

# Vulcan<sup>®</sup> Box Furnace

with Automatic Controls

## Owner & Operator's Manual

|                |              |              |               |
|----------------|--------------|--------------|---------------|
| <i>Models:</i> | <i>A-130</i> | <i>A-550</i> | <i>A-1750</i> |
| 100V           | ---          | 9493486      | ---           |
| 100-120V       | 9493300      | ---          | ---           |
| 120V           | ---          | 9493306      | ---           |
| 200-240V       | 9493301      | 9493307      | 9493407       |
| 230 (EURO)     | ---          | ---          | 9493657       |

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- Never operate furnace in close proximity to combustible materials or place materials on top of the furnace.
  - Caution: To provide continued protection against risk of electric shock, connect to properly grounded outlet only.
  - The furnace must be electrically grounded to a three wire electrical outlet or receptacle. The electrical service provided must be a dedicated line of the proper size according to local electrical codes.
  - Disconnect the line cord before attempting to service the furnace.
  - Do not attempt to service the furnace until you read and understand the service manual. (See Service Manual under Accessories on page 11)
  - Do not operate the furnace controls with tongs or other tools; the tongs will damage the control switches.
  - Do not use solvents or liquid cleaners on the control panel; they will enter the panel and damage it.
  - Do not place firing trays or other hot objects directly in front of the furnace; they will melt the graphic overlay.
  - Always verify that the power switch light is off before attempting to load or reach into the furnace chamber with any tools or instruments.
  - As a routine working precaution, always wear safety glasses and protective gloves when operating, loading and unloading the furnace.
  - The furnace is not equipped with overcurrent protection on the AC primary. In the event that an overcurrent condition occurs, the building's branch circuit overcurrent protection (fuse or circuit breaker) will be the primary means of protection.
-  If the furnace is not used in the manner as specified in this manual, the protection provided by the furnace may be impaired.

#### OSHA AND CALIFORNIA PROPOSITION 65: MUFFLE DUST EXPOSURE

In keeping with the policy of DENTSPLY NeyTech to build safe products, comply with all National and State statutes and keep you, the valued customer informed; the services of a Certified Industrial Hygienist firm were employed to test and evaluate the lab operator's exposure to respirable refractory ceramic fiber (RCF) and crystobalite (a form of crystalline silica) present in the furnace muffle.

The findings of this test revealed that levels of exposure during the normal operation of this equipment, as outlined in the operator's manual, were far less than the Permissible Exposure Limit set by the Federal Government.

When it becomes necessary to replace the muffle, the person doing this work is recommended to wear a HEPA filter respirator and protective gloves as a precautionary matter.

Seal used muffle in a plastic bag and dispose of in accordance with local, state and Federal regulations.

Because this product and many similar products on the market today contain crystalline silica and ceramic fibers, it is necessary under the statutes of California Proposition 65 that DENTSPLY NeyTech include the following statement:

*"This product contains substance(s) known to the State of California to cause cancer."*

Material Safety Data Sheets for RCF materials supplied upon request.

#### SYMBOL TABLE

|                                                                                     |                                 |                           |
|-------------------------------------------------------------------------------------|---------------------------------|---------------------------|
|  | - Alternating current           | Courant alternatif        |
|  | - On (Supply)                   | Marche (alimentation)     |
|  | - Off (Supply)                  | Arrêt (alimentation)      |
|  | - Caution, Hot Surface          | Attention, surface chaude |
|  | - Protective Conductor Terminal | Borne de masse, châssis   |
|  | - Caution                       | Attention                 |

## FEATURES

- High Performance, Hybrid Muffle;
- Longer life and more durable than Fiber;
- Faster heating and Faster cooling than Firebrick
- Wide Operating Temperature Range:  
200°C (392°F) --- 1100°C (2012°F)
- Smooth, low force vertical lift door, with roll back action;  
Gives maximum access with minimum vertical space
- Durable stainless steel front panel
- Automatic temperature controller; Select temperature with front panel control knob and muffle temperature is maintained at that temp
- Easy to operate; power switch and temperature set knob
- Integrated door safety switch breaks both sides of the power line to muffle
- Agency Approval: ETL, CE
- Easy / Lower Cost Muffle Service;  
Individual muffle heating plate replacement

## APPLICATIONS

- WAX BURNOUT
- MATERIAL ASHING
- MATERIAL HEAT TREATING
- CERAMIC FIRING
- GLASS SEAL FIRING

## INSTALLATION INSTRUCTIONS

### UNPACKING:

#### CAUTION:

Carefully unpack and remove the furnace from its shipping carton. Save the carton and other packing material for future use in transporting the furnace.

**Shipping damage should be reported to the carrier as soon as detected.**

The furnace shipping carton contains the following:

- One furnace complete with power cord
- Owner's & Operator's Manual plus Calibration Pellets
- Ceramic Floor tray (shipped in the muffle)
- Two exhaust port plugs (for heat treating applications only)

### LIFTING AND CARRYING:

NOTE: The 1750 models require two people.

1. Get a firm footing. Keep your feet shoulder width apart for a stable base.
2. Bend your knees. Don't bend at the waist.
3. Grip the base of the furnace and lift with your legs.
4. Keep the load close to your body and carry the unit to the destination. Keep your back upright during lifting.

### INSTALLATION:

1. Remove all packing material from in and around the furnace. The furnace should be located at least 15cm (6") away from walls, shelves and heat sensitive materials. Open the furnace door and remove the packing material from inside the furnace. NOTE: The furnace front panel will show some discoloration around the muffle due to the calibration and burnin cycles performed at the factory.
2. The furnace should **not** be located directly under shelves and other airflow restrictions.
3. On high voltage (200-250 volt) units, connect the line cord packaged in the rear of the furnace to the socket in rear of furnace.
- 4a (Combustion, Burnout or Reaction Processes) Position the furnace under a vent hood or connect the exhaust port to a ventilation system to prevent exposure to the exhaust fumes. The furnace exhaust port 25 mm (1") OD by 25 mm (1") long [50 mm (2") OD by 20 mm (0.8") long on 1750 Model] can be ducted into the exhaust hood for more effective ventilation. Stainless Steel flexible metal tubing can be used for this ducting.
- 4b (Heat Treating or Non-Reaction Processes) Position the furnace under a vent hood. Plug the exhaust port with the ball plugs provided in the furnace accessory kit. This will reduce heat loss and electricity requirements.
5. Connect the furnace to a power circuit or receptacle with an overcurrent protection (circuit breaker or fuse) rating of 20 Amps on the low voltage model and 10 Amps on the high voltage model. The furnace should be the only load on this circuit. The 1750 North American model requires a 20A supply (breaker/recepticle). The 1750 Euro model requires a dedicated 32A supply (breaker/recepticle).
6. Turn on the furnace lighted green power switch (right-hand side of the control panel).
7. When the door is fully closed, the power switch light should be illuminated. As the door opens the power switch light should turn off. Do not attempt to operate the furnace if this light does not turn off when the door is open.
8. At this time, your new furnace should be set-up to operate. Please review the Operations section of the manual before proceeding to operate the furnace.

## OPERATIONS

### STARTING OPERATION:

Close the furnace door. Turn the green power switch to the on (I) position. The light inside the switch will turn on. An interlock door switch located inside the furnace disconnects the power to the muffle when the door is opened. The door must be closed for the furnace to heat.

Turn the setpoint knob to desired temperature and the furnace will ramp to the set temperature. Turn off the power switch, to turn off the furnace.

The temperature rate will start out at full speed and gradually slow as it approaches the setpoint temperature. If a slower temperature increase rate is required set the temperature at several intermediate temperatures. This will cause the control to approach each intermediate temperature at a slower rate.

Note: Observe the rate curves on Pg.6-7 to determine the time required to reach set-point.

### OPERATING EXAMPLES:

The furnace will continuously operate at 900°C each day.

- Insert work, close door, adjust knob to 900°C (white inside scale).
- Turn power switch to on position (green light should come on when door is down). If the same temperature is needed each day the knob does not have to be adjusted.
- The furnace will heat to the temperature indicated on the front control panel. Turn off the power switch when the cycle is finished.

A temperature cycle calls for a slow ramp to 700°C (1300°F).

Procedure:

- Insert work and close door.
- Turn power switch to on position (green light should come on when door is down).
- Turn the set-point knob to 300°C (inside scale), 30 minutes later turn the knob to 500°C, and finally 30 minutes later to 700°C .
- The furnace load slowly heats to the desired 700°C.

Note: Because of the nature of the control, the first 90% of the rate will be relatively fast while the last 10% takes somewhat longer. The furnace will reach the set point, but it takes some time. If a faster rate is required, set the furnace to approximately 10 to 20% higher than desired set-point and then adjust to the desired set-point when temperature is reached.

## SPECIFICATIONS

### PARAMETER

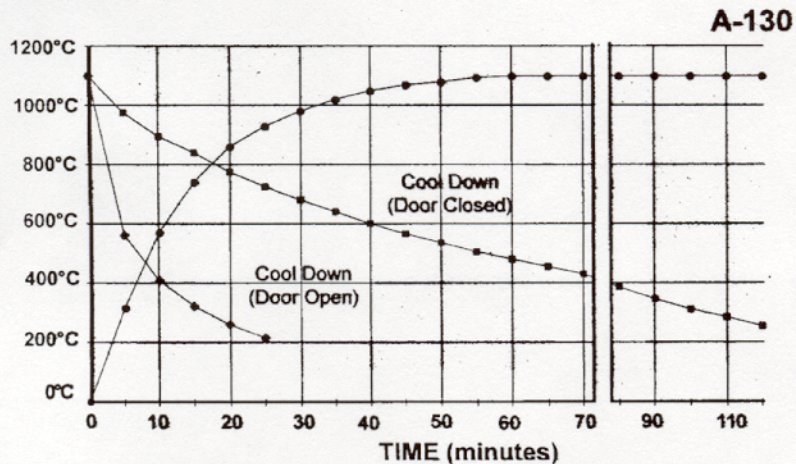
- Temperature Range: 200°C (392°F) - 1100°C (2012°F)
- Temperature Accuracy:  $\pm 25^{\circ}\text{C}$  ( $\pm 45^{\circ}\text{F}$ ) at steady state
- Muffle Temperature Uniformity:  $\pm 8^{\circ}\text{C}$  ( $\pm 15^{\circ}\text{F}$ ) at steady state

| ELECTRICAL               | A-130                     | A-550                                     | A-1750   | A-1750(EURO) |
|--------------------------|---------------------------|-------------------------------------------|----------|--------------|
| Voltage Range:           | 100 -120                  | 100                                       | ----     | ---          |
| @ 50/60Hz                | ----                      | 120                                       | ----     | ---          |
|                          | 200 -240                  | 200 -240                                  | 200 -240 | 230          |
| <u>Steady State</u>      |                           |                                           |          |              |
| Current: 100V            | ----                      | 14.7                                      | ----     | ----         |
| Amps 120V                | 6.5                       | 12.0                                      | ----     | ----         |
| 240V                     | 4.4                       | 10.0                                      | 20.0     | 19.0         |
| Max Power Watts:         | 720 (120V)<br>1060 (240V) | 1470 (100V)<br>1440 (120V)<br>2400 (240V) | 4800     | 4370         |
| Watts to Maintain 1000°C | 525                       | 1050                                      | 2200     | 2200         |

### ENVIRONMENTAL

Ambient Operating Temperature: 5 - 40°C  
Relative Humidity: Maximum 80%, non-condensing

### PERFORMANCE CURVES

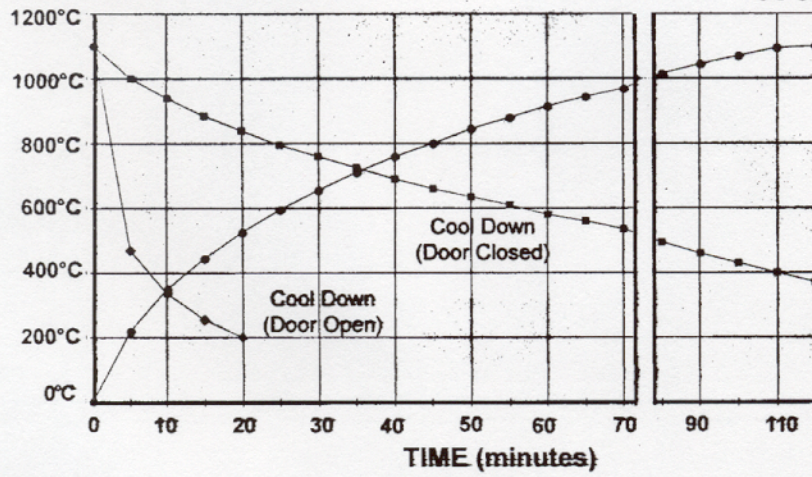


Test Conditions: nominal line voltage, no load in the muffle, control set to 1100°C. Lower temperatures will require approximately the same amount of heating time due to the nature of the control. Setting the control higher than the desired setpoint and then reducing it will shorten the total time.

# SPECIFICATION (cont.)

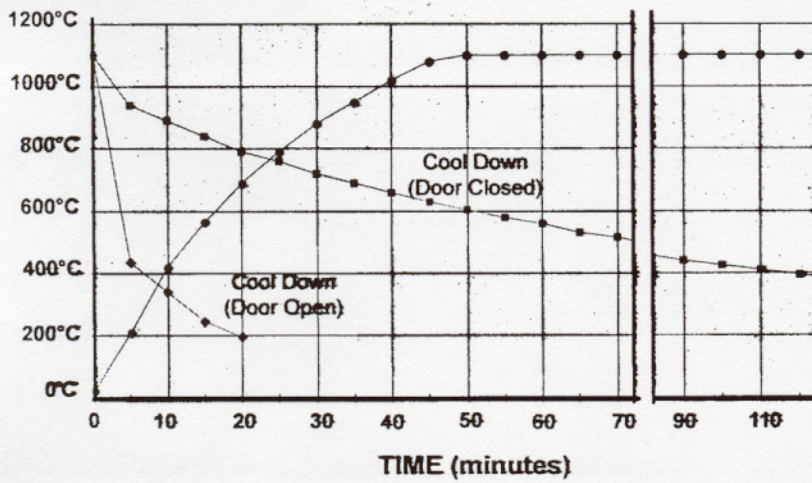
## PERFORMANCE CURVES

**A-550**



## PERFORMANCE CURVES

**A-1750**



## OUTLINE DRAWINGS mm(in)

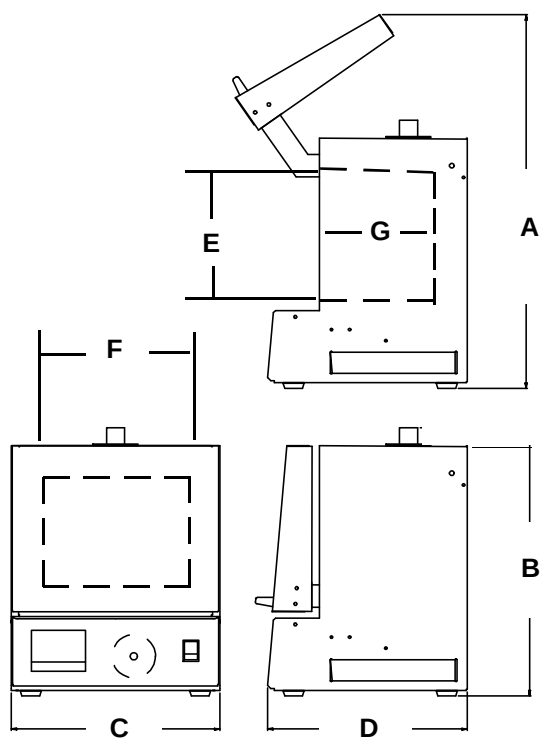
### MECHANICAL

Exterior Dimensions:

| Model  | A            | B            | C            | D            |
|--------|--------------|--------------|--------------|--------------|
| A-130  | 510mm(20.0") | 350mm(13.8") | 290mm(11.5") | 330mm(13.0") |
| A-550  | 635mm(25.0") | 410mm(16.0") | 400mm(15.8") | 430mm(17.0") |
| A-1750 | 815mm(32.0") | 545mm(21.5") | 610mm(24.0") | 535mm(21.0") |

Internal Muffle Dimensions:

| Model  | E            | F            | G            |
|--------|--------------|--------------|--------------|
| A-130  | 120mm(4.6")  | 140mm(5.7")  | 130mm(5.2")  |
| A-550  | 180mm(7.0")  | 230mm(9.0")  | 230mm(9.0")  |
| A-1750 | 250mm(10.0") | 360mm(14.0") | 320mm(12.5") |



| Model  | Furnace Weight: | Shipping Weight: |
|--------|-----------------|------------------|
| A-130  | 12kg(26lbs)     | 15kg(32lbs)      |
| A-550  | 20kg(45lbs)     | 25kg(54lbs)      |
| A-1750 | 44kg(97lbs)     | 60kg(132lbs)     |

## SETUP & MAINTENANCE

### TEMPERATURE ADJUSTMENT:

Every VULCAN furnace is calibrated in the factory at 1100°C.

**CAUTION! Unplug the power cord before attempting to adjust the calibration. The Thermocouple and PC board are connected to the AC power supply!**

The calibration can be adjusted by turning the trimmer potentiometer (pot) RP1 located on the "A" Controller board. If the meter temperature is **lower** than the temperature setting that the control knob is set to, turn the trimmer pot one **1/4 turn clockwise**. If the temperature is **higher** then **a 1/4 turn counter clockwise**. Allow the furnace 10 to 20 minutes to stabilize before making further adjustments.

### CLEANING:

- Vacuum dust and dirt from the furnace rather than blow. This will minimize the amount of air born dust particles.
- Use a soft damp cloth to clean the control panel. Avoid excess water or solution when cleaning the furnace. These solutions can attack the panel or electronics and cause the furnace to malfunction.

## TROUBLESHOOTING THE VULCAN "A" CONTROL

### PROBLEM

#### Not Heating

### CHECK LIST / CAUSES

Does the green power switch light?

No: - Check power receptacle or outlet for power.

- Check line or power cord connections.

- Check door that it is completely closed. Door switch may be interrupting power.

Yes: - Check the control knob and verify that it is turned to desired temperature.

- Check the fuse on the controller PCB.

- Check heating element plates for continuity.

- If muffle is hot but the meter reads a low temperature check the thermocouple for shorts to the cabinet.

#### Slow heating

The control will slowly approach the setpoint temperature. Set to a higher temp and then turn down to reduce the heatup time.

#### Poor Temperature Accuracy

On the low voltage model (100-125VAC) the heating element plates are wired in parallel. If one plate fails the furnace will heat very slowly and not reach the setpoint temperature.

Slight changes in the knob rotation will have a significant impact on the setpoint temperature. If major differences exist between the meter and the knob scale a temperature adjustment can be made as described on page 9 "Temperature Adjustment".

#### Door Too Loose or Tight

The amount of force or drag on the door movement can be changed by adjusting the hex screws located on the upper rear corners of the furnace cabinet. Turning the screw clockwise adds drag and requires more force.

## ACCESSORIES

| DESCRIPTION                       | PART NUMBER |
|-----------------------------------|-------------|
| Tongs; 25cm (10") Stainless Steel | 9390014     |
| Tongs; 30cm (12") Stainless Steel | 9390015     |
| Tongs; 36 cm (14") Plated Steel   | 9491010B    |
| Tray- Bottom, Model 130           | 9353053     |
| Tray- Bottom, Model 550           | 9353057     |
| Tray- Bottom, Model 1750          | 9353060     |
| Shelf - free standing, Model 550  | 9493327     |
| Shelf - Model 1750                | 9493396     |
| Muffle Hardening Agent            | 9491006     |
| Temperature Pellets, Bottle of 25 |             |
| 705 °C (1300 °F)                  | 9490911     |
| 815 °C (1500 °F)                  | 9490912A    |
| Exhaust port ball plug            |             |
| Small (Models 130, 550)           | 9491093A    |
| Large (Model 1750)                | 9492456     |
| Service Manual, VULCAN            | 9363049     |

## PRODUCT SERVICE

Three methods of product service are available for the VULCAN. The first is telephone assistance available at the numbers listed below. The second is to return the furnace for servicing using the instructions below. The final method is to call DENTSPLY NeyTech at the phone numbers below and obtain a service manual for a nominal fee.

### BEFORE RETURNING THE FURNACE, DO THE FOLLOWING:

- Remove all firing trays, shelves and other loose items from inside the muffle. Pack the muffle with the original foam block or newspapers to prevent shipping damage to the heating plates.
- The original packing material should be used for the return shipment. Contact DENTSPLY NeyTech for replacements if they are not available.
- Call DENTSPLY NeyTech for a RMA number (Return Material Authorization). This is used to track and identify your furnace. Material received without this number may not be identifiable.
- Equipment damaged in shipment as the result of improper packing may not be paid by the carrier. DENTSPLY NeyTech will not be responsible for damages resulting from improper packing.

|                  |                            |
|------------------|----------------------------|
| Ship Prepaid To: | DENTSPLY NeyTech           |
| TEL 909.795.2461 | RMA Number _____           |
| FAX 909.795.5268 | 13553 Calimesa Blvd.       |
|                  | Yucaipa, CA 92399-2303 USA |

## WARRANTY

**WARRANTY:** Except with respect to those components parts and uses which are hereinafter described, DENTSPLY NeyTech warrants this furnace to be free from defects in material and workmanship for a period of two years from the date of sale. DENTSPLY NeyTech's liability under this warranty is limited solely to repairing or, at DENTSPLY NeyTech's option, replacing those products included within the warranty which are returned to DENTSPLY NeyTech within the applicable warranty period (with shipping charges prepaid), and which are determined by DENTSPLY NeyTech to be defective. This warranty shall not apply to any product which has been subject to misuse; negligence; or accident; or misapplied; or modified; or repaired by unauthorized persons; or improperly installed.

**INSPECTION:** Buyer shall inspect the product upon receipt. The buyer shall notify DENTSPLY NeyTech in writing of any claims of defects in material and workmanship within thirty days after the buyer discovers or should have discovered the facts upon which such a claim is based. Failure of the buyer to give written notice of such a claim within this time period shall be deemed to be a waiver of such claim.

**DISCLAIMER:** The provisions here-in stated DENTSPLY NeyTech sole obligation and exclude all other remedies or warranties, expressed or implied, including those related to *MERCHANTABILITY* and *FITNESS FOR A PARTICULAR PURPOSE*.

**LIMITATION OF LIABILITY:** Under no circumstances shall DENTSPLY NeyTech be liable to the buyer for any incidental, consequential or special damages, losses or expenses.

**LIMITATION OF ACTIONS:** The buyer must initiate any action with respect to claims under the warranty described in the first paragraph within one year after the cause of action has accrued.



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