

EVALUATION OF NEW EQUIPMENT FOR AIR MONITORING AND SAMPLING

Testing of some representative air sampling pumps at LANL is currently being conducted. Our air sampling systems at LANL typically consist of a sampling head with a 47 mm filter operating at 2 ACFM. The pressure drop with the sample filters is approximately 2 inches of mercury. Most of the fixed in place air sampling at LANL is supported by large multi-stage centrifugal blowers in the 40 to 100 HP range. LANL has several hundred portable air samplers however. Those portable air samplers typically have AC motors with rotary vane pumps. Following recent failures of wiring on some portable air samplers this current testing was intensified to determine if an alternative air sample pump was available.

The testing so far has been a physical measurement of weight, running amps, air pumping capacity at 2 inches of mercury pressure drop, and temperature rise. From this information calculations were made to determine power consumption and cost to operate.

The following pumps are covered in this phase of the testing.

	T-Squared Pumps / Parker Hannafin	GAST	GAST	GAST
Model	T201	72R645-V164	0523-V191Q	SAA-V308
Cost	\$264	\$625	\$815	\$520
Weight	1.8 Kg	11.4 Kg	15.9 Kg	9.1 Kg
Type	DC-diaphragm	AC-diaphragm	AC-rotary vane	AC-diaphragm

Further testing will include additional rotary vane and multi-stage centrifugal pumps and also sound level measurements.

Temperature Rise After 1 Hour of Run Time at Rated Load

Pump	Degrees Fahrenheit
T-Squared T201	12
GAST 72R645-V164-D303X	33
GAST 0523-V191Q-G582DX	33
GAST SAA-V308-NQ	53

The GAST SAA-V308-NQ is a dual-diaphragm pump with an all metal housing. The highest temperature was on top of the pump head. With an ambient temperature of 74 degrees this pump reached 127 degrees after 1 hour of operation.

	Rated Amp Draw	Measured Running Amps At Full Load
T-Squared T201	1.0 @ 24 VDC	1.0
GAST 72R645-V164-D303X	5.3 @ 117 VAC	3.5
GAST 0523-V191Q-G582DX	5.4 @ 117 VAC	4.3
GAST SAA-V308-NQ	3.0 @ 117 VAC	2.7

	Maximum Air Sampling Rate at 2 inches Hg dP
T-Squared T201	50 LPM
GAST 72R645-V164-D303X	75 LPM
GAST 0523-V191Q-G582DX	80 LPM
GAST SAA-V308-NQ	45 LPM

	Watts required per LPM of Air Sampling Rate
T-Squared T201	0.5
GAST 72R645-V164-D303X	5.5
GAST 0523-V191Q-G582DX	6.3
GAST SAA-V308-NQ	7.0

	Kg Weight	Weight in grams per LPM of Air Sampling Rate
T-Squared T201	1.8	36
GAST 72R645-V164-D303X	11.4	152
GAST 0523-V191Q-G582DX	15.9	199
GAST SAA-V308-NQ	9.1	202

	Cost	Purchase Cost in \$ per LPM of Air Sampling Rate
T-Squared T201	\$264	\$5.28
GAST 72R645-V164-D303X	\$625	\$8.33
GAST 0523-V191Q-G582DX	\$815	\$10.19
GAST SAA-V308-NQ	\$520	\$11.56

	Annual Cost for Electricity @ \$0.08 per KW-hr for 2,000 hours operation	Total Cubic Meters Sampled
T-Squared T201	\$80	6,000
GAST 72R645-V164-D303X	\$880	9,000
GAST 0523-V191Q-G582DX	\$1,008	9,600
GAST SAA-V308-NQ	\$1,120	5,400

Preliminary conclusions:

1. The annual cost for electricity becomes important if you need to provide a remote air sampling station. In operations inside our facilities with an AC receptacle available we would not be concerned about the electrical power needed.
2. Weight and power consumption are important considerations if you need a truly portable air sampler.
3. The capacity of the pump needs to be matched to the air sampling needs.
4. The premature failure of the wiring on our portable air samplers may be due to excessive temperature rise.