

Technical Bulletin # 36

To: Coulometrics Support Personnel
From: Engineering Dept.
Date: March 18, 2002
Subject: Combustion Tube Installation Procedure

Purpose:

To provide a step-by-step procedure to properly install combustion tubes in the furnace.

Introduction:

In order to align the height of the combustion tube and the breech block, ceramic tube insulation (CM162-016) must be placed around the tube at the furnace ends. It is important to note that each furnace requires a slightly different amount of insulation to align the tube with the breech block. The proper amount of bedding is the amount of insulation necessary to align the combustion tube without applying strain on the tube when mounted in the breech block and the furnace top is closed.

Procedure:

To build up pre-combustion tube bedding:

1. Disconnect main power to furnace.
2. Open furnace top.
3. Remove any debris in furnace tube chamber.
4. Cut two thin pieces of 2 inch wide ceramic tube insulation.
5. Place the insulation pieces at opposite ends of the furnace tube chamber.
6. Place the pre-combustion tube on top of the insulation at the back of the furnace chamber. Center the pre-combustion tube in the furnace tube chamber.
7. Place another thin piece of 2 inch wide ceramic tube insulation over each end of the tube.
8. Place a thin piece of 2 inch wide ceramic tube insulation between each end of the pre-combustion tube and the combustion tube.
9. Build up the pre-combustion tube bedding from the bottom until the pre-combustion tube is secure in the chamber. Periodically check the tube bedding is not built up excessively by gently closing the furnace top.
CAUTION: Using excessive amounts of insulation will cause the tube to break when the furnace top is closed.
10. When the pre-combustion tube is properly bedded, attach the inlet and outlet silicon unions to the tube.
11. Close Furnace top. CAUTION: Do not force the furnace top closed. The top should close with minimal force.
12. Connect main power to furnace.

To build up combustion tube bedding:

1. Disconnect main power to furnace.
2. Open furnace top.
3. Remove any debris in combustion tube chamber.
4. Mount the breech block on the rail but do not tighten the thumbscrew. Make sure that the pedestal base is loose on the rail.
5. Cut two thin pieces of 2 inch wide ceramic tube insulation.
6. Place the insulation pieces at opposite ends of the combustion tube chamber.
7. Place the combustion tube on top of the insulation. Align the portion of the combustion tube filled with silver metal with the inner edge of the furnace end board.
8. Place another thin piece of 2 inch wide ceramic tube insulation over each end of the tube.
9. Build up the combustion tube bedding from the bottom until the combustion tube is slightly above the breech block opening with the breech block in its lowest position. Periodically check the tube bedding is not built up excessively by gently closing the furnace top.
CAUTION: Using excessive amounts of insulation will cause the tube to break when the furnace top is closed.
10. Place a thin piece of 2 inch wide ceramic tube insulation between each end of the pre-combustion tube and the combustion tube.
11. Verify that the combustion tube is properly bedded and the breech block height is established. Then place the knurled nut, ferrule, and the o-ring on the combustion tube.
12. Close Furnace top. CAUTION: Do not force the furnace top closed. The top should close with minimal force.
13. Raise the breech block to align the opening with the combustion tube.

14. Carefully move the breech block on the rail toward the furnace. Gently bottom the combustion tube against the breech block stop. NOTE: The 15 mm breech block does not have a stop for the combustion tube. To prevent blocking of the gas inlet of the breech block do the following:
 - A. Fully unbend a paper clip and insert it into the gas inlet tube as far as it will go.
 - B. Secure the paper clip with a piece of tape.
 - C. Raise the breech block in its base and the opening with the end of the combustion tube.
 - D. Tighten the thumbscrew.
 - E. Carefully move the breech block on the rail toward the furnace until it contacts the paper clip and then move the breech block back slightly to leave a small gap.
 - F. Tighten the thumbscrew.
15. Securely tighten the knurled nut onto the breech block. CAUTION: Over tightening can chip or break the combustion tube.
16. Loosen the pedestal base thumbscrew and tighten the pedestal base onto the rail by turning the base clockwise.
17. Tighten the breech block pedestal base thumbscrew. NOTE: In the 15 mm breech block, remove the paper clip and connect the supply gas line to the breech block gas inlet tube.
18. Connect main power to furnace.

See attached figure for an example of combustion tube bedding.

