

1.0 Scope

- 1.1 Instructions for the removal and replacement of CAWC water cooling modules on an RTC, GBT or FurnacePros closed atmosphere continuous belt IR furnace.

2.0 Equipment Affected

- 2.1 Cover panels, belt, air and water connections and water cooling modules.
- 2.2 Water cooling module, each configured with an upper section and a lower section.



New Cooling Section with quartz rods

3.0 Isolate Furnace Utilities

- 3.1 Shut-off and lockout all power, water and process gas supply to furnace before starting work.

4.0 Panel Removal instructions

- 4.1 Remove upper and lower side panels of both the front and back of the furnace at the exit end exposing the entire cooling section to be removed.



Furnace Cabinet Panels – Old (left) and New (right) Design Furnaces

- 4.2 If necessary for access to cooling section, remove screws holding exhaust stack cover and lift stack off cover.



Stack and Top Cover Removal

- 4.3 Remove all screws holding top panels on frame surrounding cooling section at exit of furnace. Remove top panels.

5.0 Disconnect Utility Lines

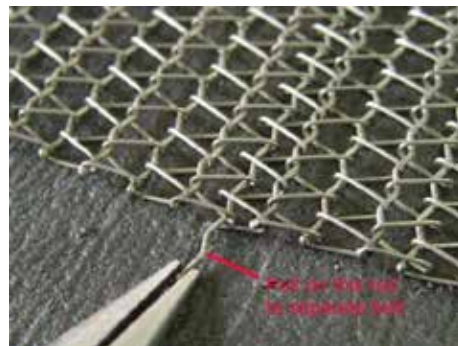
- 5.1 Disconnect all process gas lines to cooling section air rakes by using an open end or adjustable wrench and turning tube nuts to release fittings. Be careful to protect gas line fittings and tubing from damage so they can be reused.
- 5.2 Unscrew fittings from cooling section and remove all air rakes. Mark or note of the position of the air rake sparger holes so they can be reinstalled in the same orientation. (The sparger rakes have a notched ring to help properly locate the sparger).
- 5.3 Disconnect water lines to cooling section. Unscrew water fittings from module being careful to protect threads on all parts for reuse on new cooling section.

6.0 Belt Removal

- 6.1 If so equipped, remove the weight bar from its enclosure at the exit of the furnace.
- 6.2 Remove belt splice rod shown in the picture below on the right. If a splice rod cannot be found, make a new one by snipping both ends of a selected rod as shown in picture below on the left. Pull rod out and save.



Making a Belt Splice Rod



Removing a Belt Splice Rod

- 6.3 Separate belt. Tie a string or wire to the belt. From the entrance of the furnace gently pull belt through the furnace leaving the string or wire for reinstallation of the belt. Pull belt parallel to the belt length to be careful not to distort shape of belt.

7.0 Cooling Section Removal

- 7.1 Once all devices are disconnected from Cooling Section Assembly, place wood blocks under cooling section for support.
- 7.2 Unbolt screws connecting flanges on either end of cooling section.
- 7.3 Gently pull cooling section flange from furnace chamber and baffle sections. You may need to use thin pry bars to aid in breaking the seal and separating the flanges.

**CAUTION: ALUMINUM IS SOFT. DO NOT BEND,
 SCAR OR OTHERWISE DAMAGE THE FLANGES**

- 7.4 Have one to two people on both sides of furnace lift the cooling section assembly over furnace uprights. Place the section on a pallet or trolley for moving out of the area.

8.0 Cooling Section Preparation

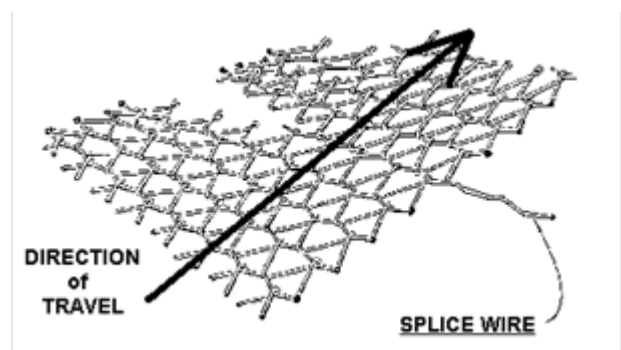
- 8.1 Assemble existing water and process gas fittings on the new cooling section modules in the same locations they were on the original cooling assembly.
- 8.2 Apply Teflon pipe tape to pipe threads of water and process gas fittings and screw fittings into openings of new cooling modules. Tighten to seal, but do not over-tighten and strip aluminum threads on water cooling chamber. (Note: Pipe thread tape or compound is for tapered thread only, do not use on tube compression nuts)
- 8.3 Apply gasket material or high temperature sealant to flanges on either end of cooling module to form a smooth seal.

9.0 Cooling Section Installation

- 9.1 Position new cooling section assembly parallel with furnace and have one to two people on both sides of furnace lift cooling section assembly over uprights into position on wood blocks.
- 9.2 Push together cooling section flanges and align to furnace baffle flanges. Use clamps to hold the flanges in place.
- 9.3 Insert machine screws and nuts and tighten flanges evenly all around.

10.0 Re-connect Belt

- 10.1 Reconnect belt by pulling string or wire through the furnace. Pull ends together and insert rod as shown in picture by inserting one of the cross-section wires through the belt mesh across the width of the belt
- 10.2 Splice wire should be even and parallel and aligned with the belt edges. The cross-section wires will stay in place without any finishing at either end
- 10.3 Replace the weight bar if so equipped. Carefully lower weight into the enclosure to tension the belt.



Belt Splice

11.0 Re-connect Utility Lines

- 11.1 Install air rakes making sure air rake holes are positioned in the same way as they were when removed. Factory default: notch faces down so sparger holes point toward the belt.
- 11.2 Connect all process gas lines to cooling section air rakes by carefully mating fittings and tightening tube nuts to re-seal fittings.
- 11.3 Connect water lines to cooling section. Use pipe thread or Teflon tape compound on all tapered threads.

12.0 Test Water Connections

- 12.1 Set water pressure to a maximum of 30 psig (2.1 bar).
- 12.2 Open water inlet and outlet valves and fill cooling modules. Always open the outlet valve first and then open the inlet valve.
- 12.3 Once cooling section is full of water, close outlet valve and visually check for leaks. If no leaks are apparent, close inlet valve and observe water pressure.
- 12.4 If pressure stays constant at 30 psig for 5 minutes with both inlet and outlet valves closed, the system has been sufficiently leak tested.
- 12.5 If not, fix all leaks and retest until pressure holds for 5 minutes with inlet and outlet valves closed.

13.0 Water Setup for Operation

- 13.1 Open outlet water valve.
- 13.2 Open inlet water valve and set water pressure control to preferred level.

CAWC System Preferred and Maximum Operating Pressure Settings		
Temp Inside Furnace at Cooling Section Entrance*	Preferred	Maximum
50 – 100 C	24 psig (1.7 bar)	28 psig (1.9 bar)
100 - 149 C	20 psig (1.4 bar)	25 psig (1.7 bar)
150 - 204 C	14.5 psig (1.0 bar)	19.5 psig (1.4 bar)
205 – 259 C	8.5 psig (0.6 bar)	12 psig (0.8 bar)
260 – 314 C	4.5 psig (0.3 bar)	5.5 psig (0.4 bar)
315 – 360 C	3.0 psig (0.20 bar)	3.5 psig (0.25 bar)

*Note: These guidelines are related to the ultimate tensile strength of 5052-H32 Aluminum.

- 13.3 Key elements in effective cooling and prolonging the life of the water cooling section include making sure there is an adequate unimpeded flow of water through the system. Process air flow is used to drop the temperature of the furnace atmosphere within cooling section. CAWC water systems typically flow approximately 0.5 gpm (1.9 Lpm) per section or 1.0 gpm (3.8 Lpm) per module (consisting of an upper and lower section). Higher flows are possible with fewer line restrictions.
- 13.4 Set water pressure to less than or equal to the maximum values in the table above for the expected operating temperature of the furnace at the entrance of the cooling section.
- 13.5 Open outlet water valve.

WARNING: DO NOT OPERATE THE FURNACE WITH THE COOLING WATER SYSTEM DISABLED. THE OUTLET VALVE MUST BE OPEN AT ALL TIMES THE INLET VALVE IS OPEN TO AVOID OVERPRESSURIZING THE CAWC MODULES.

14.0 Replace Panels

14.1 Replace all upper and lower panels

15.0 Turn on Remaining Utilities

15.1 Turn on Power and open process gas lines.

15.2 Start furnace.