



**NWCG Equipment Technology Committee
Invasive Species Subcommittee**



Equipment Bulletin

Date: Oct. 07, 2016

ETC-EB-2016-03

Subject: Engine and Water Tender Foot Valve Leakage – Field Test Protocol

Issue: Aquatic invasive species (AIS) can be found in the untreated water sources used in firefighting operations. Untreated water sources may harbor a variety of AIS, including quagga and zebra mussels, New Zealand mud snails, whirling disease, didymo (*or rock snot*), and many others.

Of great concern for ground equipment is the possibility that residual tank water in engines and water tenders contaminated with AIS could be transferred to uncontaminated waterbodies.

Therefore the following best management practices are recommended:

- Use a properly functioning and tested foot valve during drafting. Ensure the foot valve is screwed on snugly and not leaking.
- To minimize the potential for engine or water tender tank water leakage through the foot valve, *prime with water from the drafting source rather than water from the engine tank*. When priming using a bucket, first make sure that the bucket is clean prior to priming so the bucket does not transfer AIS. Additionally, during drafting and water tending operations, don't leave draft hose full with foot valve engaged and submerged in water source when not pumping.
- Care should be taken when drafting to minimize any potential of tank water to come in contact with drafting source; e.g. pump priming or overflow of engine tank when filling.
- Untreated tank water obtained in one location should never be directly discharged into a waterbody at a different location.

In order to be prepared, foot valves on engines and water tenders should be tested monthly during the fire season and whenever an apparatus is moved between waterbodies. The following protocol outlines a simple test method that can be implemented in the field. Because foot valves can leak at either low or high pressures, testing at both pressure levels is required to evaluate the potential for leakage during operational drafting conditions.

Equipment List

Some items may be part of an engine's supplied equipment. Other items may need to be purchased but are easily found at fire equipment vendors. Items needed to perform the leak test include:

- Suction hose and ratchet straps
- Assorted male-to-female adapters, increasers, and reducers
- If pressure gauge is not present on equipment: 1 ½" Pump Test Kit with Gauge – CFE (Cascade Fire Equipment) P/N: 11495 or similar, and 1 ½" 90 Degree Elbow – CFE (Cascade Fire Equipment) P/N: 10251-90 or similar.

Low Pressure Test (3-5 psi)

Fasten the suction hose vertically to the engine or water tender (Figure 1). Use ratchet straps or another suitable method, as long as the suction hose is attached safely and securely.

To adjust for size of the foot valve (e.g., 1½", 3" or other), use a combination of male-to-female adapters, increasers, and/or reducers to attach the foot valve to the suction hose (Figure 2). Fill the suction hose with six to 10 feet of water to obtain 3-5 psi (i.e. 2' hose = 1 psi). The weight of the water provides the pressure on the foot valve. Check the foot valve for 3 to 5 minutes. There should be no leakage. If leakage occurs, replace the foot valve with one that does not leak.



Figure 1. Suction hose with foot valve attached to engine ladder.



Figure 2. Foot valve attached to suction line with various adapters as needed to adjust for foot valve size.

High Pressure Test (130 psi)

To perform the high pressure test, first attach a wye or other suitable shut-off valve to the rear discharge (Figure 3). If a pressure gauge is not available on the equipment, attach a pressure gauge to the wye, then attach the 90 degree elbow and next attach the foot valve. The test set-up should resemble the one shown in Figure 3. Using the engine's pump, increase the pressure to 130 psi. Check the foot valve for 3 to 5 minutes. There should be no leakage. If leakage occurs, replace the foot valve with one that does not leak.



Figure 3. Pressure valve attached to the foot valve.

Questions concerning AIS: NWCG Equipment Technology Committee; Invasive Species Subcommittee
<http://www.nwcg.gov/committees/invasive-species-subcommittee> or local resource advisor assigned to the incident.

Questions specific to Equipment and Testing: NWCG Equipment Technology Committee
<http://www.nwcg.gov/committees/equipment-technology-committee> or USFS Engineering: San Dimas Technology and Development Center
<http://www.fs.fed.us/eng/techdev/sdttdc.htm>