



### AVS Furnace Copper Electrode / Phase Bar Connections

The copper electrode to graphite phase bar connection is the main hot zone transference interface for the electrical power distribution to the graphite resistance heating elements.

AVS uses relatively low AC voltages, typically less than 55 VAC but high ampacity. High amperage loading under less than ideal conditions can lead to arcing of the respective components.

The typical failure mode on an electrode to phase bar is arcing and melting of the threaded portion of the copper electrode, with secondary damage to the graphite female threads on the phase bar. It is not uncommon to also find once molten copper, re-solidified on the bottom of the vessel. This should be removed or repaired.

Preventative maintenance will reduce the possibility of catastrophic failures of the copper / graphite connection and should be performed at scheduled intervals to ensure the joint remains tight, debris free and that the graphite portion is intact and not cracked.

#### Proper Assembly of the Copper Electrode to Graphite Phase Bar

The copper electrode is threaded into the appropriate phase bar and tightened so that the flat face of the copper electrode, directly behind the threaded portion is in intimate contact with the graphite phase bar. Both the threaded interface and the flat-to-flat contact surfaces are designed to transmit power in the system.

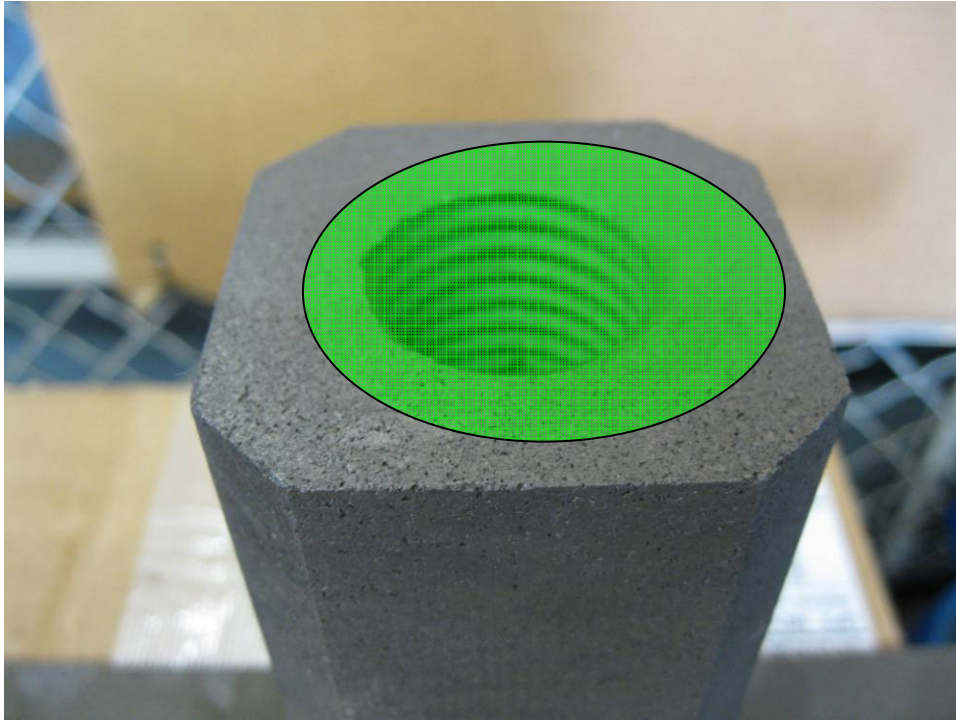
AVS recommends the following procedures:

1. Ensure the graphite contact surface is clean and flat ( Figure 1 )

**+++ Perform the first fit test on the bench if possible ++**

2. Thread the copper electrode into the phase bar connection, taking care to keep the two threaded points of contact in-line
3. Fully seat the copper electrode into the graphite, using ONLY your hand as a tool ~ never use a wrench, spanner, chain or strap wrench
4. Back out the previously seated copper electrode ½ the way
5. Then fully seat the copper electrode into the graphite, using ONLY your hand as a tool ~ never use a wrench, spanner, chain or strap wrench
6. Using a 'feeler gage' of 0.003 inches ( 0.075 mm ) check that the gap between the copper and graphite as shown is not exceeded. This exception would be indicated by the feeler gage entering the line interface between the copper and graphite.

You can now install the parts into the furnace and perform tasks 2,3,4 & 5 above.



**Figure (1)**

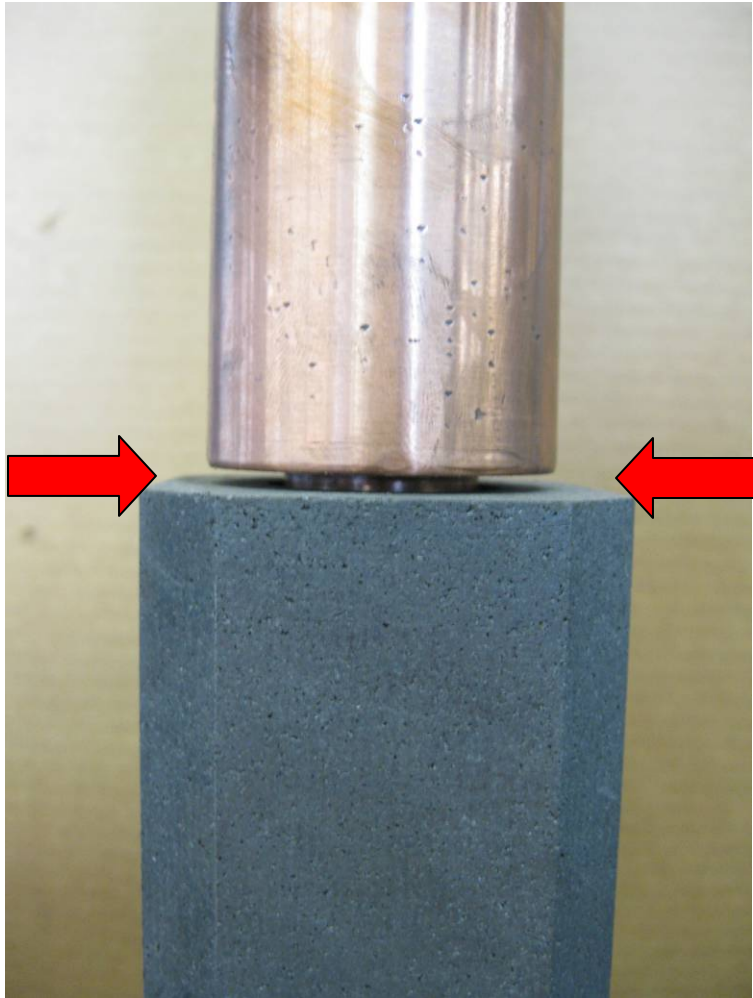
A clean, unmarred phase bar surface.  
The shaded area indicates the contact patch for the copper electrode.



**Figure (2)**

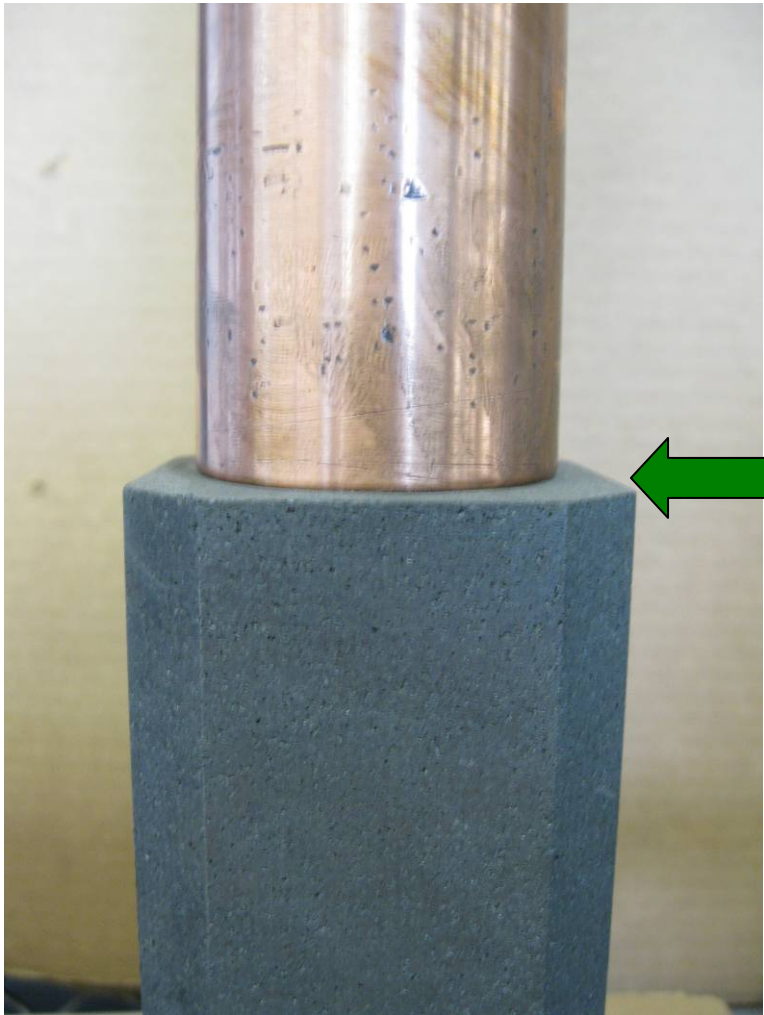
'Feeler Gage' of 0.003 inches ( 0.075 mm ) used to check that the gap between the graphite and copper.

Check the circumference ~ the gage should not enter the interface.



**Figure (3)**

**Unacceptable Gap** ~ Copper electrode not fully seated.  
Remove electrode and check for debris in the hole, damage graphite or copper electrode threads, total depth of the female threaded hole vs. the male threaded projection.



**Figure (4)**

**Acceptable Gap** ~ Copper electrode is fully seated.