



Graphite Hot Zone Curing Procedure

Noted below is the minimum cycle & procedure to cure graphite glue.

If possible, lengthen the time as much as possible. This procedure must be followed for the initial run of the hot zone or after substantial repairs to the insulation package have occurred, or when AVS specifically advises that this procedure be followed.



If the hot zone is heated too fast or this procedure is not followed, the graphite glue will not bond properly and the zone may fail and or collapse.

1. Turn on the water to the heater power supply, chamber, power leads, and feed through as a minimum. Check that any of these failing while in maintenance mode will trip the heat circuit breaker.
2. Set the over-temperature instrument to trip the heaters off at 250°C. Set the Process over temperature to trip the heaters off if the "high" thermocouple exceeds 250°C.
3. Place the furnace in maintenance mode and turn on the heat circuit breaker.
4. Perform an "arc check" by running each heat zone with the chamber and hot zone doors open fully, and at least 3 people present (One at control cabinet, one at heat circuit breaker to turn off if necessary, one watching furnace) to 100% power momentarily (15 second maximum) Check that each zone's thermocouple responds correctly.
5. If work has been done on the mating surfaces of the hot zone doors, ensure that both hot zone doors are slightly open, enough to allow heat to escape the inside of the hot zone to heat the outside, and also to keep the hot zone door from being glued shut.
6. Close and lock the chamber doors.
7. Heat the furnace as follows using a manual ramp. (This should clamp all heat zones to 20 % maximum power) Check periodically (every 15 min. or less) for signs of arcing and or hot spots.
 - a. Room temperature to 100°C @ 1°C/min.
 - b. 100°C to 150°C @ 50°C/Hr.
 - c. 150°C to 225°C @ 25°C/Hr.
 - d. Hold 225°C a MINIMUM of 4 Hrs. (Overnight is preferred.)
 - e. 225°C to 150°C @ 25°C/Hr.
 - f. 150°C to room temperature @ 50°C /Hr.
8. Open the chamber doors and CAREFULLY inspect the hot zone, and repair as needed. If glue is required for the repair, repeat the cycle.
9. Re-adjust the hot zone doors for proper fit. Close and lock the chamber doors.
10. Turn on all water circuits and check all water alarms.
11. Pump the furnace to less than 1 Torr. As soon as 1 Torr is reached, backfill the chamber to atmospheric pressure with Argon. Repeat pump down and backfill twice!



12. **NEVER** operate or attempt to operate a furnace unattended – regardless of the cycle or temperature level. Doing so may place your property and or life in jeopardy.



Heat the furnace to maximum design temp or 50°C above maximum operating temperature at 0.5°C / min or less. Allow the furnace pressure to rise through expansion.

13. Maintain temperature for at least 1 Hr.
14. Turn off heat and allow the furnace to cool to room temperature.
15. Pump the furnace to less than 1 Torr. As soon as 1 Torr is reached, backfill the chamber to atmospheric pressure with AIR. Repeat pump down and backfill twice!
16. Place "catch pans" under the chamber doors, and carefully open the doors. (Liquid binder MAY run out of the chamber) Clean any binder off the chamber walls using rags with Isopropyl Alcohol.



17. Backfill and open the doors **CAREFULLY**. A highly flammable residue can & may have collected on the chamber walls. This residue may spontaneously ignite when exposed to air, or when handled. If it does, close both chamber doors and pump the system down. Wait 15 minutes at vacuum, and repeat this step.
18. Pump the furnace to maximum attainable vacuum, and leak check the furnace. The leak rate must be less than 150 microns / hour.
19. Heat the furnace to maximum design temperature or 50°C above normal operating temperature at your normal ramp rate or less.
20. Maintain temperature for at least 1 Hr. or until the vacuum level stabilizes.
21. Vacuum cool to room temperature. Perform a leak rate check. The leak rate must be less than 20 microns / hour.



22. Backfill and open the doors **CAREFULLY**. A highly flammable residue can & may have collected on the chamber walls. This residue may spontaneously ignite when exposed to air, or when handled. If it does, close both chamber doors and pump the system down. Wait 15 Min at vacuum (<100 microns) and repeat this step.

Any questions or problems, contact the AVS, Inc. Service Department @ 978-772-0710