GBW Associates, LLC
Westminster, MD

WSI LLC
Water Supply Innovations LLC

Low Level Strainer
Flow Test Results Briefing

September 30, 2017

On September 30, 2017, the folks from GBW Associates, LLC and Water Supply Innovations, LLC conducted a number of flow tests on 30 different makes, models, and styles of 6-inch, fire department suction strainers. The results from the low level strainer performance tests are presented in this document.

All testing was done at the Hunterdon County Emergency Services Training Center in Annandale, New Jersey. Engine 1262 from the Glen Gardner Fire Company was used for each flow test. The pumper was equipped with a Hale QMax 2,250 gpm single-stage pump powered by a 515 hp diesel motor.

The Test Conditions

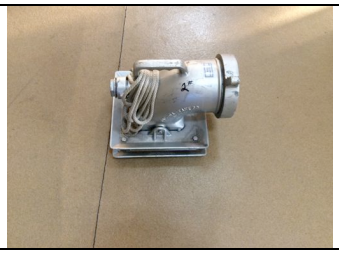
All test conditions were kept constant from flow test to flow test:

- 20-feet of 6-inch Kochek lightweight suction hose;
- 3.52-feet of lift;
- 371-feet test site elevation;
- Air temperature between 60 ^{0}F and 69 ^{0}F;
- Water temperature between 60 ^{0}F and 70 ^{0}F;
- 50-feet of 4-inch hose from the pump's high-flow discharge supplying a 2-1/2-inch Hose Monster; and,
- Dual, 3-inch hoses, each 50-feet in length, each connected to a 2-1/2-inch discharge, and each supplying a portable monitor outfitted with an Akron Flow Test Kit and 1-3/4-inch smooth bore tip.
- All strainers tested, except the floating strainers and the ice strainer, were tested at a depth of 25-inches below the water's surface.
- The same person operated the fire pump.
- The same person oversaw pump operations and suction strainer deployment.
- The same person collected all physical data on each suction strainer.
- The same person recorded all gauge readings.

The only variable in the entire flow testing process was the suction strainer being tested.

Prior to the first suction strainer flow test, a flow test was completed using no strainer on the suction hose. This test provided a baseline for comparison of all strainers: as strainers were added to the end of the suction hose, a restriction in flow was expected. For each flow test, data was recorded at peak output flow, which in most cases was also the point at which pump cavitation began.

The Low Level Strainers

		
Task Force Tips A03HNX-JET-F	Kochek LL60	Harrington HTLLS-60NHLH
		
Kochek Big Water LL602	Ziamatic QD-600-NST	Fol-Da-Tank LFS6 – no jet pipe
		
Fol-Da-Tank LFS6 – with jet pipe	Firovac HVLL	

Low Level Strainer Flow Test Results

Device	Flow Achieved (gpm)	Motor Speed (rpm)	Vacuum Reading ("Hg)
No strainer (Baseline Test)*	1800 gpm	1225 rpm	17.0 in
Task Force Tips (A03HNX-JET-F)	1800 gpm	1125 rpm	16.5 in
Kochek (LL60)	1040 gpm	925 rpm	24.0 in
Harrington (HTLLS-60NHLH)	924 gpm	978 rpm	24.0 in
Kochek Big Water (LL602)	1284 gpm	1050 rpm	22.0 in
Ziamatic (QD-600-NST)	1666 gpm	1025 rpm	17.5 in
Fol-Da-Tank (LFS6) [no jet pipe]	1594 gpm	1000 rpm	19.5 in
Fol-Da-Tank (LFS6) [with jet pipe]	1590 gpm	950 rpm	19.0 in
Firovac (HVLL)	1864 gpm	1125 rpm	14.5 in

General Notes About the Flow Tests

- The baseline flow test measured maximum flow without the use of a suction strainer.
- All flow readings were obtained using remote test gauges connected to a 2-1/2" HoseMonster flow diffuser and to an Akron Flow Test Kit on a portable deluge gun outfitted with a 1-3/4-inch smooth bore nozzle.
- Motor speed readings were obtained using the digital tachometer on the pumper's pump panel.
- Vacuum readings were obtained using a remote test gauge connected to the pump's vacuum test port.
- All test gauges were either new or recently calibrated. All test gauges were also field verified the morning of the flow tests. Therefore, all flow readings are expected to have a 5% or less margin of error.

The Findings

The Firovac and Task Force Tips strainers clearly were the top performers – this is evident in their 1800+ gpm flows and in their low vacuum readings at those flows. In fact, the Firovac strainer most likely could have flowed more water if the Hale QMax pump could have taken in more water using the single, side suction inlet. However, the pump had reached its suction inlet limit.

In "real life" application, the great concern is the fire ground use of a low level suction strainer that does not allow a fire pump to reach maximum capacity. This most frequently happens when a fire department uses a lower performing suction strainer on a large capacity pump. Using a 1,000 gpm limited low level strainer on a 1,500 gpm rated pump is just going to cause problems when trying run a "big water" operation. A suction strainer should at least be able to support the maximum intake capability of the pump's suction inlet.

Many thanks to all of the folks and fire departments that contributed time, equipment, and funds in support of this project. A complete listing can be found in the project's "official" white paper.

Questions or concerns about the flow test results can be directed to Mark E. Davis, CFPS at www.gotbigwater.com by emailing thebigcamel@gotbigwater.com or by joining the Members Area of www.GotBigWater.com.