
KT 3000/02/A	250	1000 x 1500 x 2000	3000	1800 x 2900 x 2500	30,0	400 3/N	1300
KT 4000/02/A	250	2200 x 1500 x 1200	3960	3000 x 2900 x 1750	41,0	400 3/N	1650
KT 4000/02/A1	250	1100 x 1500 x 2300	3795	1900 x 2900 x 2900	41,0	400 3/N	1650
KT 5000/02/A	250	2000 x 2000 x 1250	5000	2900 x 3700 x 1800	48,0	400 3/N	1700
KT 6000/02/A	250	2000 x 2000 x 1500	6000	2900 x 3700 x 2000	66,0	400 3/N	1800
KT 8000/02/A	250	2200 x 1500 x 2300	7590	3100 x 2900 x 2900	78,0	400 3/N	1900

Other sizes on request

EN 1539

Low-temperature ovens and cabinets for drying and heating of coatings, lacquers and hard and soft materials are used in production and for R&D applications. If any flammable substances, e.g. solvents, emerge from the charge and create a flammable gas mixture in the chamber, the oven must comply with EN 1539 and need to have suitable safety devices in order to prevent the formation of a flammable gas mixture.

For many models THEMCONCEPT offers optionally an EN 1539 compliant version. The furnaces are defined as "drayer type A" with:

- monitored air exchange
- monitored air-circulation system
- secured pre-rinse time
- additionally sealed working chamber
- flushing rate of fresh air individually adapted to the process requirements

Vacuum laminating of CFRP components

For the production of laminated CFRP components the resins and adhesives used would have to be dried. Emerging waste gases and fumes must be discharged. At same time the air trapped in the material has to be removed to achieve the desired stability of the parts. For this purpose, the components are packed in vacuum bags and loaded in the THERMCONCEPT low-temperature oven. The vacuum pump is connected to the vacuum bags. The parts in bags will be evacuated and finally heated in the furnace. For this process THERMCONCEPT supplies standard low-temperature furnaces or custom-made ovens incl. vacuum feed-through with the appropriate connections in the furnace as well as a combined PLC for overall control of temperature and vacuum. Corresponding vacuum pumps can be also offered by THERMCONCEPT.

KT 84000/02/AS Electrically heated oven system for vacuum annealing of structural components for railway vehicles made of innovative CFRP components.

Lighting

Connections for vacuum pump and batch thermocouples

Adjustable circulating air distribution

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KT 1000/04/A	450	1000 x 850 x 1200	1020	1700 x 1400 x 1750	20,0	400 3/N	670
KT 1500/04/A	450	1000 x 850 x 1850	1570	1800 x 2100 x 2400	36,0	400 3/N	810
KT 2000/04/A	450	1100 x 1500 x 1200	1980	1900 x 2900 x 1750	41,0	400 3/N	1100
KT 3000/04/A	450	1000 x 1500 x 2000	3000	1800 x 2900 x 2500	48,0	400 3/N	1300
KT 4000/04/A	450	2200 x 1500 x 1200	3960	3000 x 2900 x 1750	53,0	400 3/N	1650
KT 4000/04/A1	450	1100 x 1500 x 2300	3795	1900 x 2900 x 2900	53,0	400 3/N	1650
KT 5000/04/A	450	2000 x 2000 x 1250	5000	2900 x 3700 x 1800	66,0	400 3/N	1700
KT 6000/04/A	450	2000 x 2000 x 1500	6000	2900 x 3700 x 2000	90,0	400 3/N	1800
KT 8000/04/A	450	2200 x 1500 x 2300	7590	3100 x 2900 x 2900	96,0	400 3/N	1900

Other sizes on request

AIR CIRCULATION CHAMBER FURNACES

KM 1000/06/A - KM 4000/08/A1

T max. 650 °C and 850 °C

- Air-circulation chamber furnaces for heavy industrial use, suitable for batch weights of several tons depending on design
- Robust housing made of high-quality sheet steel
- Inner housing made of heat-resistant stainless steel with long service life, extremely resistant and corrosion withstanding
- Furnace designed with parallel-guided door
- High-quality heating elements with long service life
- Multi-sided heating and powerful horizontal air circulation for even temperature distribution up to +/- 5 K according to DIN 17052 inside the usable chamber
- Optimum air flow due to air guidance system with adapted arrangement of air outlet openings
- High-quality insulation for low energy consumption and low electricity costs

Options:

- Pneumatic, electric or hydraulic lift door
- Automatic exhaust air flap control
- Powerful fan cooling
- Semi-gastight furnace with protective gas connection for operation under non-flammable protective gas
- Gas supply systems
- Charging racks and aids
- Optical/Acoustic Signals
- Individual solutions adapted to customers needs

KM 2050/04/AS

Air-circulation chamber furnace up to 450 °C with 4 separate, individually accessible chambers each with 500 litres, for the aging of aluminium pistons in baskets after solution annealing

KU 840/07/AS

Air-circulation chamber furnace up to 750 °C with internal dimensions of 750 x 3000 x 400 mm (w x d x h) for the heat treatment of rods, profiles and plate materials. With shelve supports on both sides, lift door and entry aid in the base frame for easy loading of long components.

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KM 1000/06/A	650	1000 x 1000 x 1000	1000	1320 x 1780 x 1940	39	400 3/N	1300
KM 1500/06/A	650	1500 x 1000 x 1000	1500	2020 x 2150 x 1750	51	400 3/N	1500
KM 1500/06/A1	650	1000 x 1500 x 1000	1500	1520 x 2650 x 1750	51	400 3/N	1500
KM 2000/06/A	650	2000 x 1000 x 1000	2000	2520 x 2150 x 1750	75	400 3/N	1750
KM 2000/06/A1	650	1000 x 2000 x 1000	2000	1520 x 2650 x 1750	75	400 3/N	1750
KM 4000/06/A	650	2200 x 1500 x 1200	3960	2750 x 2650 x 2140	85	400 3/N	2300
KM 4000/06/A1	650	1500 x 2200 x 1200	3960	2020 x 2850 x 2140	85	400 3/N	2300
KM 1000/08/A	850	1000 x 1000 x 1000	1000	1320 x 1780 x 1940	45	400 3/N	1300
KM 1500/08/A	850	1500 x 1000 x 1000	1500	2020 x 2150 x 1750	65	400 3/N	1500
KM 1500/08/A1	850	1000 x 1500 x 1000	1500	1520 x 2650 x 1750	65	400 3/N	1500
KM 2000/08/A	850	2000 x 1000 x 1000	2000	2520 x 2150 x 1750	83	400 3/N	1750
KM 2000/08/A1	850	1000 x 2000 x 1000	2000	1520 x 2650 x 1750	83	400 3/N	1750
KM 4000/08/A	850	2200 x 1500 x 1200	3960	2750 x 2650 x 2140	97	400 3/N	2300
KM 4000/08/A1	850	1500 x 2200 x 1200	3960	2020 x 2850 x 2140	97	400 3/N	2300

Other sizes on request

AIR-CIRCULATING BOGIE HEARTH FURNACES

WM 1000/02/A – WM 7200/04/A

T max. 250 °C and 450 °C

- All furnaces electrically heated with horizontal or vertical airflow
- Ovens for maximum temperatures of 250 °C and 450 °C, e.g. for drying, preheating and ageing of large batches
- Robust, double-walled housing constructions, inner housing covering the insulation and air baffle made of heat-resistant stainless steel
- Furnaces in standard version with parallel-guided swing door
- Powerful recirculation fans for high air exchange and optimum temperature distribution of up to +/-5 K according to DIN 17052 in the usable chamber
- High-quality insulation with low heat losses and low power consumption
- Rail-bound bogie with flange wheels for above-floor or underfloor installation
- Manual exhaust air flaps

Options:

- Lift door with electric or hydraulic drive
- Automatic fresh air and exhaust air flap control for furnace ventilation and faster cooling
- Air inlet fan for smooth furnace chamber ventilation and atmosphere exchange
- Automatic cooling system for forced cooling
- Electric bogie drive
- 2. bogie
- Furnace installation with transverse shunting track for several bogies and parking rails
- Second door on the rear wall of the furnace for operation with two bogies
- Bogie hearth freely movable on wheels
- Indirect gas heating
- Connections for vacuum pump and thermocouples inside furnace chamber
- Customer-specific designs

Technical Data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
WM 1000/02/A	250	1000 x 1000 x 1000	1000	2200 x 1800 x 3200	32	400 3/N	1130
WM 1500/02/A	250	1000 x 1500 x 1000	1500	2200 x 2300 x 3200	47	400 3/N	1290
WM 2000/02/A	250	1000 x 2000 x 1000	2000	2200 x 2800 x 3200	59	400 3/N	1420
WM 3500/02/A	250	1300 x 2500 x 1100	3580	2500 x 3100 x 3500	72	400 3/N	1740
WM 5000/02/A	250	1300 x 3100 x 1250	5040	2500 x 3800 x 3700	78	400 3/N	1900
WM 7200/02/A	250	1500 x 3100 x 1500	6980	2800 x 3800 x 3900	93	400 3/N	2700
WM 1000/04/A	450	1000 x 1000 x 1000	1000	2200 x 1800 x 3200	41	400 3/N	1130
WM 1500/04/A	450	1000 x 1500 x 1000	1500	2200 x 2300 x 3200	53	400 3/N	1290
WM 2000/04/A	450	1000 x 2000 x 1000	2000	2200 x 2800 x 3200	68	400 3/N	1420
WM 3500/04/A	450	1300 x 2500 x 1100	3580	2500 x 3100 x 3500	81	400 3/N	1740
WM 5000/04/A	450	1300 x 3100 x 1250	5040	2500 x 3800 x 3700	87	400 3/N	1900
WM 7200/04/A	450	1500 x 3100 x 1500	6980	2800 x 3800 x 3900	102	400 3/N	2700

Other sizes on request

AIR CIRCULATION BOGIE HEARTH FURNACES

WM 1000/06/A – WM 7200/08/A

T max. 650 °C and 850 °C

- These bogie hearth furnaces are particularly suitable for the heat treatment of large batches with high work load.
- Vertical air flow, optimum temperature distribution inside the usable dimensions of up to +/-5 K according to DIN 17052
- Furnaces for maximum temperatures of 650 °C and 850 °C
- Robust housing design and inner housing made of heat-resistant stainless steel
- Furnace door in the standard version designed as parallel guided swing door
- Strong bogie equipped with flanged wheels on rails incl. rails in front of the furnace, bogie completely covered with stainless steel plates
- High-quality, multi-layer insulation for low heat losses and low power consumption
- Powerful air-circulation fans in the furnace ceiling
- Manual exhaust air flaps

Options:

- Lift door with electric or hydraulic drive
- Automatic fresh air and exhaust air flap control for furnace venting and faster cooling
- Automatic cooling system for forced cooling
- Electric bogie drive
- 2. bogie
- Furnace installation with transverse shunting track for several bogies and parking rails
- Second door on the rear wall of the furnace for operation with two bogies
- Custom-made designs
- Support grate for bogie made of heat-resistant cast steel for optimum load distribution
- Bogie hearth furnaces also available gas-heated

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
WM 1000/06/A	650	1000 x 1000 x 1000	1000	2200 x 1800 x 3200	47	400 3/N	1420
WM 1500/06/A	650	1000 x 1500 x 1000	1500	2200 x 2300 x 3200	59	400 3/N	1570
WM 2000/06/A	650	1000 x 2000 x 1000	2000	2200 x 2800 x 3200	75	400 3/N	1950
WM 3500/06/A	650	1300 x 2500 x 1100	3580	2500 x 3100 x 3500	93	400 3/N	2400
WM 5000/06/A	650	1300 x 3100 x 1250	5040	2500 x 3800 x 3700	101	400 3/N	4600
WM 7200/06/A	650	1500 x 3100 x 1500	6980	2800 x 3800 x 3900	117	400 3/N	5300
WM 1000/08/A	850	1000 x 1000 x 1000	1000	2200 x 1800 x 3200	50	400 3/N	1420
WM 1500/08/A	850	1000 x 1500 x 1000	1500	2200 x 2300 x 3200	66	400 3/N	1570
WM 2000/08/A	850	1000 x 2000 x 1000	2000	2200 x 2800 x 3200	86	400 3/N	1950
WM 3500/08/A	850	1300 x 2500 x 1100	3580	2500 x 3100 x 3500	101	400 3/N	2400
WM 5000/08/A	850	1300 x 3100 x 1250	5040	2500 x 3800 x 3700	156	400 3/N	4600
WM 7200/08/A	850	1500 x 3100 x 1500	6980	2800 x 3800 x 3900	168	400 3/N	5300

Other sizes on request

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AIR CIRCULATION PIT-TYPE FURNACES

with vertical airflow

SU 40/04/VA – SU 800/07/VA

T max. 450 °C, 650 °C and 750 °C

Air-circulating pit-type furnaces allow charging from the top. Due to the square base, baskets can be used for loading. Long components can also be placed hanging in the furnace.

- Robust housing constructions made of high-quality steel sheets
- Inner housing made of heat-resistant stainless steel with a long service life, extremely resistant and corrosion withstanding
- Vertical air circulation with optimum air guidance through air baffle system with adapted arrangement of air outlet openings
- Excellent temperature distribution of up to +/- 3 K according to DIN 17052 (750 °C models)
- Heating by high-quality tube heating elements with long service life
- High-quality insulation for low energy consumption and low electricity costs
- Hand crane available as charging aid (option)

Options:

- Pneumatic lid movement
- Powerful fan cooling
- 750 °C furnaces in semi-gastight design with gas connection for protective gas applications
- Charging baskets
- Gas boxes for heat treatment under protective gas
- Gas supply systems

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	Voltage [V]	Weight [kg]
SU 40/ 04/06/07 /VA	450 / 650 / 750	300 x 300 x 400	35	400 3/N	130
SU 70/ 04/06/07 /VA	450 / 650 / 750	350 x 400 x 500	70	400 3/N	145
SU 140/ 04/06/07 /VA	450 / 650 / 750	450 x 500 x 600	135	400 3/N	230
SU 270/ 04/06/07 /VA	450 / 650 / 750	600 x 600 x 750	270	400 3/N	495
SU 540/ 04/06/07 /VA	450 / 650 / 750	750 x 800 x 900	540	400 3/N	580
SU 800/ 04/06/07 /VA	450 / 650 / 750	800 x 800 x 1250	800	400 3/N	830

AIR CIRCULATION PIT-TYPE FURNACES

with vertical air guide cylinder

SU 220/07/VAZ – SU 1810/07/VAZ

T max. 750 °C

- Durable, robust production furnaces, designed for continuous operation with high batch weights
- Furnace equipped with round air guide cylinder for stacking several round baskets
- Powerful air circulation fan with very high air speed and forced guidance through the charge
- Excellent temperature distribution of up to +/- 3K according to DIN 17052
- Heating by high-quality heating elements with long service life
- High-quality insulation for low energy consumption and low electricity costs

Options:

- Pneumatic lid drive
- Automatically controlled fresh air and exhaust air flaps
- Powerful cooling system
- Semi-gas-tight design for protective gas applications
- Gas supply systems
- Customized design and other temperature ranges on request

Technical data

Model	T max. [°C]	Internal dimensions [mm] Ø x Höhe	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]
SU 220/07/VAZ	750	630 x 700	220	1100 x 1100 x 1580	24	400 3/N
SU 310/07/VAZ	750	630 x 1000	310	1100 x 1100 x 1880	32	400 3/N
SU 380/07/VAZ	750	630 x 1200	380	1100 x 1100 x 2080	36	400 3/N
SU 700/07/VAZ	750	900 x 1100	700	1600 x 2400 x 1800	54	400 3/N
SU 1020/07/VAZ	750	900 x 1600	1020	1800 x 2500 x 1800	80	400 3/N
SU 1050/07/VAZ	750	1100 x 1100	1050	1800 x 2800 x 2200	84	400 3/N
SU 1810/07/VAZ	750	1100 x 1900	1810	2000 x 3100 x 2200	105	400 3/N

Other sizes on request

Model SM 1000/06/HA consisting of four shaft furnaces for heat treatment of machine parts

AIR CIRCULATION PIT-TYPE FURNACES

with horizontal airflow

SM 1000/06/HA – SM 2000/08/HA

T max. 650 °C and 850 °C

Air-circulating pit-type furnaces are particularly suitable for the heat treatment of heavy parts.

Large individual components or baskets can be easily loaded from the top by crane.

- Robust housing constructions made of high-quality sheet steel
- Inner housing made of heat-resistant stainless steel with long service life, extremely resistant, corrosion withstanding
- Horizontal air circulation with optimum air guidance through air baffle with adapted arrangement of air outlet openings
- Excellent temperature distribution of up to +/- 5 K according to DIN 17052
- Heating by high-quality heating elements with long service life
- High-quality insulation for low energy consumption and low electricity costs

Shaft furnace with indirect gas heating and horizontal air circulation

Shaft furnace with three separately controllable chambers for preheating steel rolls

Model SM 3000/04/HA Single-chamber shaft furnace for heating aluminium profiles

Options:

- Furnace lid can be folded or moved horizontally
- Pneumatic or hydraulic lid drive
- Automatically controlled fresh air and exhaust air dampers
- Powerful cooling system
- Charging baskets
- Gas boxes for heat treatment under protective gas
- Gas supply systems
- Customer-specific special designs

Technical data

Model	T max [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
SM 1000/06/HA	650	1000 x 1000 x 1000	1000	1700 x 2200 x 1700	36	400 3/N	890
SM 1500/06/HA	650	1500 x 1000 x 1000	1500	2200 x 2200 x 1700	60	400 3/N	1240
SM 2000/06/HA	650	2000 x 1000 x 1000	2000	2700 x 2200 x 1700	75	400 3/N	1750
SM 1000/08/HA	850	1000 x 1000 x 1000	1000	1700 x 2200 x 1700	48	400 3/N	930
SM 1500/08/HA	850	1500 x 1000 x 1000	1500	2200 x 2200 x 1700	64	400 3/N	1290
SM 2000/08/HA	850	2000 x 1000 x 1000	2000	2700 x 2200 x 1700	90	400 3/N	1830

Other sizes on request

AIR-CIRCULATION LIFT-BOTTOM FURNACES

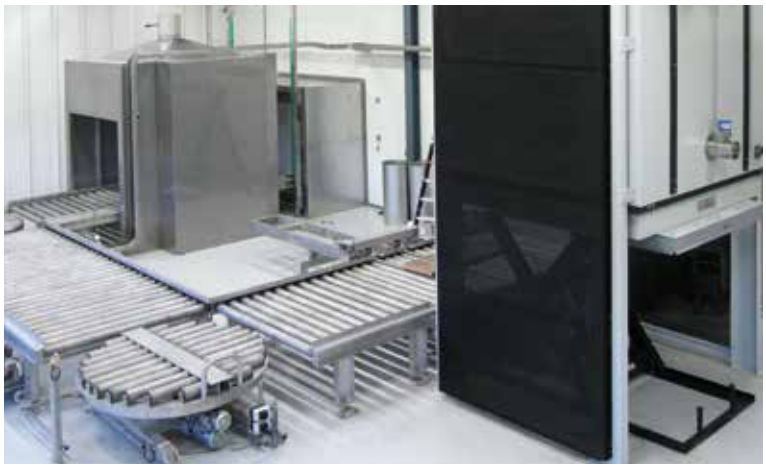
T max. 850 °C

Air-circulation lift-bottom furnaces have a moveable furnace bottom which also serves as a charging table. The charge is placed on the lowered lift-bottom and then moved into the furnace. Lift-bottom furnaces are often integrated into automated batch transport systems for fully automatic operation. The lift-bottom or charging platform can also be designed as a separate trolley for free movement.

- Robust housing constructions made of high-quality sheet steel
- Inner housing made of heat-resistant stainless steel with long service life, extremely resistant, corrosion withstanding
- Vertical and horizontal air circulation with optimum air guidance through air duct system with adapted arrangement of the air outlet openings
- Excellent temperature distribution of up to +/- 5 K according to DIN 17052
- Heating by high-quality heating elements with long service life
- High-quality insulation for low energy consumption and low electricity costs

Options:

- Charging platform available as trolley for free movement
- Automatically controlled fresh air and exhaust air flaps
- Powerful cooling system
- Semi gas-tight version with gas connection for protective gas applications
- Horizontal airflow
- Charging baskets
- Gas supply systems
- Cooling stations
- Customized special design and adaptation to existing processes and systems



THERMCONCEPT
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HEAT TREATMENT PLANTS - OVERVIEW

for aluminium components

THERMCONCEPT quenching and tempering systems are used for solution annealing and artificial ageing of aluminium components in T1 to T9 processes.

Design of the plants

The designs of these systems are individually adapted to the component and process requirements.

- Furnace systems with vertical or horizontal batch transport
- With fixed or movable furnaces
- Mobile or stationary quenching tank, also with installation in a pit
- Plant concepts with multi-furnace plants, various baths and various batch storage locations
- Systems for manual operation up to fully automated heat treatment lines
- Furnace systems usually with electrical heating, alternatively also available with direct or indirect gas heating

The furnace systems are characterized by very high temperature accuracy and fast batch transport. The temperature operating ranges are between 80 °C and 600 °C and can be extended to suit applications up to 850 °C.

The systems are usually controlled via a PLC. All motion sequences can be controlled fully automatically.

The process documentation is carried out according to NADCAP, AMS, CQI-9 and optionally batch recognition systems are available.

THERMCONCEPT tempering systems are used in the aircraft and automotive industries as well as in the forging and foundry industry.

Tempering plants are designed on the basis of different furnace systems:

Tempering systems based on chamber furnaces

- Horizontal batch transport
- Manual batch movement by forklift truck
- Automated batch movement via traversing unit or robot system
- Water quench bath placed in front of the furnace

Tempering plants based on shaft furnaces

- Horizontal and, when the furnace is mounted in an elevated position, also vertical batch transport
- Manual batch movement by overhead crane
- Automated batch movement via lifting conveyor unit
- Water quench bath placed in front of the furnace

Tempering plant based on bogie hearth furnaces

- Horizontal and, if the furnace is mounted in a lifted position, also vertical batch transport
- Manual batch movement by overhead crane
- Automated batch movement with lifting conveyor unit
- Water quenching bath placed in front of the furnace

Tempering plants based on continuous furnaces

- Vertical batch transport for very short quenching times
- Automated batch movement via lifting conveyor unit
- Drop shaft furnace fixed or movable
- Versions with fixed or mobile quenching baths under the furnace
- Optionally equipped with parking positions for charging and discharging respectively

Tempering plant based on drop bottom furnaces

- Vertical batch transport for very short quenching times
- Automated batch movement by lifting conveyor unit
- Fixed or movable furnaces
- Quench baths under the furnace fixed or movable
- Parking lots for charging and discharging optionally possible

HEAT TREATMENT PLANTS

based on chamber furnaces

The semi-automatic heat treatment system is designed for solution annealing with subsequent quenching and tempering of aluminium components for aircraft industry with a quench-delay time of 7 seconds.

Process sequence:

The process is semi-automatic. First, the charging basket with aluminum components is pushed over the roller conveyor into the solution annealing furnace.

After the specified dwell time in the furnace, the operator actuate a foot switch at the water bath. The furnace door opens automatically and the bascule bridge moves into the horizontal position.

With a draw hook the operator pulls the charging basket with aluminium components via furnace roller conveyor and bascule bridge onto the quenching grate against a stop.

The system is equipped with light barriers. As soon as both light barriers signalize that the basket is in the correct position, the quenching grate is automatically lowered into the water bath. The draw hook is also released automatically. The quench delay time is 7 seconds.

The duration of the basket in the quenching bath can be defined via furnace control. After the intended dwell time, the quenching grate returns to its starting position above the quenching bath.

Now the operator can push the basket manually over the roller conveyor into the drying station. The blower of the drying station switches on automatically. The drying duration can also be programmed via PLC-controls.

After the drying process has been completed, the operator pulls the basket again onto the charging grate and into the opposite ageing oven. The aging process takes place at approx. 180 °C.

If no aging process is required, the basket with the dried parts can also be transported directly to a parking location.

The next basket with untreated aluminium components is then picked up from one parking location.

This tempering plant consists of the following components:

Solution annealing furnaces model KU 270/06/A

This tempering system is based on two identical circulating air chamber furnaces for T max. 650 °C with pneumatic lift-door. The two furnaces are arranged stationary opposite each other. The charging of the parts takes place in adapted charging baskets.

Water quench bath with pneumatic lifting device

The quenching takes place in a water quench bath equipped with a pneumatically driven lifting grate. In order to be able to move the charging basket over the water bath, the lifting grate is equipped with stainless steel ball rollers. The water quenching bath is mounted on rails and is placed between the two furnaces, the water quenching bath has a chiller with heat exchanger and circulation pump. The water temperature is continuously recorded. The cooling water is pumped through the heat exchanger and therefore constantly refrigerated. All system components are matched to each other and ensure precise process cooling with energy-efficient operation.

Drying station

Between the two ovens there is a drying station with a powerful fan. The parts removed from the water bath are dried here. The drying station has a stainless steel roller conveyor and is equipped with a water collecting tray. The system is automatically switched on and off via PLC-control unit

Aging furnace model KU 270/06/A

The second air circulation chamber furnace is space-savingly mounted on the opposite side of the quenching and tempering system and integrated into the quenching and tempering process. Depending on the task at hand, this furnace can be used as an aging furnace or as a solution annealing furnace.

Charging stations

The plant can be supplemented with various preparation places for the admission of the charge and/or the baskets. Any number of storage places for the finished batches can also be integrated.

Plant control

The system is controlled via a Siemens PLC S7 with touch panel and various options for data tracking and data archiving with complete documentation in accordance with AMS 2750 E.

HEAT TREATMENT PLANTS

based on continuous furnaces

This fully automatic furnace system is used for tempering high-performance pistons. The system consists of a batch feed system, the 4-chamber continuous furnace, a traversing unit with horizontal and vertical working range, a double quenching bath, the cleaning tank and a storage position.
The ageing takes place in separate air-circulation chamber furnaces. From the provision of the batch baskets in front of the furnace plant to the depositing on the storage area, the entire process takes place fully automatically.

Batch feed:

- The batch feed consists of a batch table, an infeed table and a cross conveyor.
- The charging baskets are manually placed on the charging table
- The charging table takes up to 4 annealing baskets. Baskets are automatically moved to the infeed table.
- The prepared basket is moved from the infeed table into the furnace while the next basket is pulled from the batch table at the same time.

Solution annealing furnace

- The continuous furnace is designed for T max. 650 °C.
- The furnace line is equipped with 4 chambers separated by bulkheads. Each chamber is independently controlled.
- In the first chamber the furnace is heated up to 580 °C.
- After reaching the target temperature, the batch basket is moved to chamber 2, one of the two holding chambers.
- After a dwell time, the basket is transported to chamber 3, the second holding chamber.
- Once the preset holding time at working temperature has been reached, the batch basket is moved to chamber 4, the removal chamber.
- In chamber 4, the basket waits for it´s removal.
- After opening the furnace door, the basket automatically moves to the transfer position at the furnace outlet. The manipulator takes over the basket for further transport for quenching.

Double quenching bath

- The solution annealing plant comprises a double quenching baths for two different emulsions.
- Both quenching tanks are equipped with a heater, a circulation pump and a swivelling shower.
- The quenching device can be moved on rails and is located in a collecting tank which can hold the entire content of the bath in the event of a leakage.
- A draining device is mounted on both baths.
- The quenching system is completely made of stainless steel.

Cleaning bath

- The cleaning bath is arranged stationary and also stands in a collecting tray.
- The washbasin is equipped with an air-bubble device.
- The entire system is also made of stainless steel.

Manipulator

- The further transport of the baskets after solution annealing is done fully automatically by a manipulator.
- The manipulator, which is suspended from a running rail, picks up the basket at the transfer position and carries out the quenching process in one of the two water baths.
- After quenching, basket and parts are washed in a cleaning bath.
- The manipulator then places the charging basket on a delivery table. The delivery table is equipped with rollers for further transport of the baskets.
- The delivery table has limit switches for occupancy detection.
- From here, the baskets are picked up manually and transported to the multi-chamber aging furnace.

Multi-chamber aging furnace

- The quenching and tempering system is equipped with two identical 4-chamber convection ovens for T max. 260 °C for ageing.
- Each chamber is indendently controlled and designed to take 2 charging baskets on top of each other.

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HEAT TREATMENT PLANTS

Bases on drop-bottom furnaces

This fully automatic quenching and tempering system is used for the quenching and tempering of aluminium components for automotive production. The system is based on drop bottom furnaces. Falling bottom furnaces are recommended when short quenching times have to be achieved. The system consists of two identical drop bottom furnaces for solution annealing, a stationary water bath and several aging furnaces.

A batch basket is placed on the feeding position. The drop-bottom furnace moves over the basket and pulls it upwards into the furnace chamber. After closing the bottom of the furnace, the solution annealing is started. After completion of the selected holding time the drop-bottom furnace moves over the water-bath. The quenching process is started when the furnace bottom is opened to the rear.

A lifting unit integrated in the furnace lowers the basket into the quenching bath. After the quenching process, the basket is pulled back into the furnace. The drop-bottom furnace moves to a position to deposit the basket. From here, the batch basket is transferred to one of the available aging furnaces.

The water bath is mounted between the two drop-bottom furnaces. The quenching bath is embedded in the hall floor in order to achieve the lowest possible construction height of the drop-bottom furnaces. The water bath is equipped with a cooling unit and water circulation. The water temperature in the quench bath as well as the temperature increase during quenching are continuously recorded and documented.

Quenching and tempering systems based on drop-bottom furnaces are designed according to the specific needs of the customer and can be supplied in a variety of versions:

- Quenching and tempering systems with a fixed drop-bottom furnace and quenching bath underneath.
- Quenching and tempering systems with a fixed drop-bottom furnace and a movable water bath.
- Quenching and tempering systems with several mobile drop-bottom furnaces and one or more stationary or mobile quench baths.
- The systems can be supplemented with storage lots.
- Movement technology can be semi-automatic or fully automatic.
- The data-logging according to the relevant aviation and automotive standards, such as AMS 2750 or CQI-9 is possible.

This tempering plant consists of the following components:

Drop-bottom furnace with air circulation for solution annealing

Both furnaces have a volume of 1100 liters and can be used flexible up to 650 °C. Each furnace is equipped with a horizontally movable furnace slide bottom as well as an integrated drive for vertical movement of the batch.

For quenching, the entire furnace is motorized and driven above the bath for quenching the batch.

After opening the bottom, the basket is lowered into the water bath.

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Embedded water quenching bath

The water bath is mounted between the both drop-bottom furnaces. In order to achieve the lowest possible installation height of the furnaces the quench bath is embedded in the hall floor.

The water bath is equipped with a cooling unit and a water circulation system. The water temperature of the quench bath as well as the temperature increase during quenching are continuously measured and stored

Air-circulation air chamber furnace for aging

After the quenching process, the batch is placed on a storage position and from there moved manually into one of the available the aging ovens.

The aging furnaces have dimensions similar to the drop-bottom furnaces, but the design is adapted to front loading. The maximum application temperature is 450 °C.

Due to the independent installation and operation, it is also possible to use the furnaces for tempering of steel components after hardening from the steel heat treatment plant next to this line.

ANNEALING AND HARDENING FURNACES

KM 10/13 – KM 1600/13

T max. 1300 °C

- Very robust chamber furnaces e.g. for annealing, hardening, powder carburizing and powder nitriding, preheating, forging etc.
- Double-walled housing with rear ventilation for low outside shell temperature
- Parallel guided swing door opening downwards (KM 10/13 – KM 70/13), with steel tray on the door as charging aid as well as door lintel, both made of stainless steel, loading height approx. 900 mm
- From KM 110/13 manual parallel guided door upwards opening, with counterweight, easy to open, from KM 780/13 with hydraulic lift door
- Base frame already included in the standard scope of delivery (from KM 50/13)
- Multi-layer insulation (lightweight refractory bricks and insulation) for low heat loss, low energy consumption, low electricity costs
- 3-sided heating (from both sides and bottom) with heating wire for a uniform temperature distribution in the furnace chamber
- Heating elements mounted on ceramic support tubes, free heat radiation into the furnace chamber, thereby energy saving and long service life of the heating elements
- Covering of the floor heating elements by heat permeable silicon carbide plates with high mechanical strength, to protect the bottom heating
- Sufficiently dimensioned power guarantee short heating times

Options:

- Charging plates and grates as additional protection for the furnace bottom
- Lateral protective cover of the heating elements through silicon carbide boards
- Lift door with hydraulic drive, operable via foot pedal or 2-hand operation (standard from KM 780/13)
- Automatic fresh air and exhaust air flaps, controlled via the program controller
- Fresh air fan for forced cooling of the batch or exhaust gas discharge
- Semi-gas-tight design with special sealing and gas connection for non-flammable protective gases
- Gassing and hardening boxes and suitable charging aids

Technical Data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Gewicht [kg]
KM 10/13	1300	250 x 250 x 120	8	500 x 600 x 700 (1)	2,5	230 1/N	69
KM 15/13	1300	250 x 250 x 200	13	500 x 700 x 700 (1)	3,6	230 1/N	75
KM 20/13	1300	250 x 350 x 200	18	500 x 700 x 700 (1)	6,0	400 3/N	91
KM 30/13	1300	250 x 500 x 200	30	500 x 850 x 700 (1)	7,0	400 3/N	105
KM 50/13	1300	350 x 500 x 250	44	950 x 1500 x 1490 (1) (2)	13	400 3/N	268
KM 70/13	1300	350 x 750 x 250	66	950 x 1500 x 1740 (1) (2)	20	400 3/N	330
KM 110/13	1280	500 x 650 x 350	110	1350 x 1750 x 1950	22	400 3/N	670
KM 140/13	1280	500 x 800 x 350	140	1350 x 2130 x 1950	25	400 3/N	770
KM 190/13	1280	600 x 800 x 400	190	1400 x 2130 x 1980	30	400 3/N	950
KM 240/13	1280	600 x 800 x 500	240	1400 x 2130 x 2300	35	400 3/N	970
KM 410/13	1280	750 x 1100 x 500	410	1600 x 2200 x 2300	50	400 3/N	1250
KM 590/13	1280	650 x 1500 x 600	590	1500 x 3000 x 2400	50	400 3/N	1650
KM 780/13	1280	1000 x 1300 x 600	780	1850 x 2400 x 2400	70	400 3/N	1750
KM 1000/13	1280	900 x 1900 x 600	1030	1750 x 3400 x 2400	75	400 3/N	2000
KM 1240/13	1280	1500 x 1500 x 550	1240	2680 x 2450 x 2620	90	400 3/N	2500
KM 1600/13	1280	1700 x 1200 x 800	1630	2300 x 3200 x 2750	110	400 3/N	2600

(1) Each + approx. 200 mm for controller on the side of the oven; (2) Depth incl. door mechanism | Other sizes on request

MANUAL HARDENING LINE WITH OIL QUENCH BATH

Annealing and quenching of spring steel strips in roller bearing production

This manual hardening line consists of two annealing chamber furnaces with swivelling charging tables as well as a centrally positioned oil bath with integrated lifting grate.

The bearing rings made of spring steel strips are placed on the charging table and manually pushed into the annealing furnace.

After heating up, the bearing rings are pulled by a draw hook on the batch table.

The charging table is then swivelled over the oil bath and the bearing rings are placed on the lifting grate.

The lifting grate with the charge is then lowered into the oil bath for quenching.

The pneumatic drive enables fully automatic up and downwards movement to ensure optimum rinsing of cool oil around the charge.

In order to check the product quality in the manufacturing process samples are taken and analysed.

For this purpose THERMCONCEPT offers laboratory-scale furnaces and quenching equipment as well as the corresponding hardness testers (please refer to our special catalogue).

PROTECTIVE GAS HARDENING LINE WITH OIL QUENCHING BATH

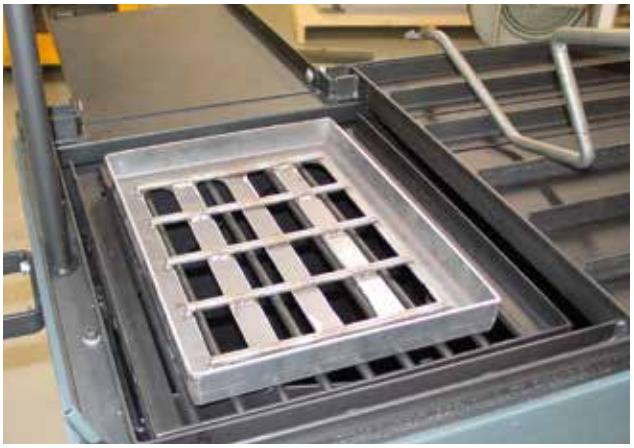
Model SHA 400

Scale and decarburization free hardening and annealing under protective gas and quenching in oil of a whole charge in a gas bell with bottom grid, specially developed for a simple and safe hardening of larger workpieces and subsequent quenching under inert gas in oil.

The SHA 400 inert gas hardening plant consists of:

- Annealing and hardening furnace with pneumatic door opening and charging plate
- Double-walled oil bath on rollers with integrated lift table and pneumatic drive for fully automatic loading into the oil bath, with oscillating lift table for optimum quenching in oil
- Heating element for temperature control of the oil bath
- Protective gas bell with grid bottom
- Smoke extraction with flame trap
- Oil temperature measuring system
- For quenching in water the bath can also be supplied in stainless steel.

The batch is placed on the bottom grid of the bell, covered with the gas bell, pre-flushed with protective gas and placed in the furnace. After the batch has been thoroughly heated, the entire gas bell is pulled out of the furnace and placed on the lifting table of the oil baths. Due to the pneumatic drive of the lifting table the bottom grid with the charge only is discharged into the oil bath, while the gas bell remains above the oil bath. The oscillating movement of the lifting table ensures an optimum rinsing of oil around the batch.



SHEET METAL PREHEATING FURNACES

Electrically heated chamber furnaces for the preheating of special plates made of high-temperature heat-resistant steels for highly stressed components used in automotive production.

Preheating of sheets for hot forming (press hardening) with automated sheet handling by industrial robots or motorized charging trolleys. Designed for continuous operation.

- Multi-zone temperature control of the furnace chamber to create a temperature gradient into the sheet metal
- Fully automatic system control with integration of handling systems
- System control via Siemens PLC S7 with touch panel and various data tracking options and data archiving
- 2. door instead of the rear wall for loading from the front side and removal from the back side.

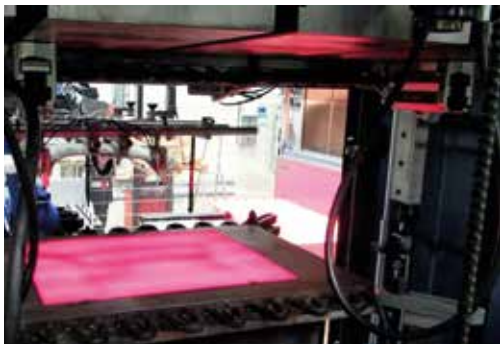
HOT FORMING OF SHEET METAL BY PRESS HARDENING

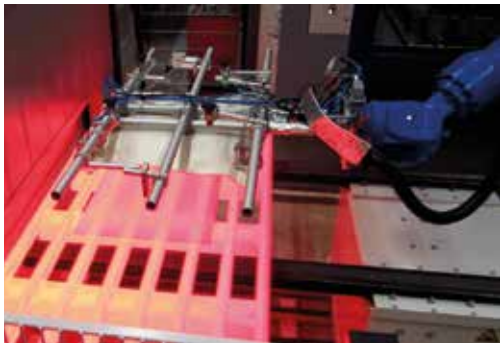
This procedure is increasingly used in the automotive industry. Press hardening is done since a few years and it has gained in importance, since this process is environmentally friendly and cost effective. With less material the same or a higher strength of the material is reached.

Depending on the complexity of the component, the forming is carried out directly or indirectly. The indirect process contains several working steps, e.g. preparatory shaping. With the direct forming method the shaping itself is done in only one working step.

During press hardening, a metal sheet is heated in a so-called sheet preheating furnace to the temperature of approx. 900-1000 °C and austenitized. The red-hot sheet metal is subsequently taken out warm, e.g. with a robot or manipulator and placed directly into a cooled press. In the following conventional forming process, the sheet metal is pressed into shape and at the same time cooled down to temperatures below 250 °C. While shaping the material is quenched and hardened.

Further shaping steps are then carried out subsequently. Processes, only such as laser cutting are possible because the hardened parts cannot processed further by using conventional methods.





KM 25/11/R

RETORT CHAMBER FURNACES

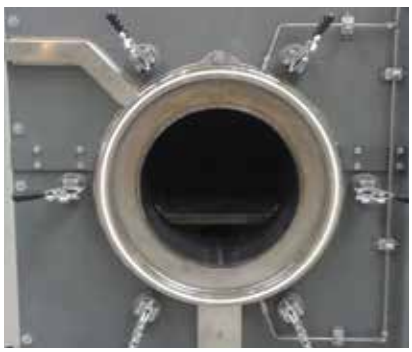
KM 25/11/R – KM 250/11/R

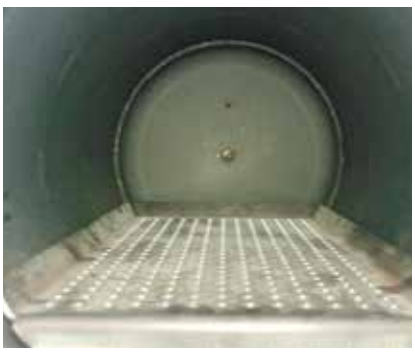
T max. 1100 °C

Protective gas retort furnaces are designed for heat treatment processes, which can be carried out only under oxygen-free atmosphere, such as bright annealing, tempering, sintering, soldering. The program includes chamber and shaft furnaces.

- Gas-tight retort furnaces in robust design with horizontal retort
- Retort made of highly heat resistant steel with special gasket and water-cooled flange
- Multiple-sided heating, therefore uniform temperature distribution in the retort
- Parallel guided swing door with encapsulated insulation
- Suitable for various shielding gases such as Nitrogen, Argon, forming gas 95/5
- Very low gas consumption

KM 250/11/R





Retort shaft furnaces

- Individual design, specially adapted to the process and the batch dimensions
- Shaft furnaces to be loaded from top with vertical, gas-tight retort, crane loading possible
- Retort made of highly heat resistant steel with special gasket and water-cooled flange
- All-round heating for very uniform heating of the retort and the batch
- Cover with vertical movement, special seal with water cooling
- Suitable for various protective gases such as Nitrogen, Argon, forming gas 95/5

Options:

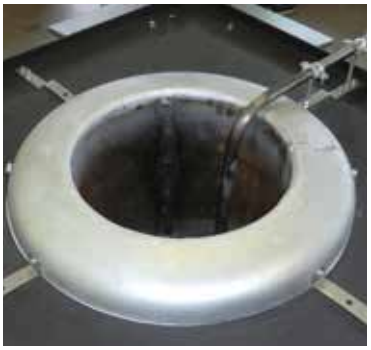
- Retort with gas circulation (T max. 900 °C)
- Automatic gassing device
- Vacuum pump for cold evacuating of the retort
- Process control via batch thermocouple in the retort
- Cooling system with exhaust air flap control for cooling to reduce the process times
- O_2-measuring instruments for monitoring

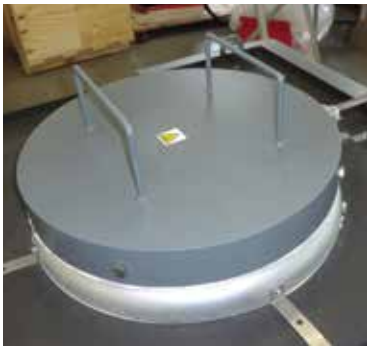
Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
KM 25/11/R	1100	220 x 450 x 260	25	1400 x 1300 x 1450	11	400 3/N	400
KM 30/11/R	1100	320 x 450 x 200	30	1450 x 1300 x 1450	13	400 3/N	570
KM 65/11/R	1100	450 x 700 x 200	65	1500 x 1600 x 1650	21	400 3/N	950
KM 120/11/R	1100	500 x 700 x 340	120	1650 x 1550 x 1650	29	400 3/N	1050
KM 250/11/R	1100	700 x 1050 x 340	250	1850 x 1900 x 1700	50	400 3/N	1350

Other sizes on request

TS 20/10





SALT BATH FURNACES

TS 20/10 – TS 360/10

T max. 1000 °C

Salt bath furnaces and warm bath furnaces

Salt bath furnaces and warm baths are characterized by fast, intensive heat transfer and outstanding temperature distribution. Due to the liquid salt creating an inert-atmosphere, an oxidation of the surfaces does not take place. These furnaces are equipped either with active salts for nitriding according to Tenifer up to 600 °C and carburizing up to 950 °C as well as with neutral salts for bright annealing up to 1000 °C, quenching and tempering up to 500 °C.

- Special versions of the warm baths up to 550 °C are used for heat treatment of moulded memory alloys, such as Nitinol or NiTiCu.
- Robust housing constructions
- Multi-layer insulation (lightweight refractory bricks, insulation panel), therefore low heat losses, low energy consumption and low electricity costs
- Heating from 4 sides for even heating of the crucible
- Heating elements mounted on ceramic support tubes, thereby free heat radiation into the furnace chamber, thus energy saving and long life.
- Removable collar plate made of solid steel for optimally protected crucible
- Control via salt bath temperature
- Safety controller for system protection

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
TS 20/10	1000	220 x 450	20	1100 x 1100 x 770	21	400 3/N	570
TS 40/10	1000	350 x 500	40	1250 x 1250 x 820	27	400 3/N	710
TS 80/10	1000	500 x 500	80	1350 x 1350 x 820	53	400 3/N	810
TS 150/10	1000	500 x 800	150	1350 x 1350 x 1070	68	400 3/N	1120
TS 180/10	1000	700 x 750	180	1550 x 1500 x 1070	72	400 3/N	1300
TS 240/10	1000	600 x 1000	240	1550 x 1450 x 1320	82	400 3/N	1420
TS 360/10	1000	800 x 1000	360	1650 x 1650 x 1320	102	400 3/N	1510

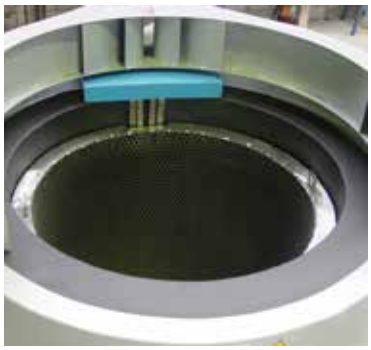
Other sizes on request

WARM BATH FURNACES

SWB 20/05 – SWB 400/05

Working temperatures 150 °C to 500 °C

- Baths filled with neutral salt, thus quick and intensive heat transfer during quenching or tempering after salt bath hardening
- Also for intermediate hardening, quenching and tempering, annealing, nitro blackening or blueing
- Optimum temperature distribution up to +/- 2 K according to DIN 17052 inside the hot bath
- Heating via immersion heater directly in the salt
- Control via bath temperature
- Incl. charging basket (up to SWB 70/05)
- Water cooling for increased quenching performance and manual hoist with winch optionally available



Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	Salt level [mm]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
SWB 20/05	500	300 x 210 x 460	20	350	610 x 580 x 920	2,6	230 1/N	110
SWB 30/05	500	300 x 210 x 580	30	450	610 x 580 x 920	3,2	230 1/N	140
SWB 70/05	500	400 x 300 x 680	70	550	750 x 680 x 980	7,5	400 3/N	240
SWB 200/05	500	540 x 520 x 880	200	750	900 x 900 x 1200	18	400 3/N	660
SWB 400/05	500	730 x 720 x 980	400	830	1100 x 1100 x 1300	24	400 3/N	1150

Other sizes on request

BOGIE HEARTH FURNACES

WM 1000/09 – WM 7200/13

T max. 900 °C und 1280 °C

- Bogie hearth furnaces particularly suitable for heat treatment of large batches with high load weight
- Furnaces with maximum temperatures of 900 °C and 1280 °C
- Robust housing constructions, double-walled design with rear ventilation for low outside wall temperature
- Furnace door in standard version as parallel-guided swing door, simple and easy to use, with the warm side the away from the operator
- Sturdy bogie with flange wheels on rails, incl. rails in front of the furnace
- Heating elements of the bogie covered by SiC plates, easy loading due to flat support
- Bottom slide and manual exhaust air flaps in the furnace roof
- 5-sided heating (left, right, rear wall, door, bogie hearth), thereby extraordinary even temperature distribution

Options:

- Electric or hydraulic lift door, operated by foot pedal or 2-hand operation
- Automatic fresh air and exhaust air flap control for furnace ventilation
- Automatic cooling system for forced cooling
- Multi-zone control to increase temperature uniformity
- Electric bogie drive
- 2. bogie
- Furnace installation with transverse shaunting track for several bogies and parking rails
- Second door on the rear wall of the furnace, e.g. for the operation with two bogies
- Support grate for bogie hearth, made of heat-resistant cast steel for optimum and even weight distribution
- Customer-specific special design

Technical data

Model	T max. [°C]	Internal dimensions [mm] Width x Depth x Height	Volume [l]	External dimensions* [mm] Width x Depth x Height	Power [kW]	Voltage [V]	Weight [kg]
WM 1000/09	900	900 x 2000 x 600	1080	2350 x 3050 x 2650	45	400 3/N	1420
WM 1600/09	900	900 x 2000 x 900	1620	2350 x 3050 x 2950	65	400 3/N	1570
WM 2000/09	900	1000 x 2300 x 900	2070	2450 x 3500 x 2950	85	400 3/N	1950
WM 3200/09	900	1000 x 2700 x 1200	3240	2450 x 4000 x 3250	115	400 3/N	2400
WM 5000/09	900	1200 x 3500 x 1200	5040	2700 x 4800 x 3250	135	400 3/N	4600
WM 7200/09	900	1200 x 4000 x 1500	7200	2700 x 5050 x 4500	155	400 3/N	5300
WM 1000/13	1280	900 x 2000 x 600	1080	2350 x 3050 x 2650	55	400 3/N	1420
WM 1600/13	1280	900 x 2000 x 900	1620	2350 x 3050 x 2950	85	400 3/N	1570
WM 2000/13	1280	1000 x 2300 x 900	2070	2450 x 3500 x 2950	115	400 3/N	1950
WM 3200/13	1280	1000 x 2700 x 1200	3240	2450 x 4000 x 3250	135	400 3/N	2400
WM 5000/13	1280	1200 x 3500 x 1200	5040	2700 x 4800 x 3250	185	400 3/N	4600
WM 7200/13	1280	1200 x 4000 x 1500	7200	2700 x 5050 x 4500	225	400 3/N	5300

Other sizes on request

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HEAT TREATMENT PLANT

THERMCONCEPT supplies industrial heat treatment plants for steel materials. The following plants consist of several annealing bogie hearth furnaces and quenching equipment for heat treatment of high-grade steel components for a supplier to the automotive industry. The process data-logging follows CQI-9.

Features:

Electrically heated bogie hearth furnaces for annealing and hardening up to 1280 °C and air circulating bogie hearth furnaces up to 850 °C each with independent controller.

- Bogies and lift doors with electric drives
- Quench baths with circulating unit and cooling aggregate
- Delivery incl. charging baskets
- System control via Siemens PLC S7 with touch screen and various data archiving according to AMS 2750 and CQI-9

Batch manipulation

Charging can be carried out with a charging trolley and a draw hook, manual manipulators, manual lift trucks, forklift trucks or even semi- or fully automatic traversing units.

For large and heavy workpieces, also hall cranes can be used for loading and unloading a bogie hearth furnaces.

The process requirements and batch sizes will define the degree of automation.

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Batch quenching

Depending on the steel grade, the quenching is carried out in oil or water. Air quenching is also used.

For the different applications, quenching baths with circulation and cooling or even air quenching chambers with high performance cooling fans are available.

For sensitive components, warm baths with very even and moderate quenching performance may taken into consideration.

The design of the quenching units depends on weight and geometry of the batch, the requested production rate and other process parameters.

THERMCONCEPT
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GAS-HEATED FURNACES – OVERVIEW

THERMCONCEPT supplies furnace concepts such as chamber furnaces for the whole temperature range up to 1400 °C, bogie hearth furnaces, bell-type furnaces and mobile furnaces with direct and indirect gas heating, which are specially designed for the requirements and processes of the customers.

Performance features:

- Universally applicable furnace types adapted to the installation site and process requirements
- Excellent heat treatment results
- Low energy consumption due to multi-layer refractory lining with the best insulating properties
- Own burner systems with high power output, especially adapted to the furnace system and designed for optimized energy consumption
- Automatic control of the furnace atmosphere to avoid oxidation of the batch
- Cycle start even at low temperature already with high accuracy and without temperature leaps
- Optimum temperature distribution due to multi-zone control and special ducting of flue gas
- The most modern control and regulation technology with optimum process control, for fully automatic operation of the furnace and with perfect adaptation to the user needs
- Minimum maintenance

We deliver:

- Furnaces with direct or indirect heating batch and continuous furnace systems (chamber, bogie hearth, shaft and bell furnaces)
- Furnace systems for operating with reduced atmosphere
- Additional equipment such as conveyors, loading and unloading systems as wells as systems for heat recovery

GAS-FIRED FORGING FURNACES

- Chamber furnace plants with hydraulic lift door
- Integrated charging table in front of the furnace
- Designed for a working temperature of 1250 °C
- Heating via high-speed gas burner
- Controlled via Siemens PLC S7 with touch screen for data tracking and data logging

Gas-heated chamber furnaces for preheating of bar material made of special steel before forging

- Chamber furnace system with two hydraulic lifting doors
- Integrated batch storage
- Heating via high-speed gas burner for working temperatures up to 1250 °C

GAS-FIRED CHAMBER FURNACES

Production line consisting of two gas heated chamber furnaces for the annealing of cast iron in baskets

- Two chamber furnaces each with hydraulic lift door
- For working temperatures up to 1100 °C
- Batch weight 4 to
- Heating via high-speed gas burner
- PLC controls with process data logging

Production line consisting of three gas heated chamber furnaces for heat treatment of diesel soot filters for trucks in baskets

- Chamber furnace line, each furnace with hydraulic lift door
- Designed for a working temperature of 1100 °C
- Heating by 6 high-speed gas burners
- Siemens PLC S7 with touch-panel for control and documentation

GAS-FIRED CHAMBER FURNACES

Gas-heated chamber furnace for the annealing of piping fittings, safety and security valves and gas fittings for a leading European manufacturers of fittings, regulators and systems for building construction.

- Gas-fired chamber furnace with electric lift door
- Designed for operation with charging boxes
- Stable ram protection and guides in the furnace bottom area for easy charging by means of a forklift
- Designed for working temperatures from 400 - 650 °C
- Furnace heating via 6 high-temperature speed burners with combustion air pre-heating
- Powerful cooling system for the controlled cooling of the batch in the oven
- Supplied with batch thermocouples for permanent monitoring and documentation of the charge temperatures

Production line consisting of two identical gas-fired bogie hearth furnaces for T max. 1200 °C. The furnaces are equipped with 8 recuperative gas burners and a multi-zone temperature control system. The exhaust gas treatment is carried out by a powerful thermal afterburner. In addition the furnaces have a controlled batch cooling system.

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GAS-HEATED 6-CHAMBER FURNACE

Furnace system for a globally active manufacturer of high-quality stainless steel components, produced by centrifugal casting.

In order to ensure the availability of a sufficient number of preheated moulds for a casting line, moulds for centrifugal casting are preheated at 450 °C in continuous operation.

- Furnace system consisting of 6 individual chambers, each independently heated
- Each chamber equipped with strong steel rack to take the moulds for pre-heating
- Charging by 6 separately controllable lift doors
- 5 t batch weight per chamber
- Usable inside dimension of a chamber:
  1500 x 3000 x 1500 mm (w x d x h)
- External dimensions of the furnace system:
  7700 x 4600 x 4600 mm (w x d x h)
- Heating by 12 recuperativ gas burners with a total power of 1800 kW
- Delivery incl. air/water heat exchanger
- Process control by Siemens PLC S7 with touch panel and various possibilities for data tracking and data logging

HEAT RECOVERY

Large quantities of waste heat are produced, especially in gas-fired kilns. The heat potential of the exhaust gases can be used for downstream processes and thus improve the overall energy efficiency

The heat recovery of THERMCONCEPT industrial furnaces is carried out via heat exchangers. It comes as air-to-air heat exchanger or air-to-water heat exchanger.

THERMCONCEPT supplies intelligent solutions, which will lead to significant savings in the energy costs and also protect the environment.

This picture shows a heat recovery system for a gas-heated 6-chamber furnace with a heating capacity of 1800 kW. Heat recovery takes place via an air-to-air heat exchanger. The waste heat from the furnace is used to heat the production hall.

GAS HEATED BOGIE HEARTH FURNACES

Gas-heated bogie hearth furnace for stress relieving of welded structures for a worldwide manufacturer of railway vehicles in Germany.

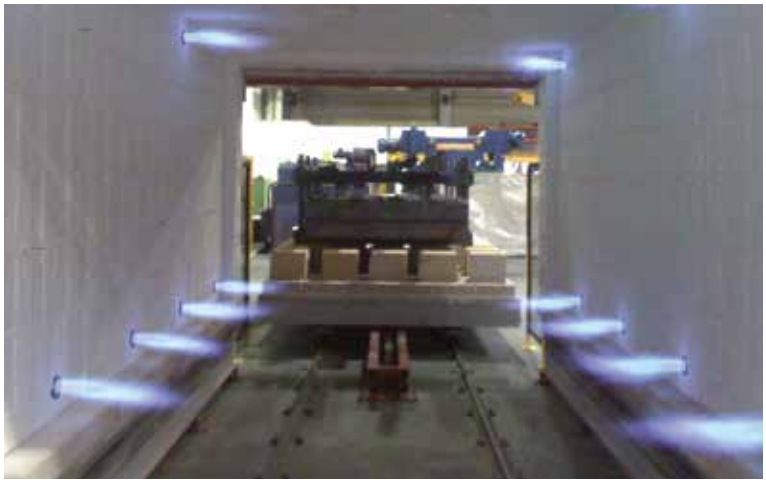
The furnace system is designed for T max. of 650 °C. The delivery includes adapted charging racks for easy loading of the furnace.

- Bogie hearth designed to take two charging racks on top of each other
- Usable inner dimension:
  2800 x 5100 x 1400 mm (w x d x h)
- Heated by 6 high-speed gas burners with a total power of 900 kW
- System control via Siemens PLC S7 with touch screen and various options for data tracking and data logging

Bogie hearth furnace for stress relieving of sheet metal for highly stressed precision parts such as press and carrier plates, punching plates and press tools.

The furnace system is equipped with two bogies and two lifting doors, so that annealing can take place alternately.

- The bogies are changed fully automatically. The plates are charged in quettes.
- Usable inside dimensions:
  2500 x 5000 x 1600 mm (wxdxh)
- Heating via 12 high-speed gas burners
- Total output of 2400 kW
- System control via Siemens PLC S 7 with touch panel as well as data tracking and data archiving

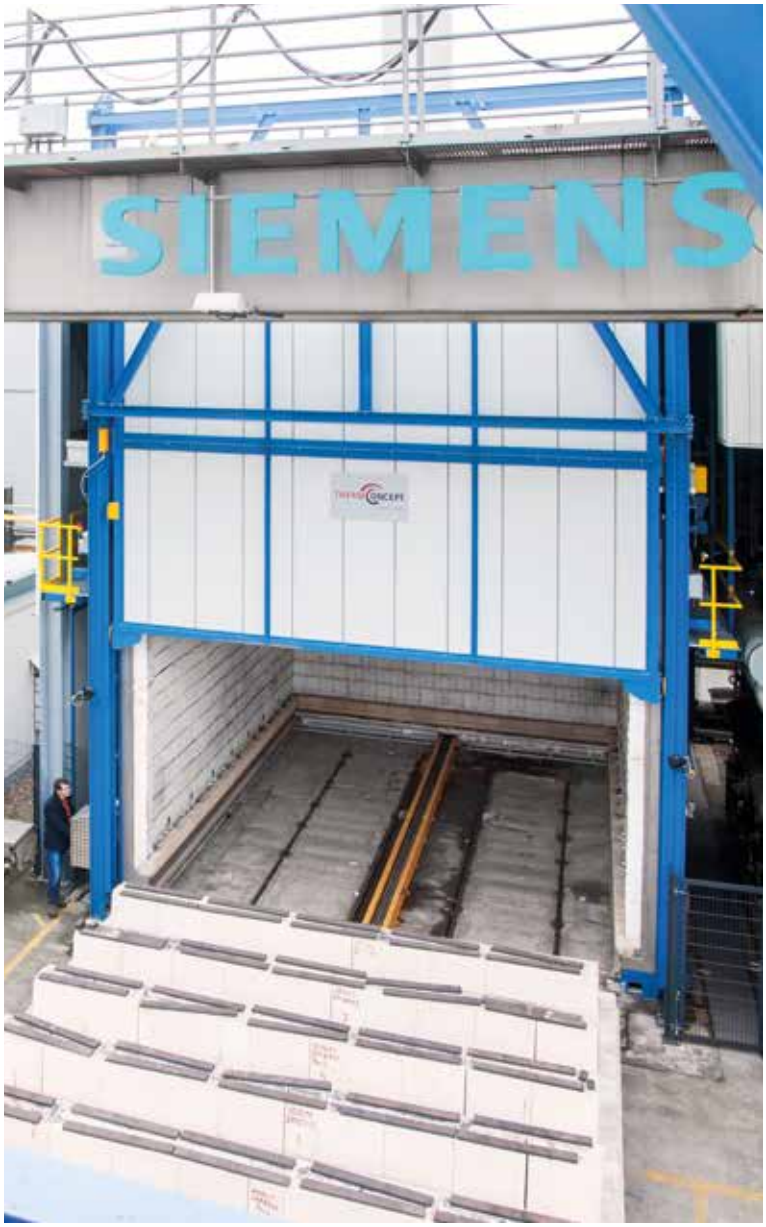


GAS-HEATED BOGIE HEARTH FURNACE

Furnace systems for annealing highly stressed rolls at 1000 °C.

Once the set temperature has been reached, the rolls are moved out of the furnace at 1000 °C and then quenched in water. The furnace system is therefore equipped with an air curtain system in the floor and in front of the furnace door to prevent the hot air from being blown out.

- Bogie hearth designed for rolls of different sizes with up to 12 t batch weight.
- Heating via 16 high-speed gas burners with a total power output of 1120 kW
- Temperature uniformity better than +/- 5 K at working temperature
- System control via Siemens PLC S7 with touch panel and various data tracking options and archiving



GAS HEATERED BOGIE HEARTH FURNACES

Production plant consisting of 2 identical gas-heated bogie hearth furnaces for a globally active gas turbine manufacturer in Germany.

The furnaces are used for annealing of gas turbine housings with charge weights of up to 75 t at 1100 °C. To avoid scale formation, the furnaces are designed for reducing atmosphere. The delivery included exhaust chimney for outdoor installation.

- Annealing temperatures up to 1100 °C
- Bogie hearth designed for a maximum batch weight of 75 t
- Usable inside dimension:
  6000 x 8000 x 4000mm (w x d x h)
- Heating via 26 high-speed gas burners with a total output of 7800 kW
- Furnace chamber divided into 8 control zones
- Temperature uniformity of up to +/- 5 °C according to DIN 17052
- Atmospheric control: Neutral or reducing atmosphere
- Controlled batch cooling
- System control via Siemens PLC S7 with touch screen and options for data tracking and data-logging


SIEMENS
Power Ge
55t

FURNACE PLANTS

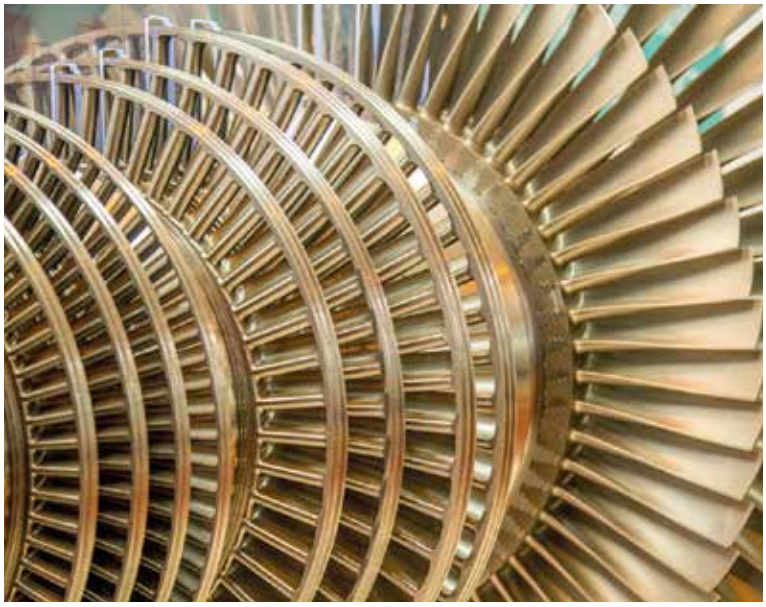
for thermal and thermochemical processes

Thermal cleaning / decoating

THERMCONCEPT supplies electrically and gas-heated furnace systems for the thermal cleaning of components. Mainly chamber and bogie hearth furnaces are used for this process. At temperatures above approx. 430 °C, organic substances are decomposed into carbonization gas and carbon. In thermal afterburners, the carbonization gases are post-combusted at high temperatures and the resulting carbonization gases are molecularly decomposed.

E.g. extruder screws, filters, dies, pipes, press moulds, etc. are thermally cleaned in THERMCONCEPT furnaces. Each application requires an individually specified cleaning process. We supply the individually developed furnace plant.

Gas-heated bogie hearth furnace with integrated thermal afterburner



MELTING OUT RESIDUAL WAXES

Wax melting with subsequent firing of ceramic moulds

THERMCONCEPT supplies electrically heated and gas-fired furnaces for investment casting moulds with subsequent firing of the ceramic moulds. In the production of investment castings, our kiln systems are mainly made for aluminium and titanium materials. The investment casting products are used in the automotive industry, aircraft construction, medical technology, mechanical engineering etc.

Gas-fired chamber furnace

- For the lost wax melting of turbine blades at 800 °C.
- The moulds are placed on an adapted charging rack.
- For the exhaust gas treatment, a thermal afterburner is installed on top of the furnace.
- The system is controlled by a Siemens PLC S7 with touch panel

Gas-fired chamber furnace with integrated thermal afterburner for firing of lost wax moulds in turbine blade production

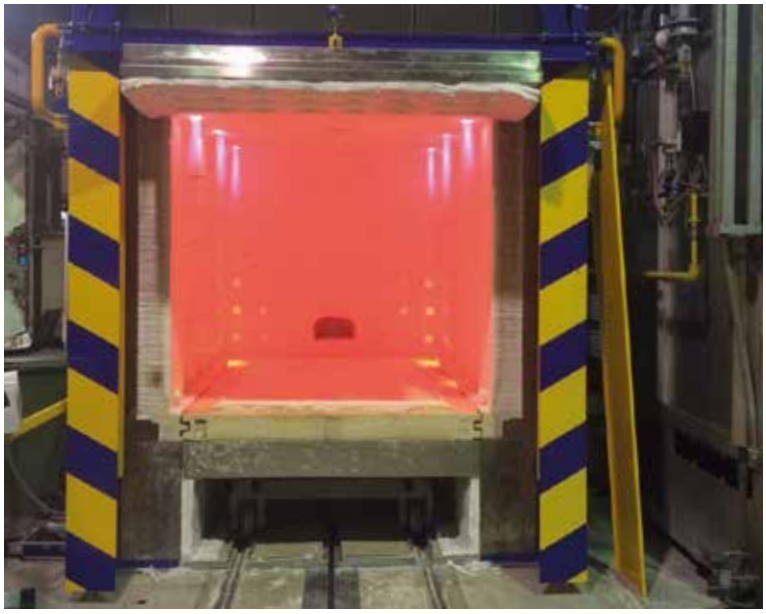
GAS HEATED BOGIE HEARTH FURNACES

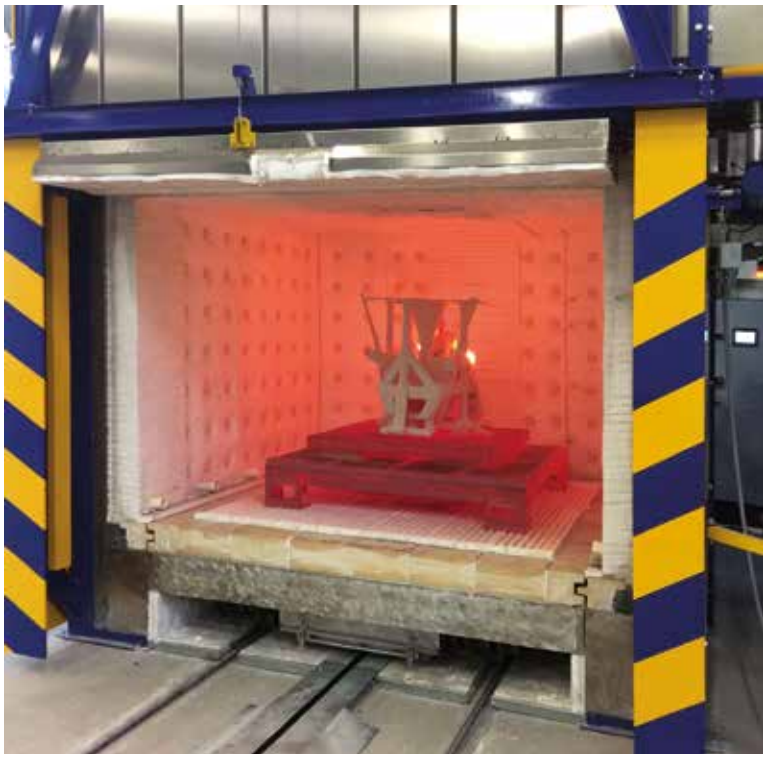
Lost wax investment casting of aluminium and titanium

Production line consisting of 2 identical gas-heated bogie hearth furnaces with integrated thermal afterburner for wax removal and firing of investment casting moulds up to at 1000 °C for a globally operating company with headquarter in the USA.

The lost wax melting of the ceramic moulds is carried out according to the Flash-Fire process. The furnaces have wax collecting trays which can be installed under the bogie. A shielding gas flow in the wax drain and in the drip trays prevents ignition of wax gases. The exhaust gas treatment is carried out by a powerful thermal afterburner. The furnace plant is used for the production aluminium and titanium parts for the automotive and aircraft industry.

- Useful dimensions (mm):
  1800 wide x 1800 deep x 1500 high
- Max. Working temperature: 1000 °C
- Equipped with 6 high-speed burners with a total output of 480 kW
- 2-zone furnace control
- System control via Siemens PLC S7 with touch panel and various data tracking and data-logging according to AMS 2750 E





PLANT AUTOMATION

The need for automation in all areas of production is constantly increasing. THERMCONCEPT supplements furnace systems with adapted systems for batch movement. The following systems are used:

- Hanging transport systems
- Roller conveyors
- Automatic transverse shunting devices for rail-bound bogies
- Linear conveyors, suspended or rail-mounted
- Fully automatic loading and unloading systems based on 6-axis industrial robots

1 Automatic material feed via a driven roller conveyor into a circulating air hood furnace

2 Batch feeding via an electrically driven cross conveyor

- Batch feeding via a transverse conveyor which is designed for up to 4 charging baskets
- Further transport of the baskets automatically to the infeed table
- The prepared charging baskets are inserted one by one into the furnace by the infeed table
- Pulling of the next charging basket from the batch table

3+4 Electrically driven transverse shaunting device for several rail-bound bogies.

5+6 Linear conveyors, rail-bound, with pneumatic lifting device for the charging of large scale metal sheets

7 Linear conveyor, hanging operation, for the handling of charging baskets

- Takeover of a charging basket at the discharge area of the furnace
- Further transport for quenching in water baths with pulsating lifting movements
- Further transport and lowering into a cleaning bath with downstream draining position
- Baskets are placed on a transfer position.

8 Fully automatic loading and unloading processes based on a 6-axis industrial robots

FULLY AUTOMATIC HEAT TREATMENT PLANT

for preheating steel ingots before rolling

This customized heat treatment plant consists of 6 chamber furnaces designed for T max. 1300 °C. Steel blocks of different sizes are provided onto a hydraulically operated centering device and precisely positioned for transfer. The loading robot takes over the cold steel block and loads this into a free furnace. After the heating time has elapsed, the loading robot removes the block, which has been heated to 1200 °C. The transfer to the rolling mill takes place via a roller conveyor.

The entire process, including the control of the furnace systems, is carried out fully automatically. Various processes with different temperature profile can be carried out in the heating furnaces

Hydraulic centering unit with suitable fork holder of the loading robot.

Plant with 6 chamber furnaces and linear traversing unit for charging

Fully automatic heat treatment plant

for homogenizing, stress relieving and controlled cooling of steel sheets after rolling

The heat treatment plant consists of two furnaces arranged one above the other, which can operate independently of each other.

The sheets from the rolling mill are fed in via a roller conveyor. A hanging portal robot takes over the sheet and deposits it on one of the 5 levels of a furnace chamber. After homogenizing, the sheets are cooled down in a controlled manner and then removed.

The entire process, from picking up the sheets, feeding them to a free loading level of the furnace, controlling the temperature in the furnace to removing them from the furnace, is done fully automatically.

QUENCHING AND CLEANING BATHS

THERMCONCEPT supplies quenching and cleaning baths for a wide range of heat treatment processes, from a 50 litre standard bath as part of on the hardening system to free-standing individual special baths.Single baths as well as combined baths for quenching and cleaning baths are available.

Water quenching bath

mounted in a pit between 2 drop bottom furnaces for solution annealing of aluminium components in the automotive industry.

For larger plants, baths are designed according to the process data and individually adapted to the requirements. Hardening oils as well as polymers or water are used as quenching media.

Charging racks and baskets in connection with charging trolleys for easy loading and unloading are available as well as stirring equipment for fast and uniform quenching and cleaning.

Oil quenching bath O 2500

for quenching spring steel, capacity 2500 litres
Incl. 3 pneumatic charging devices, heating, oil cooler, 2 agitators and fume extraction with flame trap

Double water quenching bath

for aluminium components after solution heat treatment, integrated in a sequenzed conveyor furnace

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SYSTEMS FOR HARDENING, ANNEALING, TEMPERING, CARBURIZING, NITRIDING, ...

THERMCONCEPT supplies complete systems for heat treatment. Starting with the HS1 hardening system with a footprint of only 3m² up to semi-automatic systems for training, tool making, etc. or production. These systems are used, among others, for preheating, annealing, hardening and tempering under inert gas, semi-vacuum hardening, tempering, carburizing and nitriding, aging and brazing.

The first step is the purchase of an annealing furnace. All other components can be implemented step by step. We supply you with all devices and auxiliary equipment that you need for hardening. In addition we will help you with all questions about hardening.

Compact hardening system HS 1

for small to mid-size workpieces, punches and dies. This compact hardening shop is based on the HS 1 system table:

- Sturdy table with storage space for tools and accessories
- Integrated cooling grate for hot parts of air-hardening steels or hot boxes, expandable with a fan set for forced cooling
- Installation of a heating stove above the cooling grates for heating parts for subsequent forging, welding, flame hardening, etc. Stones included in delivery
- Integrated quenching baths with hinged lid for water (stainless steel) and oil incl. charging baskets with drip tray as well as heating element with thermostat for heating the water and/or oil bath.

The HS 1 system table can be completed with the matching KM 10/13 - KM 30/13 annealing and hardening furnace and the KU 15/06/A tempering furnace (see separate catalogue).

Modular hardening system HS 2

For medium-sized and larger workpieces, tools, moulds and other annealed parts

The HS 2 hardening system consists of individual components, has a modular design and can therefore be combined and used for a wide range of different heat treatments. All system components are selected according to the products required for the specific application. Later extension of the HS 2 hardening system is possible at any time. All components have been tried and tested in practice for many years and offer a maximum of process safety and reliability.

Annealing and hardening furnace - The basis

- The annealing furnaces of the KM series (pages 32 - 33) are used as the basis for the hardening system. Designed for a maximum working temperature of 1300 °C.

Combi bath WO 200 - Hardening in oil or water

- Consists of an oil bath (200 l) and water bath (120 l)
- Optimum working temperatures of 40-60 °C (oil bath) and approx. 70 °C (water bath) by separate heating
- Water bath can also be used for cleaning the workpieces
- Alternatively, individual baths are available in single and double-walled design with inner container made of stainless steel and a capacity of 50 to 200 l

Air circulation furnace - Tempering

- Suitable for tempering, normalizing, quenching and preheating
- Wide range of practical models (pages 6 - 9)
- Extremely high temperature uniformity across the entire temperature range up to 850 °C Also available in semi-gastight version or for operation with gas retort for bright annealing, etc.

Charging trolley W41 - Hardening in air

- Enables safe and convenient loading and unloading of the furnace with larger workpieces or hardening boxes
- The hot workpiece is placed on the cooling grate and hardened in air.
- Optionally available cooling fan allows forced air hardening

SPECIAL ANNEALING PROCESSES FOR WORKSHOPS AND LABORATORIES

In addition to the HS1 and HS2 hardening systems, THERMCONCEPT supplies a special developed accessory program that have been tried and tested in hardening shops for many years. The range of accessories suits to the components of the hardening systems and enables protective gas annealing or oxidation-free hardening in a simple way. We will be happy to advise you on the selection of accessories and practical handling (see separate catalogue).

Gas grid system

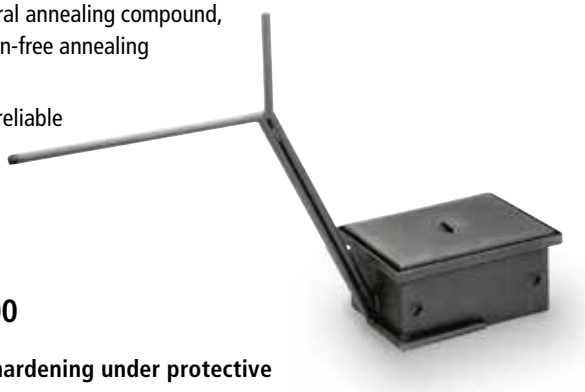
Hardening, annealing and cooling under protective gas up to approx. 1150 °C

- Bright hardening under inert gas atmosphere, followed by gas quenching
- No loss of time during heating due to the use of ultra-thin foil containers
- Can be used with forming gas, nitrogen as well as other noble gases such as argon, helium, etc.
- Very low gas consumption due to small container
- Also available with thermocouple for monitoring the temperature inside the foil container

Hardening box

Hardening, annealing, carburizing, nitriding up to approx. 1100 °C

- All hardening boxes matched to the internal dimensions of the annealing furnaces
- By adding neutral annealing compound, almost oxidation-free annealing is possible.
- Easy handling, reliable process flow



Gas box 1100

Annealing and hardening under protective gas up to approx. 1100 °C

- Annealing and hardening under protective gas for almost oxidation-free components
- Cooling under inert gas possible, also outside the furnace, thus short cycle times
- Gas-tight boxes suitable for all standard furnaces
- Quick and easy loading and unloading from the oven
- Also available as Atmos-box with hinged lid to remain in the furnace
- Furnace can be operated with or without retort at any time

Gas box 850

Annealing and tempering under protective gas up to 850 °C

Gas-tight welded boxes suitable for all standard furnaces for annealing and tempering of sensitive metals under inert gas for nearly oxidation-free components

- Cooling under protective gas, possible inside and outside the furnace
- Charging trolley for quick and easy loading and unloading of the furnace
- For short cycle times and increased productivity both furnace and charging trolley with cooling system on request
- Furnace can be operated at any time with or without retort

Auxiliaries, tools, accessories

With us you will find a comprehensive assortment tested in practice. Auxiliaries, tools and hardening accessories:

- Protective gas retorts, hardening boxes, baskets and furnace frames
- Hardening foils, envelopes and foil containers for oxidation-free annealing of steels up to approx. 1200 °C
- Carburizing granulate, nitriding powder and neutral annealing compound
- Heat protective clothing such as gloves, protective masks, etc.
- Charging equipment like pliers, shovels, draw hooks, charging plates and charging trolleys
- Hardening oils, detergents for cleaning, degreasing and for corrosion protection
- Hardness testers

CATALYTIC AND THERMAL EXHAUST AIR PURIFICATION PLANTS

With many thermal processes, volatile organic substances are released. Compliance with the emission limits requires an exhaust air purification system.

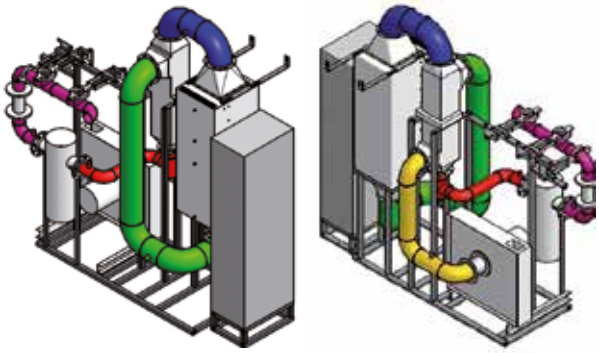
THERMCONCEPT supplies catalytic and thermal exhaust air cleaning systems that are individually adapted to the process.

Catalytic exhaust air cleanings

THERMCONCEPT catalysts work with ceramic honeycombs coated with needle perovskite crystals and are highly resistant to most catalyst poisons.

The catalytic exhaust air purification systems are designed according to the exhaust gas volume, the composition and concentration of the organic pollutants.

Depending on the application, at temperatures between 280 °C and 500 °C they are oxidized and completely converted into carbon dioxide and water.



THERMCONCEPT supplies fully integrated plant systems consisting of the furnace, the catalytic exhaust air purification and a PLC overall process control. The plant system also includes the required safety technology according to EN1539.

Thermal exhaust air cleaning

THERMCONCEPT develops, builds and supplies thermal afterburners for various applications. This robust and versatile type of exhaust air purification is usually used for an undefined raw gas or when catalyst poisons exclude the use of a catalytic converter. Organic components in the exhaust air are completely burned.

- Version in vertical, horizontal or suspended design
- With noise control measures (installation of silencers, soundproof cabins)
- Insulation with high-quality ceramic fibre for combustion temperatures up to 1200 °C
- Heating via gas or oil burners, also with electricity heating possible
- Volume flows from 50 nm^3 /h to 15,000 nm^3 / h
- Can be equipped with heat exchanger for heat recovery.
- System equipped with the necessary safety engineering

Gas-heated furnace system for lost wax melting with thermal afterburner, program control and temperature control via a Siemens PLC S7 with touch panel.

THERMCONCEPT range of services:

- Planning and design of exhaust air purification systems for new and old plants
- Accompaniment of official approval processes and emission measurements
- Connection to upstream and downstream process steps
- Integration into existing conveying and handling solutions
- Tests in our high temperature pilot plant

THERMCONCEPT supplies thermal afterburner for electric or gas-fired furnace systems. The focus is always on delivery of a complete solution consisting of the furnace, the waste gas treatment, the safety technology and also the process control, all together tailored to the individual process and needs of the user.

PROCESS CONTROL AND DOCUMENTATION

Control technology adapted to the applications and furnaces is part of the basic equipment of THERMCONCEPT furnaces. Controllers from renowned manufacturers ensure extremely precise process control. If necessary, the control technology can be supplemented by appropriate software for programming, monitoring and control to evaluate the processes.
PLC controls with touch panels are also available. Our tried and tested standard systems can also be used under consideration of factory standards and equipment regulations.

Heating element control

Contactors

- Practice-oriented switching frequencies, sufficient for many processes
- Rugged and proven technology
- Cost-effective and efficient solution

Semiconductor relay (SSR

- High switching frequency and thus fast response time during temperature control
- Wear-free and noiseless
- Cost-effective solution for higher demands on control and temperature accuracy
- Heating circuit monitoring with alarm of defective heating elements as option

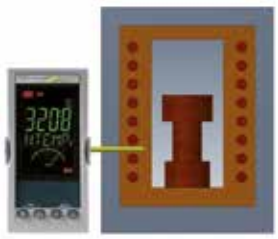
Thyristors (phase control)

- Extremely accurate temperature control
- Also wear-free and noiseless
- Smooth, constant mains load, no mains fluctuations, protection of the heating elements
- Power management via proportional power limitation possible
- Heating circuit monitoring with alarm of defective heating elements as option

Furnace temperature regulation

Furnace chamber control

- Measurement at a mechanically protected position in the furnace chamber, which experience has shown to be a good average value for the control system

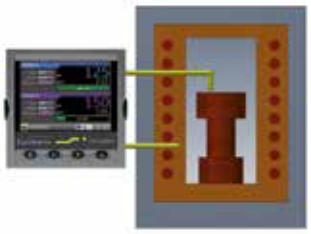


Furnace chamber control with batch measurement

- Independent display of measured temperatures
- For manual survey of the temperature values
- No influence on the control system

Batch control (cascade)

- Measurement and control of temperature in the chamber and on the batch
- Display of both temperatures
- Very precise temperature control through continuous comparison and adjustment of furnace chamber temperature and batch temperature



Temperature Measurement

Thermocouples

- NiCr-Ni type N as flexible sheathed thermocouple up to 1200 °C
- NiCr-Ni type K as flexible sheathed thermocouple up to 1200 °C
- PtRh-Pt type S as thermocouple with ceramic cover up to 1600 °C
- PtPh-Pt type B as thermocouple with ceramic cover up to 1800 °C
- Thermo-wire for individual assembly during testing or batch measurement

PROGRAM CONTROLLER

Eurotherm 3208/3216

- 1 program with 8 segments (4 ramps and 4 hold times)
- 1 event function
- RS 485 interface and iTools software as option
- Multi-zone control optional

Eurotherm 3508/3504

- 10 programs with a total of 500 segments freely programmable
- 7-day pre-selection timer
- Up to 5 event functions
- Interface RS 485 and Ethernet as well as iTools software as option
- Multi-zone control optional

Eurotherm 3216i/32h8i

- Can be used as safety temperature monitor or adjustable safety temperature selection limiter
- Alarm message as plain text
- Can also be used as a permanently mounted temperature display, optionally with interface for documentation with iTools software

Eurotherm Nanodac

- Suitable as program controller, controller/recorder combination, multi-zone controller or cascade controller
- Clear colour display
- Program controller with 100 programs, each with 25 segments, freely programmable
- 4 thermocouple inputs freely configurable
- USB connection for removable media, integrated flash memory
- Ethernet interface
- Incl. software for programming, control and documentation

ProfiTouch EPC 2000

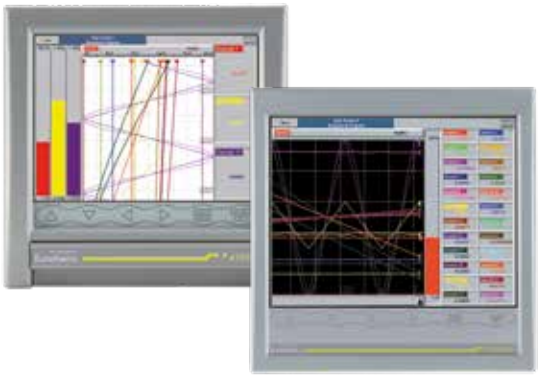
- PID controller with 4.3" touch panel
- 10 programs with 24 segments each
- Plain text display with program and segment name
- Holdback for guaranteed warm-up time
- Max. 8 event functions
- Countdown timer for delayed program start
- Ethernet interface for Eurotherm iTools software for Programming, monitoring and documentation
- Multi-zone control optional
- Cybersecurity certified according to the stringent requirements of AchillesR CRT Level 1
- Alarm messages in plain text

THERMCONCEPT
powered by innovation

PROCESS CONTROL

Control and documentation

For the control of complex processes, program sequences, necessary safety and security measures, THERMCONCEPT PLC controllers such as the Siemens S7 or the Eurotherm EPLC 400-PLC are used. These are individually and especially designed for the respective application and optimized in close cooperation with the user.



Siemens PLC S7 control/operating interfaces

- Individually adjusted and programmed for furnace and process
- Customized, individual user interfaces as option
- Optimal solution for systems with a wide range of functions and high process reliability
- Detailed process messages with full text output (multilingual)
- Simple tabular program input via touch panel
- Clear colour display

Eurotherm EPLC 400-PLC

- Central EHMI panel Touch Panel in connection with Eurotherm 3000 Series Controllers
- CODESYS programming environment for PLC and PID control
- Data recording and visualization
- Program selection e.g. via barcode reader and QR code label
- UPS - for data buffering

Dokumentation

As proof of compliance with the heat treatment regulations and for quality assurance, the data-logging of all process relevant data plays an important role. For this THERMCONCEPT offers a number of possibilities.

- Eurotherm iTools and Eurotherm controllers with PC connection for programming, monitoring and documentation
- Digital recorders with USB interfaces, Ethernet, memory cards, with up to 18 channels
- Process standard compliant recorders like e.g. Eurotherm Aerodac 6100A, 6180A, 6100XIO, Nanodac

Control and evaluation software

- Eurotherm iTools for professional process control and documentation of temperature-time profiles and batch data
- Several furnaces can be managed simultaneously
- Control from a central PC or over a network
- Great ease of use

PROCESS NORMS AND STANDARDS

International Aerospace Materials Standard AMS 2750 E

This standard covers requirements for temperature measurement in heat treatment plants of the aerospace industry and belongs to furnaces plants as well as their thermocouples, temperature controllers and displays. The documentation of heat treatment processes as well as regular system accuracy tests and temperature uniformity tests are important for quality assurance and thus ensure that components have been heat-treated in accordance with the applicable standards.

Here the heat treatment lines are divided into furnace classes (temperature distribution in the usable space) and instrumentation version (execution of pyrometry).

Instrumentation

Version A: controller, display, control thermocouple, recorder, over-temperature protection with alarm as well as high & low temperature sensors and min. 1 batch thermocouple

Version B: controller, display, control thermocouple, recorder, over-temperature protection with alarm as well as min. 1 batch thermocouple

Version C: controller, display, control thermocouple, recorder, over-temperature protection with alarm and high & low temperature sensors

Version D: controller, display, control thermocouple, recorder, over-temperature protection with alarm

Version E: controller, display and control thermocouple

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Temperature uniformity

Furnace class 1	+/- 3 °C	Furnace class 4	+/- 10 °C
Furnace class 2	+/- 6 °C	Furnace class 5	+/- 14 °C
Furnace class 3	+/- 8 °C	Furnace class 6	+/- 28 °C

International Automotive Industry Standard CQI-9

The CQI-9 is a self-assessment for the heat treatment of components in the automotive industry and was introduced by a working group of leading international automotive manufacturers and suppliers as well as the International Organization for Standardization (ISO) for continuous improvement, fault prevention and reduction of process deviations.

Relevant contents were taken from the AMS 2750 and adapted to the heat treatments in the automotive industry with regard to application, requirements, available furnace technology and test frequencies.

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PROFESSIONAL SERVICE

Success by consulting

Put your trust in the experience we have gained over the years in industrial furnace construction. We convert your special wishes into optimal solutions.

Your application is the center point

We support you in selecting the right furnace system so that you can make the right investment decision.

It all depends on a trial

Do you first want to test your workpieces and samples under realistic conditions in a furnace? No problem. For the simulation of your heat treatment processes, you can use our test field.

Everything from one source

As a system provider, we do not only advise you on the selection of the suitable furnace line. You can also contact us, if automation, the use of supplementary auxiliary equipment, tools and systems is required.

Qualified employees in service

With our qualified employees we offer a wide range of professional services around the furnace plant, for your safety right from the start. Our service technicians are integrated into the production process at our head office and thus remain up-to-date with their knowledge at all times. They are specialists for

- Insulation
- Heating Technology
- Electrical engineering/electronics
- Control + regulation technology
- Software
- Mechanics

We are focused on the full support and maintenance of your furnace system.

Retrofit and standard adaptation

THERMCONCEPT furnace systems are known for their long service life. After many years of hard use, they are still far from being part of the old iron. We take care of your plants and make them fit for the future. Often considerable energy savings can be achieved with little effort. We modify your furnace system to be used also with additional applications and processes. Modern control systems increase ease of operation and extend the possibilities for process documentation.

FIT FOR FUTURE

What you can expect from us is a comprehensive package of professional services to keep your furnace equipment fit for the future.

Furnace inspections

During a furnace inspection, we thoroughly check the condition and functionality of your furnace system. On request, this also includes measuring the temperature uniformity according to DIN 17052-1, SAT, TUS as well as checking whether your plant complies with the applicable standards. The results are summarized in a test report. In addition, we will provide you with a profitability analysis. The results of this analysis are used for the necessary retrofit measures.

Preventive maintenance - Predictive repairs - Life-cycle costing

Unexpected plant downtimes cause annoyance and considerable consequential costs. We therefore offer you flexible maintenance contracts with regular inspections and a preventive and cost-effective replacement of critical spare parts. The maintenance assignments are comprehensively documented and analysed. This is the prerequisite for optimizing life cycle costs.

Spare and wear parts - Only the original is first choice

Spare and wear parts from THERMCONCEPT offer you:

- always original equipment quality
- are 100% safe in use and fit perfectly
- maximum service lives
- better price-performance ratio than supposedly cheaper replica parts
- constant availability
- the adoption of product improvements also for spare parts
- responsive logistics

Online Monitoring / Online Support

With the online support we offer our customers a comprehensive economic service to support program improvements, troubleshooting, etc. Thus often costly visits by service technicians on site can be avoided.

WWW.THERMCONCEPT.COM

OUR PRODUCTRANGE

Annealing, Hardening, Tempering

Here you will find furnaces, systems and accessories for a wide range of applications in tool and mould making, in valve construction and in the metalworking industry. Almost all important heat treatment requirements can be fulfilled with our practical product range.

Foundry

We supply electrically-heated and fuel-fired melting and holding furnaces for light and heavy metals. The furnace range includes bale-out furnaces and tilting crucible furnaces. For tempering and aging processes of aluminium and aluminium alloys a wide range of products from convection ovens to fully automatic tempering systems is available for the user.

Technical Ceramics, New Materials

THERMCONCEPT furnaces are used for many applications in technical ceramics, semiconductor production, photovoltaics and bio-ceramics. We supply furnaces, e.g. for de-binding and sintering processes, for crystal growing, for thermal analysis. Our chamber furnaces, bogie hearth furnaces, elevator furnaces, hood furnaces and continuous furnaces are electrically-heated or gas-fired. The furnace technology is supplemented by catalytic and thermal exhaust air purification systems.

Furnaces for Research and Laboratories

Furnaces for research and laboratory applications are available for temperatures from 200 °C to 1800 °C. Our product range includes muffle and chamber furnaces, vertical and horizontal tube furnaces, drying ovens with thermal and forced air circulation, ovens with vacuum, elevator furnaces and high temperature furnaces with SiC or MoSi heating.

THERMCONCEPT powered by innovation

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