CENTORR VACUUM INDUSTRIES

APPLIED TECHNOLOGY CENTER

LABORATORY CAPABILITIES and RATES

The Applied Technology Center of Centorr Vacuum Industries is available to process customer's products and develop process cycles for advanced materials. The laboratory currently includes a Transparent furnace for viewing samples within a heated environment, a small Air furnace, Laboratory scales, a Leco Carbon Analyzer, and the following Furnace equipment:

Furnace / Equip	Batch Furnace A - Graphite **	Batch Furnace A - Metal	Batch Furnace B - Graphite	Induction Melt	Arc Melting	Continuous Belt Furnace C
Hot Zone Size:	6"w x 6"h x 15"d (9" inside elements)	6"w x 6"h x 15"d (9" inside elements)	6"w x 6"h x 15"d(9" inside elements)	60mm dia x 140mm h 2.3 kgs (5 lbs)	2"dia x 1"h (<100g)	6"w x 1"h x 36"l
Hot Zone Element:	Graphite	Tungsten	Graphite	Induction	Tri-Arc	Tungsten
Hot Zone Shields:	Graphite Felt	W / Mo Shields	Graphite Felt/Board	Al_2O_3, MgO, ZrO_2 or Graphite/Clay Crucibles	water-cooled copper base	W / Mo
Max. Temperature:	2000°C in Vac 1800°C in inert gas	2000°C in Vac/Inert Gas 1800°C in H_2	2000°C in Vac 1800°C in Inert gas	<2400°C in Inert Gas	<3500°C in Inert Gas	2000°C in Inert Gas 1600°C in H_2
Max. Vacuum:	$1x10^{-6}$ torr	$1x10^{-6}$ torr	$1x10^{-5}$ torr	N/A	N/A	N/A
Max Pressure:	0-3 psig	0-3 psig	1 atm	Slight Pos. Press	Slight Pos. Press	Slight Pos. Press
Partial Pressure Atmos. Avail:	H_2, N_2, Ar, Forming Gas (2-300 torr)	H_2, N_2, Ar, Forming Gas (2-300 torr)	N_2, Ar, Forming Gas (2-300 torr)	N_2, Ar, Forming Gas	N/A	N/A
Positive Pressure Atmos. Avail:	H_2, N_2, Ar, Forming Gas (0-3 psig)	H_2, N_2, Ar, Forming Gas (0-3 psig)	N_2, Ar, Forming Gas (1 atm)	H_2, N_2, Ar, Forming Gas (0-3 psig)	Ar, He	N_2, Ar, Forming Gas
Vacuum System:	Rotary Vane Pump / Varian Diffusion Pump w/Baffle	Rotary Vane Pump / Varian Diffusion Pump w/ Baffle	Binder Removal Pump Holding Pump Diffusion Pump	Rotary Vane Pump / Varian Diffusion Pump w/ Baffle	N/A	N/A
Binder Removal:	None	None	Yes	N/A	N/A	Minor (<2-3%)
Belt Speed:	N/A	N/A	N/A	N/A	N/A	0.1" - 5"/min
Rotovac Usage:	N/A	N/A	5" dia x 13" tube	N/A	N/A	N/A
Retort Usage:	I/I 5"w x 5"h x 11"d	N/A	I/I 5"w x 5"h x 11"d	N/A	N/A	N/A

Notes:

- RATES: The rate for Laboratory Work is $150.00 per hour ($1200.00/day), plus the cost of all expendables (ie - bottled gas, crucibles, Setters, trays, etc. .). Belt Furnace is $1500.00/day or $1000.00 for 1/2 day plus cost of gas.
- **Laboratory technician time is billed at $150.00 per hour for pre-cycle furnace configuration or post-cycle work. Eight hours is required to switch Hot Zones from Graphite to Alloy.
- Rotovac powder processing or Induction melting adds one-time charge of $600.00 for hot zone changeover.
- Customer to supply their own work fixturing if complicated support is required. Graphite sagger available at I/I dims of 5"w x 1"h x 11"l, and scrap W or Mo foil can be provided.
- Oxygen Monitor and Inert Gas Purifier available for use on furnaces at $100.00 charge.
- For quotations or further information, contact Dan Demers at 603-595-7233x 263.
- *Note: Lab schedule is based on "first come first served". A Purchase Order # is required to hold a specific date.*

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APPLIED TECHNOLOGY CENTER

REQUEST FOR LABORATORY WORK

CENTORR Vacuum Industries VI

Customer Information

Customer Name: _____
Contact: _____
Address: _____
City, State, Zip: _____
Country: _____
Telephone: _____
Facsimile: _____
E-Mail: _____

Load Information

Material: _____
Weight: _____
Dimensions: _____
Form: Powder, Solid, Other _____
Fixtures: Crucibles, Trays, Racks, N/A
Other: _____
Supplied By: Customer / Centorr/Vac. Ind.
Binder: _____
% by Weight: _____
How removed: _____
_____

Material Safety Data Sheets (MSDS) to be supplied
By Customer for material(s) and binder(s)

Process Requirements

Furnace Type: Batch Furnace Continuous Belt Furnace (vacuum capability not available for this furnace)
Heating Type: Resistance Hot Zone: (Metal / Graphite) Induction Heating Arc Melting
Atmosphere: Gasses: Ar, He, H_2, N_2, Forming Gas, Other _____
Vacuum: Level: _____ X 10^{-} _____ Torr
Maximum Temperature: _____ Degrees C - F (circle one)
Ramp Up Rate: _____ Degrees / Min: Ramps/Soaks: Please Detail On Attached Form
Cool Down Rate: _____ Degrees / Min: Ramps/Soaks: Please Detail On Attached Form
Number Of Runs: _____

Please indicate the results you are hoping to achieve with this process run: _____

_____
_____
_____
_____

Comments during process run: _____

_____
_____
_____
_____

Additional Requirements

Will Customer Be Present During Run: Yes No
Special Handling: _____
Analytical Services Required _____
How Will Samples Be Delivered to Centorr/Vacuum Industries: _____
How Will Samples Be Returned to Customer: _____

CENTORR Vacuum Industries

RUN: _____ DATE: _____

Step:	Temp (°C) from to	TIme	Ramp (°C/min)	Press / Vac	Gas	Comments
TOTALS						