

Tube cleaning inside and out including flanges and bolt holes.

NOTE

Rinse tube with DI water immediately following detergent cleaning to prevent detergent from drying on surfaces.

1. Mount tube on two adjustable support stands adjusted so that the tube will rest at an angle. Place the stands at approximately 1/3 and 2/3 of tube length.
2. Connect DI water with SS hose to hot (140 F) pressure washer and flush the system for several minutes.
3. Pre-Mix three different spray containers for cleaning.
 - a. Mix 1/3 cup of Dawn dish soap per gallon of DI water in a spray container.
 - b. Mix 3/4 cup of Mirachem per gallon of DI water in a spray container.
 - c. Mix 1 cap full of Liquinox per gallon of DI water in a spray container.
4. Pre cleaning: Rinse exterior of tubes with hot DI pressure washer to remove dirt/debris. Spray exterior with Dawn solution and scrub with Alpha Vector wipes. Rinse exterior with hot DI pressure washer for several minutes until all the detergent is removed.
5. Spray both flanges with Dawn solution. Thoroughly scrub every flange bolt holes using small nylon bristle brush on cordless drill making sure to get all surfaces of holes. Scrub both flanges with Alpha Vector wipes, including the knife edge (use caution) and tube side including the welds. Rinse both flanges with hot DI pressure washer for several minutes until all the solution is removed. Make sure to rinse all surfaces of bolt holes.
6. Repeat step 5 with Mirachem solution.
7. Repeat step 5 with Liquinox solution.
8. Mount copper gasket on each end flange to protect the knife edge using 3 bolt/nut plates.
9. Connect duct cleaner with >10' extension/handle to the pressure washer. Use a SS cart to rest the weight of the duct cleaner and line up with the ID of the tube.
10. Spray dawn mixture inside the pipe from both ends ensuring complete coverage of internal surfaces.
11. Rinse the tube as far as the extension will allow from both ends. Make sure there is overlapping coverage in the middle of the tube. Several passes may be required (~10 minutes) to rinse the detergent. Rotate tube as needed for thorough rinsing if beading is still present.

CAUTION

The extension wand will be HOT. Handle with thermal insulated gloves or equivalent.

12. Repeat steps 9 & 10 until visually there is no beading of water on the internal surface.
13. Repeat step 9 to 11 with Mirachem solution.
14. Repeat step 9 to 11 with Liquinox solution.
15. After pressure washer rinse with no visual beading use the DI water hose before the pressure washer to rinse all the tube surfaces with >17 MegOhm resistance DI water.
16. Cover the flanges with UHV foil and transport tube to a cleanroom lab space. Remove foil to let fully dry.

17. Cap each flange with UHV foil, flange covers, then wrap with two layers of UHV foil. Transport to storage.