

Heat Treatment of Metals and Ceramics

SOLUTIONS FOR ADDITIVE MANUFACTURING & POWDER INJECTION MOLDING

- _ Powder Bed and Inkjet Head 3D-Printing
- _ Direct Metal Laser Sintering (DMLS)
- _ Ceramic Injection Molding (CIM)
- _ Metal Injection Molding (MIM)
- _ Fused Filament Fabrication (FFF)
- _ Fused Deposition Modeling (FDM)
- _ Digital Light Processing (DLP)
- _ Selective Laser Melting (SLM)
- _ Stereo Lithography (SLA)
- _ Material Extrusion
- _ Multi-Material AM
- _ Powder Bed Fusion
- _ Binder Jetting
- _ Powder Metallurgy
- _ Robocasting

Stress relieving of laser sintered parts with hot wall inert gas retort furnaces



Carbolite Gero GPCMA/174

Advantages

- Stress relieving of laser printed metal parts
- Up to 700°C (HTMA)
- Up to 1200°C (GPCMA)
- Reactive gas atmosphere $\geq 800^\circ\text{C}$ (hydrogen)
- Inert gas atmosphere (argon or nitrogen)
- Highest temperature uniformity
- Oxygen content can be reduced to 30 ppm
- Optional compliance to AMS2750E Nadcap

APPLICABLE FOR METALS

Selective Laser Melting (SLM)
 Direct Laser Metal Sintering (DMLS)
 and many others

Selection of available hot wall inert gas retort furnaces

Model	Dimensions: Internal retort H x W x D [mm]	Model	Dimensions: Internal retort H x W x D [mm]
GPCMA/37	205 x 337 x 538	GPCMA/208	428 x 500 x 970
GPCMA/56	229 x 400 x 610	GPCMA/245	650 x 700 x 1050
GPCMA/117	279 x 500 x 840	HTMA 7/95	455 x 455 x 455
GPCMA/174	428 x 500 x 815	HTMA 7/220	610 x 610 x 610

For details please refer to our catalogues or enquire directly

Sintering of metals with cold wall vacuum chamber furnaces



APPLICABLE FOR METALS
 Material Extrusion (FFF/FDM)
 Stereo Lithography (SLA)
 Digital Light Processing (DLP)
 Binder Jetting
 and many others

Advantages

- Debinding and sintering of metal parts
- Up to 1450°C (higher available)
- Inert gas atmosphere (argon or nitrogen)
- Highest temperature uniformity
- Reactive gas atmosphere (e.g. 100% hydrogen for 316L)
- High vacuum (e.g. turbo pumps for titanium)
- Remaining binder (backbone binder) removal

Carbolite Gero HTK 8

Selection of available cold wall vacuum chamber furnaces

Model	Dimensions: Internal retort Ø x H [mm]	Model	Dimensions: Internal retort H x W x D [mm]
Top loader		Front loader	
LHTM 100-100	90 x 100	HTK 8	190 x 170 x 200
LHTM 100-200	90 x 190	HTK 25	250 x 250 x 400
LHTM 200-300	190 x 290	HTK 80	400 x 400 x 500

For details please refer to our catalogues or enquire directly

Process development for multiple applications with tube furnaces



Carbolite Gero HTRV 18/100/500

Advantages

- Debinding and sintering of metal or ceramic parts
- Various sizes and temperatures available
- Various tube materials available (e.g. quartz glass, mullite, RCA)
- Up to 1500°C under vacuum
- Up to 1800°C under inert gas or hydrogen
- Very small footprint
- Horizontal or vertical tube



Carbolite Gero HZS 12/600

Selection of available tube furnaces

Model	Temperature [°C]	Dimensions: Work tube inner Ø [mm]	Model	Temperature [°C]	Dimensions: Work tube inner Ø [mm]
E-Range	up to 1200	up to 50	F-Range	up to 1350	up to 180
G-Range	up to 1200	up to 150	STF-Range	up to 1600	up to 75
K-Range	up to 1200	up to 180	HTRH-Range	up to 1800	up to 88

For details please refer to our catalogues or enquire directly

Heat treatment of ceramics with high temperature chamber furnaces



APPLICABLE FOR CERAMICS

- Material Extrusion (FFF/FDM)
- Stereo Lithography (SLA)
- Digital Light Processing (DLP)
- Binder Jetting
- and many others

Carbolite Gero HTF 17/5

Carbolite Gero HB 18/80

Advantages

- Debinding and sintering of ceramic parts
- Works on air
- Very small footprint
- Up to 1800 °C on air
- Highest temperature uniformity
- Remaining binder (backbone binder) removal

Selection of available high temperature chamber furnaces

Model	Dimensions: Internal H x W x D [mm]
HTF 18/4	140 x 140 x 190
HTF 18/8	210 x 190 x 190
HTF 18/27	300 x 300 x 300
HTF 18/64	400 x 400 x 400
HTF 18/165	550 x 550 x 550

Model	Dimensions: Internal H x W x D [mm]
HTF 18/250	500 x 500 x 1000
HTF 18/332	550 x 550 x 1100
HTF 18/514	780 x 550 x 1200
HB 18/80	500 x 400 x 400
HB 18/240	500 x 1200 x 400

For details please refer to our catalogues or enquire directly

Catalytic or thermal debinding with inert gas furnaces



Carbolite Gero EBO 120

Advantages

- Thermal debinding up to 1100°C (GLO range)
- Catalytic debinding up to 150°C (EBO range)
- Inert gas control
- Safe afterburner combustion
- Nitric acid control for catalytic debinding

APPLICABLE FOR METALS & CERAMICS

Material Extrusion (FFF/FDM)
 Stereo Lithography (SLA)
 Digital Light Processing (DLP)
 Binder Jetting
 and many others

Selection of available inert gas debinding furnaces

Model	Dimensions: Internal H x W x D [mm]	Model	Dimensions: Internal H x W x D [mm]
EBO 40	300 x 300 x 450	GLO 10	170 x 170 x 300
EBO 120	400 x 400 x 750	GLO 40	210 x 210 x 600
EBO 250	500 x 500 x 1000	GLO 120	320 x 320 x 700
GLO 5	110 x 100 x 250	GLO 260	420 x 420 x 800

For details please refer to our catalogues or enquire directly

Drying of parts after solvent or water debinding with forced convection ovens



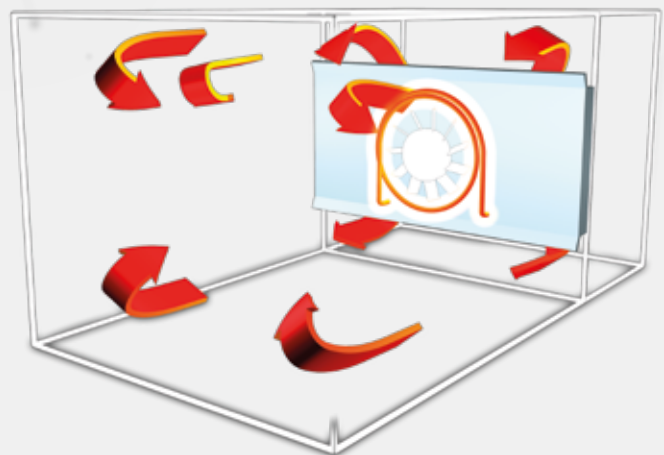
APPLICABLE FOR METALS & CERAMICS

Thermal or
Catalytic Binder Feedstock
and many others

Carbolite Gero PF 30
with moisture extraction option and optional window

Advantages

- Removal of water or organic solvents
- 300°C as standard (higher available)
- Forced convection for highest uniformity
- Works on air
- Exhaust fans
- Optional compliance to DIN EN 1539 for solvents
- Optional compliance to AMS2750E Nadcap



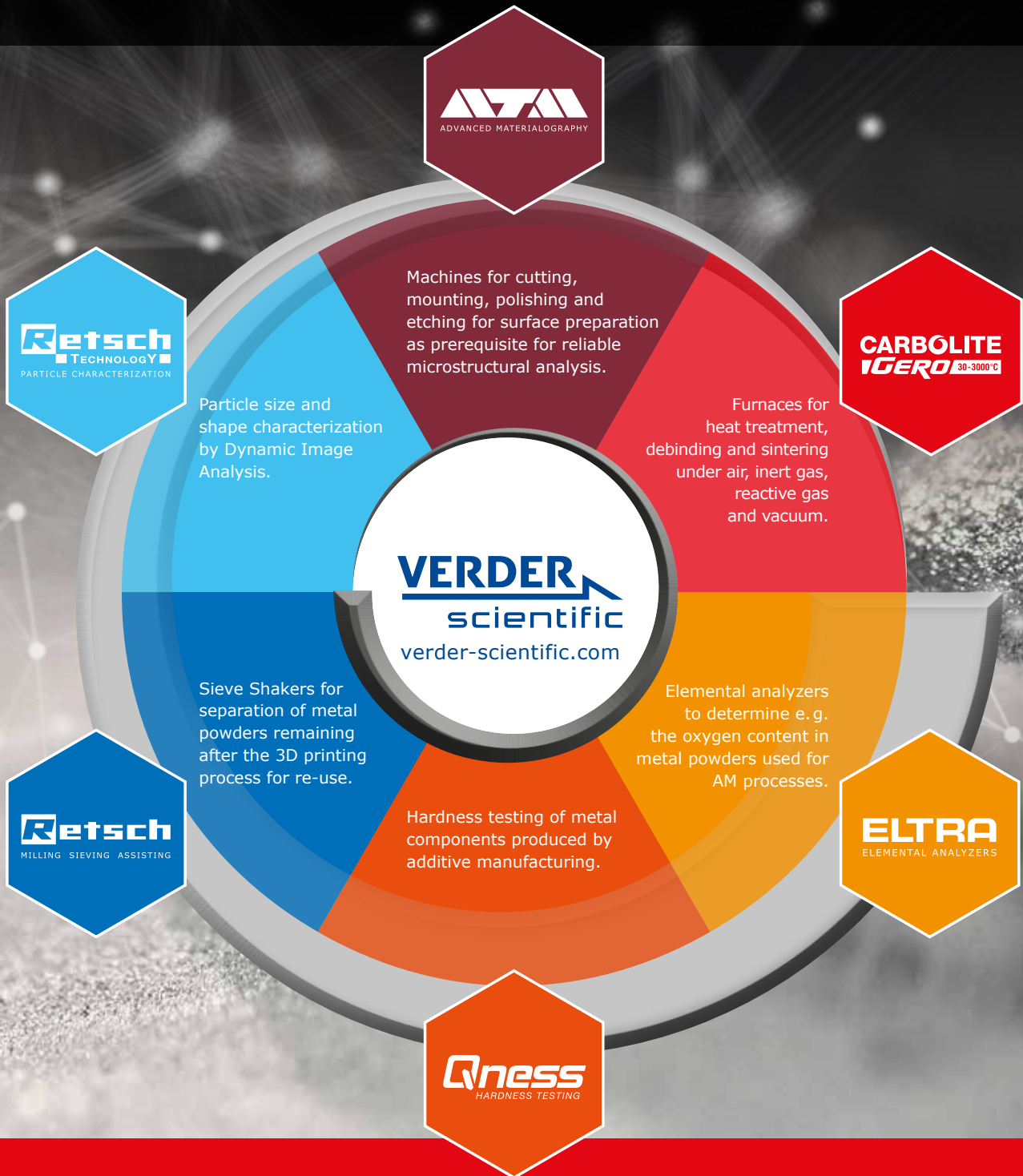
Selection of available forced convection ovens

Model	Dimensions: Internal H x W x D [mm]	Model	Dimensions: Internal H x W x D [mm]
PF 30	300 x 290 x 320	PF 400	1500 x 605 x 510
PF 60	400 x 390 x 420	GP 220A	610 x 610 x 610
PF 120	500 x 490 x 520	GP 330A	915 x 610 x 610
PF 200	750 x 590 x 520	GP 450A	1220 x 610 x 610

For details please refer to our catalogues or enquire directly

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CARBOLITE
IGERO 30-3000°C

Carbolite Gero Ltd.
Parsons Lane, Hope
Hope Valley, S33 6RB
UK

Phone +44 (0) 1433 620011
Fax +44 (0) 1433 621198
E-Mail info@carbolite-gero.com
Internet www.carbolite-gero.com

Carbolite Gero GmbH & Co. KG
Hesselbachstr. 15
75242 Neuhausen
Germany

Phone +49 (0) 7234 9522-0
Fax +49 (0) 7234 9522-66
E-Mail info@carbolite-gero.de
Internet www.carbolite-gero.de