

Conco U-Tube Cleaning System

Will Putman

Northeast Regional Division Manager
Conco Industrial Services, Inc.

412-828-1166 (Office)

412-826-8255 (Fax)

412-327-5353 (Mobile)



Conco U-Tube Heat Exchanger Cleaning Solution Summary

The fouling of U-Tube Heat Exchanger ID's not only has a negative impact on heat transfer efficiency, but also may restrict the output or production capacity of the facility and data acquisition for non destructive testing of the unit. Traditional tube ID cleaning methods include the use of high pressure water and or chemicals. However, this can not only be dangerous, it also does not completely remove the majority of the deposit from the unit. As a result, Conco has developed and facilitated a mechanical cleaning method that can completely remove the deposit from the unit that is safe, efficient and cost effective. The following storyboard will illustrate this method.

I. Equipment

Pump System – The Conco ProSeries™ 200B Tube Cleaning System is required to propel the U-Tube cleaning tools through the tubes with adequate water volume and pressure. The unit is available in a 440 Volts, 60 HZ AC, three phase configuration or as a 220 Volt or 380 Volt 50 HZ AC, three phase system. All units have a minimum water requirement of 40 PSI at 36 GPM.

Water Guns – Available in bronze or lightweight aluminum with a spring-loaded fail-safe valve, the Conco Water Guns have proven ideal for heavy-duty use. Each gun features quick-change nozzles (available in brass, stainless steel and delrin) for tube 1/2" through 1 3/8" O.D.

Hoses – Conco's rugged, industrial strength hoses are rated to withstand pressures up to 800 PSI. They are bright yellow and wire braided with durable pressed-on NPT fittings on each end for safe, dependable service. Four standard sizes are available, all in 50' lengths. Inlet hoses are 1 1/4", 1 1/2" or 2" in diameter for use from the water source to the pump. Outlet hoses are 3/4" or 1" in diameter for use with the water guns. Quick disconnect fittings and special length hoses are available..

Tube Cleaners – Conco offers 2 styles of TruFit™ U-Tube cleaners. Plastic and Metal. The metal U-Tube cleaner is recommended for tubes with a radius at the U of 4" or greater and the plastic is good for most all U bends.

ProSeries™



Pump System



Water Gun



Metal U-Tube Cleaners



Inlet Hose



Outlet Hose



Plastic U-Tube Cleaners

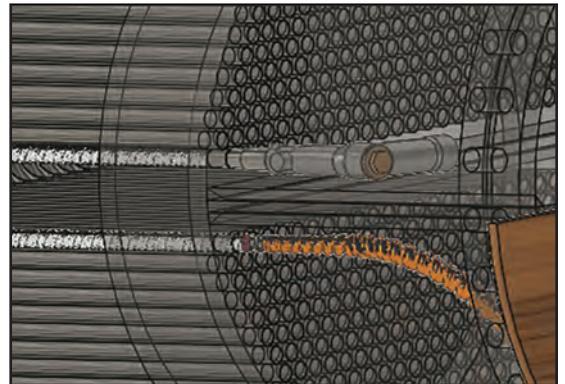
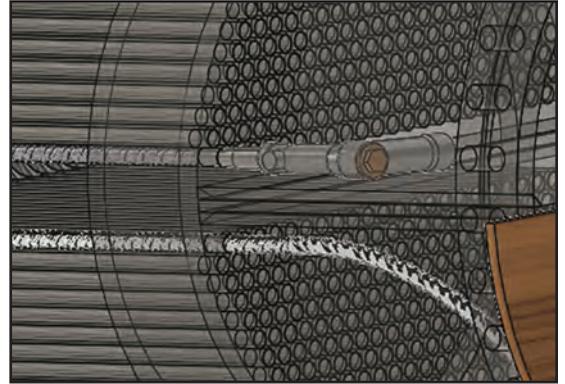
II. Cleaning Test

Prior to cleaning a test must be conducted to verify the cleaning will be trouble free with no stuck tube cleaners. You will also want to make a lightweight plywood template to block the outlet half of the unit. This will help to prevent injury and also contain the dirt being removed during the cleaning process. It is critical that the template be spaced back from the tube sheet so that the cleaners can exit the tubes. It is also important to put good screening over all drains so the cleaners do not get lost.

Starting at the center row of tubes working from the largest radius U on the outer edge of the exchanger and working your way toward the center of the bundle using water only with the pump running at 400 to 500 PSI flush each tube in the row with water only. Hold the flushing action for the count of 5 to 10 seconds. You will be able to feel the flow of water improve. You must get water to go through the tubes prior to proceeding with the test. If no water goes through the tubes stop testing until the problem can be resolved. Contact Conco for helpful hints.

After water has passed through the row being tested you are now ready to proceed with the test shooting of the U-Tube cleaners. The pump should be set at 400 to 500 PSI. Starting at the outer most row of tubes flushed load and shoot one cleaner at a time working your way toward the center of the bundle. It is important to stop if you get a cleaner stuck (see below). Continue shooting until you get to the center of the bundle. Remember to only load and shoot one cleaner at a time. Verify the number of cleaners you have after testing is the same you started with. If not, then re-shoot each tube to verify the missing cleaners are not in the tubes. If the test was successful proceed to Production cleaning.

Stuck cleaners can be removed by shooting the tube in reverse. Make some sort of tool or plastic pipe contraption to catch the cleaner when it is shot out in reverse. Place the contraption over the tube at the opposite end from where you are shooting. After the cleaner exits reload the cleaner into the tube and attempt to clean the same tube again. You may want to increase the pump pressure a little if the problem persists. Never proceed with cleaning if you have cleaners stuck. Remove stuck cleaners as they occur before you proceed on with clean



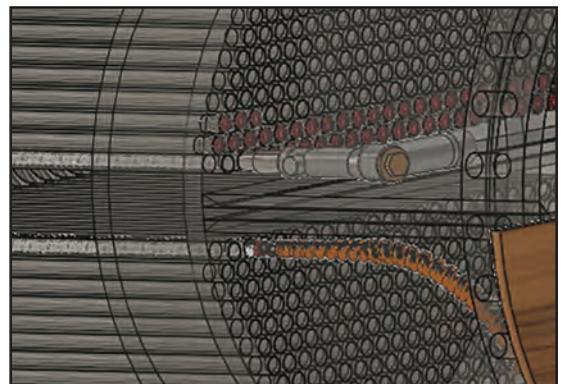
III. Production Cleaning

After you have had a successful test cleaning it is now time to proceed with the production cleaning. With the template and screening in place count your cleaners so you know how many you are working with. You should have the same number when you are done.

Start by flushing every tube in the unit with water only. Have the pump set at about 400 to 500 PSI for this step.

After water flushing remove the template and clean out any dirt that may have built up during the flushing. Then verify the screening is in good condition and replace the template.

Starting with the outer rows of tubes load all cleaners in an organized manner so you can easily identify the tubes that you have shot. Make a mark on the tube sheet. For example if you have 100 cleaners start at the outer most row and load from left to right just like reading. At tube 101 make a paint mark so you know where to start your second load.



Shoot your first load of cleaners with the pump set at 400 to 500 PSI. Watch the gauge on the gun to verify the cleaner has exited the tube. The pressure on the gauge will drop as the cleaner exits the tube. You will also hear a thump when the cleaner hits the plywood template. The water hits the template first and about 2 to 3 seconds later you will hear the cleaner hit. If the pressure on the gun goes up very high and stays there then the cleaner may be stuck and you will need to stop cleaning and use the removal method in section II.

After you are done shooting remove the template and collect all cleaners. Count your cleaners to verify you have the proper amount. If you are short on your count you must try to find the cleaners. They are very small so look hard. If you can not locate the missing cleaners you must re-shoot that section to make sure they are not in the tubes.

Repeat the process over and over until you shoot all the tubes. When you get to the tubes with tight radius bends be extra cautious. If there are some tubes you will not be able to shoot in reverse for stuck cleaner removal then just shoot water through those tubes to minimize potential problems.



Special Notes

- Remember that the Metal U-Tube cleaner is limited to tubes with a 4" radius or larger. Use plastic for the inner rows.
- Remember to do test shoot from the outer row to the inner row prior to production.
- Remember to flush all tubes with water only at the start. It is critical because if you can not get water through a tube you will not get a cleaner through the tube.
- If you are getting some stuck try to increase the pump pressure.
- Always remove stuck cleaners as you go. Do not wait until the end of the job.
- Use water pressure only. Air or air and water combinations will make the cleaner go fast enough to go through plywood and human flesh causing great pain, infection and death.
- Each cleaner is good for 6 to 12 passes depending on tube deposits and cleaner style selected. Metal will last longer.
- Inspect the unit to find tubes you may not be able to shoot in reverse. These tubes you will not be able to get stuck cleaners out of so just flush these tubes with water only – No Cleaner!

