

Additive Manufacturing



Chamber furnace LH 216/12 for stress-relief annealing of metal components in protective gas after 3D printing



Hot-wall retort furnace NR 80/11 for stress-relief annealing of metal components in protective gas or vacuum after 3D printing



Cold-wall retort furnace VHT 8/16 MO for residual debinding and subsequent sintering of metal components after 3D printing

3D printing is becoming increasingly important in many industries – individual components can be created and printed quickly, storage costs are reduced as a result of demand-based production and components can be manufactured lighter as a result of modified designs. These are just a few of the almost infinite possibilities of Additive Manufacturing.

No matter whether you use laser-based printing, binder jetting, FDM, or pellets: we have the right heat treatment solution for every printing process.

Nabertherm is a strong partner for heat treatment furnace solutions for post-processing in 3D printing and has many years of experience in the field of heat treatment of aluminum, plastic, and metal alloys as well as debinding/sintering of ceramic and metal components.

Nabertherm provides standard solutions for stress-relief annealing, tempering or hardening for the most common printer sizes or develop customized solutions for future models.

For more challenging alloys, our hot-wall and cold-wall retort furnaces offer a suitable system and can be tailored modularly to suit every requirements.

Depending on the application, we can provide support for documentation and furnace management with the right design. We have implemented many reliable systems with our customers to fulfill AMS2750F, CQI-9, and FDA requirements.

3D Printing on the Path to Automation

Nabertherm has many years of experience in the area of system automation and offer automatic feed systems for furnaces or systems to pre-heat replacement frames, for example, to make printer even more efficient.

We have many standard solutions to suit different materials and furnace atmosphere requirements.

Annealing furnaces with protective gas boxes offering a very appealing price-performance ratio achieve a residual oxygen value of up to 300 ppm, for example. These furnaces are suitable for simple heat treatment where further surface processing is allowed after stress-relief annealing.

Values of < 10 ppm are achieved in hot-wall retort furnaces. This ensures clean surfaces and minimizes subsequent processing even with complex components, such as inner channels.

Vacuum furnaces that achieve an end vacuum of up to 5×10^{-6} mbar meet the highest atmospheric requirements.

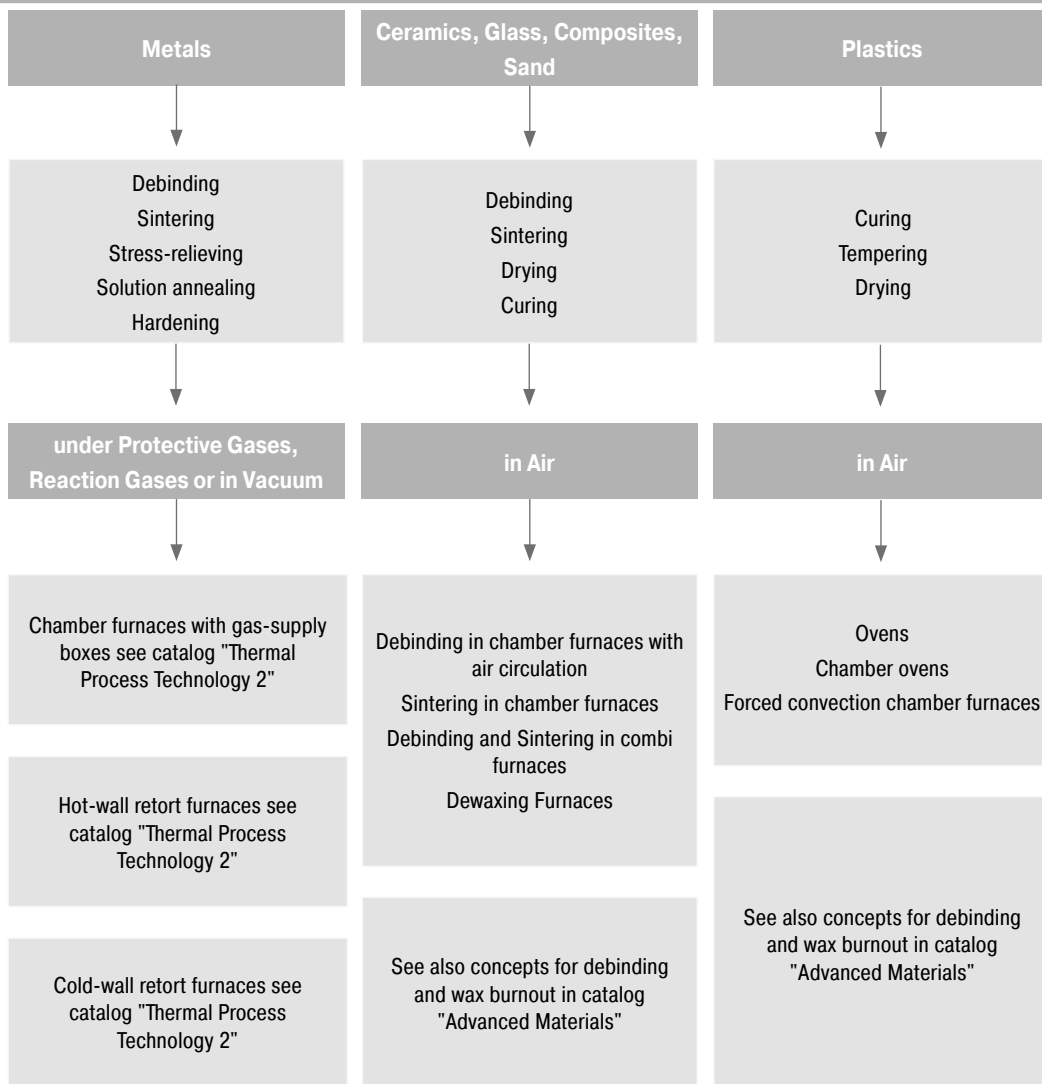
Which System for Which Material?



Forced convection chamber furnace NA 250/45 for stress-relief annealing of aluminum after 3D printing



Hot-wall retort furnace NR 300/09 for stress-relief annealing of metal components in protective gas or vacuum after 3D printing



Also, concomitant or upstream processes of additive manufacturing require the use of a furnace in order to achieve the desired product properties, such as heat treatment or drying the powder.

Classification of Print Volume – Furnace Design for Aluminum/Steel/Stainless Steel/Titanium

Print volume in mm			Forced convection furnace	Annealing furnace with protective gas box	Hot-wall retort furnace	Cold-wall retort furnace
w	d	h				
100	100	100	NA 60/..	LH 30/12	N 7/H	VHT 08/..
200	200	200	NA 60/..	LH 60/12	N 41/H	VHT 25/..
300	300	300	NA 120/..	LH 120/12	NR 100/11	VHT 70/..
400	400	400	NA 250/..	LH 216/12	NR 100/11	VHT 250/..
500	500	500	NA 500/..	NW 1000	NR 300/11	VHT 500/..

These are just some examples, other furnace sizes/designs on request



Oven TR 240 to temper plastic



Chamber furnace N 7/H for stress-relief annealing of metal components in protective gas after 3D printing



See also catalog "Additive Manufacturing"