



EPA Region 8 Drinking Water Unit Tech Tips

Sanitary Protection of Drinking Water Storage Tanks: #24 Mesh Non-corrodible Screen

EPA Region 8 requires #24-mesh non-corrodible (preferably stainless steel) screen on storage tank overflows (some situations) and vents and recommends #24-mesh for drains.

EPA, State, and Industry guidances agree that even organisms as small as insects must be kept out of drinking water storage tanks for public health protection. The Drinking Water Industry has known about using protective #24-mesh screening since 1962 when it was added into the Ten State Standards. Consult a Professional Engineer to ensure adequate air flow when installing #24-mesh screen on any openings.

Why do insects matter? Insects are disease vectors. They carry protozoal, bacterial and viral pathogens on hairs, mouthparts, vomitus, and feces. Keeping them out of tanks with #24-mesh screen eliminates endemic (low-level) disease risk to the community from insects in the water.

Example: House Fly:

Houseflies are known to carry *Cryptosporidium*, *Giardia Lamblia*, typhoid, cholera, *E. coli* 157:H7, polio, and other pathogens.



Flies in an elevated tank

Cryptosporidium



A calf with Cryptosporidiosis can shed 2 million oocysts. A 0.315-inch fly can carry a lot of 0.00019-inch *Cryptosporidium*!

Chlorine does not inactivate *Cryptosporidium*.

Salmonella

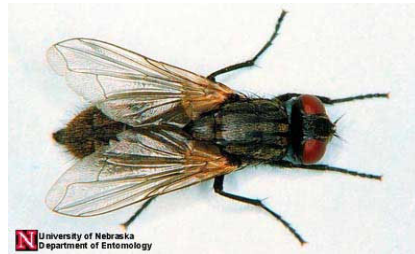


Birds and mammals are disease vectors, too. *Salmonella* In storage tanks caused outbreaks at Gideon, Missouri (transported by birds) and Alamosa, Colorado (transported by birds and rodents).

#24 mesh (0.014-inch wire) will keep all insects out of storage tanks, including:



Black Widow:
0.5518 inches



House fly:
0.315 inches



Deer tick:
0.166 inch

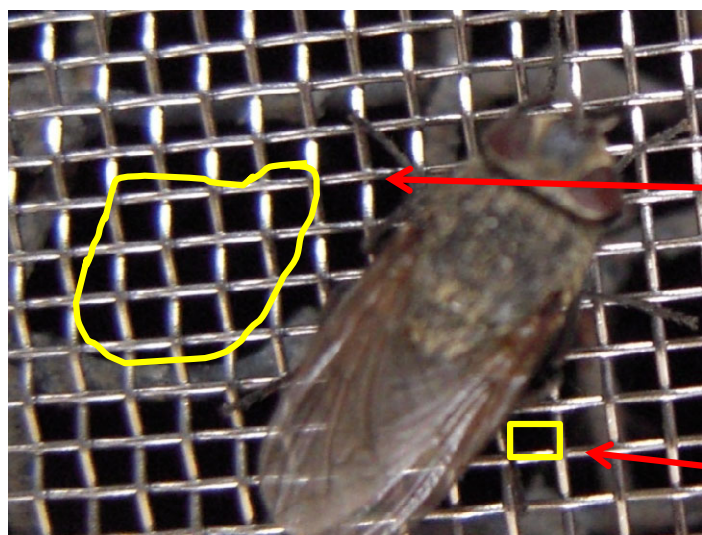


No-see-ums (biting midges):
0.059 inch

Insects can fit through spaces smaller than they are. #24-mesh screen protects against this.

How big is #24 mesh?

Plain weave 24x24 mesh screen wire diameter is 0.014 inches which produces 0.0277-inch openings..



#4-mesh screen using 0.025-inch wire creates an 0.225-inch opening (the yellow circle). The fly can enter.

This is the opening size of #24-mesh screen – the fly cannot enter.

Note: The 2003 revision of the Ten State Standards allowed #4-mesh screen for elevated tank vents due to an assumption that insects could not fly as high as an elevated tank top. Entomology experts provided research showing insects can easily fly to that height. Tank inspectors have found insects in elevated tanks, confirming this research.

Install #24-mesh non-corrodible screen to prevent insects from entering finished water storage tanks. When adding this screen protection:

1. **Vents.** Use a vacuum-pressure release mechanism to protect elevated tanks from damage caused by extreme inhalation/exhalation events, frost buildup, etc.
2. **Overflows.** Install mechanisms, such as a weighted swing valve, that temporarily give way in an overflow event. When using a duckbill or flapper valve, EPA recommends a #4 to #24-mesh screen between two flanges in the pipe (required for a flapper valve). You can also install #24-mesh screen around the overflow outfall and secure with hose clamps.
3. **Drains.** Make the screen removable for cleaning.

How to install stainless-steel #24-mesh screen on a small-diameter pipe.



#24-mesh with a thin wire diameter can be wrapped around the end of the pipe and hose clamped on. EPA recommends installing a neoprene rubber strip under the hose clamp to create a good seal. For thick wire diameter #24-mesh screen which does not wrap as easily, installation between flanges is recommended.

Installation tips for #24-mesh between two flanges.



Build a screen-between-two-flanges setup with any size and/or type of pipe with fittings available at any hardware store.

Step 1: Lay the #24-mesh screen on a board. Put the flange over the screen and mark where the bolts will go.

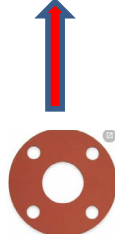
Use a drill bit or Philips-head screwdriver to separate the screen enough to get the bolts through.



Step 2: Cut gasket material or buy correctly-sized gaskets to place on either side of the screen. Be sure the gasket holes align with the flange and the holes in the screen.

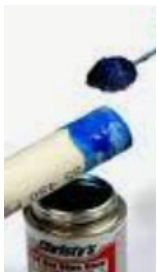


For the best seal, use a gasket on both sides of the screen.



Step 3: Thread a bolt through one flange & gasket, the screen, the other gasket and flange. Bolt them all together.

Repeat until all bolt holes are done.



Step 4: Glue the resulting two-flange setup to the small-diameter pipe.

Stainless-steel #24-mesh screen hose clamped to the end of a vent or overflow, or bolted between two flanges will reliably keep all insects out. It makes the screen removable, which is handy on a drain when you clean the tank – just remove the screen for draining and replace it after the tank cleaning is done.