HURON VALLEY SALES, INC.
Phone (734) 944-5200 Fax (734) 944-5800

Effective: December 1, 2012

Useful Engineering Data 1

WATER

One gallon of fresh water =	8.333 lbs.
One cubic foot of water =	7.48 gallons
One cubic foot of water (at 39.2° F. maximum density) =	62.428 lbs.
One cubic foot of water (at 212° F. boiling point) =	59.83 lbs.
One U.S. Gallon =	231 cubic inches

The capacity of a cylinder in gallons is equal to the length in inches multiplied by the square of the diameter in inches x .0034.
A water column one foot high exerts .4333 psi pressure.
Doubling the diameter of a pipe increases its capacity four times.

pH: above 7.0 alkaline; 7.0 neutral; below 7.0 acid

1 Grain per gallon = 17.1 parts per million.
Water expands 4.34% heated from 40° to 212°.

ELECTRICITY

Amps (3 Phase) = KW x 1,000 / Volts x 1.732

Amps (1 Phase) = KW x 1,000 / Volts

GPH = KW x 3,412 / 8.33 x Temp. Rise

1 KW Hour will evaporate 3.5 lbs. of water from and at 212° F.
1 KW Hour = 3,412 BTU
1 BPH = 34.5 lbs. of steam at 212°
1 BPH = 33,475 BTU
1 BPH = 9.8 KW

RECOVERY FORMULA

Formula for recovery in gallons per hour for any degree F. rise.

$$\frac{\text{Rated Recovery in Gallons/Hour} \times 100}{\text{Desired Degree F. Rise}} = \text{Gallons/Hour}$$

Gas - Electric - Oil - Coal
BTU CONTENT OF FUELS

COAL	BTU'S
1 Lb.	10,000-15,000
1 Ton	25 Million (approx.)
ELECTRICITY	
1 KW	3,412
GAS	
1 Lb. of Butane	21,300
1 Gallon of Butane	102,600
1 Cu.Ft. of Butane	3,260
1 Cu.Ft. of Manufactured	530
1 Cu.Ft. of Mixed	850
1 Cu.Ft. of Natural	1,075
1 Lb. of Propane	21,600
1 Gallon of Propane	91,000
1 Cu.Ft. of Propane	2,570
OIL	
1 Gallon of #1 Fuel	136,000
1 Gallon of #2 Fuel	138,500
1 Gallon of #3 Fuel	141,000
1 Gallon of #5 Fuel	148,000
1 Gallon of #6 Fuel	152,000
1 Boiler H.P. = 33,475 BTUH Output	
1 Lb. of Gas = 28" Water Column	
1 Lb. of Gas = 16 Oz.	* 100 Cu.Ft. = 1 Therm

METRIC CONVERSIONS

Multiply	*By*	*To Obtain*
Fahrenheit (F.)	5/9 (after subtracting 32)	Celsius (Cel.)
Celsius (Cel.)	9/5 (then add 32)	Fahrenheit (F.)
Ounces (oz.)	28	Gram (gm.)
Gram (gm.)	.035	Ounces (oz.)
Pound (lb.)	0.45	Kilogram (kgm.)
Kilogram (kgm.)	2.2	Pound (lb.)
Gallon (ga.l)	3.8	Liter (L.)
Liter (L.)	0.26	Gallon (ga.)
Inch (in.)	2.5	Centimeter (cm.)
Centimeter (cm.)	0.4	Inch (in.)

STORAGE TANK CAPACITY IN GALLONS

Length in Feet	* Tank Diameter – Inches															
	20	22	24	30	36	42	48	54	60	66	72	78	84	90	96
1	16	20	24	37	53	72	94	120	145	180	210	250	290	330	375
2	32	40	48	74	106	144	188	240	290	360	420	500	580	660	750
3	48	60	72	110	159	216	282	360	435	540	630	750	870	990	1125
4	66	80	96	147	212	288	376	480	580	720	840	1000	1160	1320	1500
5	82	100	120	184	265	360	470	600	725	900	1050	1250	1450	1650	1875
6	98	120	144	220	317	432	564	720	870	1080	1260	1500	1740	1980	2250
7	114	140	168	257	370	504	658	840	1015	1260	1470	1750	2030	2310	2625
8	131	160	192	294	423	576	752	960	1160	1440	1680	2000	2320	2640	3000
9	147	180	216	330	476	648	846	1080	1305	1620	1890	2250	2610	2970	3375
10	163	200	240	367	529	720	940	1200	1450	1800	2100	2500	2900	3300	3750
11	180	220	264	404	582	792	1034	1320	1595	1980	2310	2750	3190	3630	4125
12	196	240	288	440	634	864	1128	1440	1740	2160	2520	3000	3480	3960	4500
13	212	260	312	477	687	936	1222	1560	1885	2340	2730	3250	3770	4290	4875
14	228	280	336	514	740	1008	1316	1680	2080	2520	2940	3500	4060	4620	5250
15	244	300	360	550	793	1080	1410	1800	2175	2700	3150	3750	4350	4950	5625
16	260	320	384	587	816	1152	1504	1920	2320	2880	3360	4000	4610	5280	6000

* To determine diameter when only the circumference is known, divide that figure by 3.1416 (π)

AREA CONCRETE WILL COVER

3" thick	1 Yard	87 sq. ft.
4" thick	1 Yard	76 sq. ft.
5" thick	1 Yard	65 sq. ft.
6" thick	1 Yard	54 sq. ft.

1 Acre = 43,560 sq. ft.

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Useful Engineering Data 2

Stainless Steel *VeeJet*® Spray Nozzles

Nozzle Capacity

Orifice Capacity Size*	GPM (gallons per minute) at P.S.I. (pounds per square inch) based on water									
	40 p.s.i.	100 p.s.i.	200 p.s.i.	300 p.s.i.	400 p.s.i.	500 p.s.i.	600 p.s.i.	700 p.s.i.	800 p.s.i.	1000 p.s.i.
–04	.40	.63	.89	1.1	1.3	1.4	1.6	1.7	1.8	2.0
–05	.50	.79	1.1	1.4	1.6	1.8	1.9	2.1	2.2	2.5
–055	.55	.87	1.2	1.5	1.7	1.9	2.1	2.3	2.5	2.8
–06	.60	.95	1.3	1.6	1.9	2.1	2.3	2.5	2.7	3.0
–065	.65	1.03	1.5	1.8	2.1	2.3	2.5	2.7	2.9	3.3
–07	.70	1.1	1.6	1.9	2.2	2.5	2.8	2.9	3.1	3.5
–08	.80	1.2	1.8	2.2	2.5	2.8	3.1	3.4	3.6	4.0
–09	.90	1.4	2.0	2.5	2.9	3.2	3.5	3.8	4.0	4.5
–10	1.0	1.6	2.2	2.7	3.2	3.5	3.9	4.2	4.5	5.0
–15	1.5	2.4	3.4	4.1	4.7	5.3	5.8	6.3	6.7	7.5
–20	2.0	3.2	4.5	5.5	6.3	7.1	7.7	8.4	8.9	10.0
–30	3.0	4.7	6.7	8.2	9.5	10.6	11.6	12.5	13.4	15.0
–40	4.0	6.3	9.0	11.0	12.6	14.1	15.5	16.7	17.9	20.0
–50	5.0	7.9	11.2	13.7	15.8	17.7	19.4	21.0	22.0	25.0
–60	6.0	9.5	13.4	16.4	19.0	21.0	23.0	25.0	27.0	30.0
–70	7.0	11.1	15.7	19.2	22.2	25.0	28.0	29.0	31.0	35.0

GALLONS OF WATER IN 100 FEET OF COPPER TUBING

3/8" ID = .573	3/4" ID = 2.3	1¼" ID = 6.38	2" ID = 16.23	3" ID = 36.7
1/2" ID = 1.02	1" ID = 4.08	1½" ID = 10.2	2½" ID = 25.3	4" ID = 65.5

2.31 ft. of pressure drop = 1 lb. or 1 psi.

COPPER PIPE & TUBING

When measuring copper pipe, sweat fittings are measured by their inside diameter (ID) , and compression fittings are measured by their outside diameter (OD). Hard temper comes in 20 foot straight lengths, and soft temper comes in 60 foot coils. Copper tubing is normally designed to conform with ASTM Designation B88. See the code specific information on each type. Use 50/50 solid core (NOT ROSIN CORE), and a high quality flux when soldering sweat fittings.

TYPES OF COPPER PIPE

DWV: "DWV stands for :Drain, Waste and Vent" and is recommended for above ground use only, and no pressure applications. Sweat fittings only. Available only in hard type and in sizes from 1¼" to 6".

K: A thick walled, flexible copper tubing. Much thicker wall than type L and M, and is required for all underground installations. Typical uses include water services, plumbing, heating, steam, gas, oil, oxygen, and other applications where thick walled tubing is required. Can be used with sweat, flared, and compression fittings. Available in hard and soft types.

L: Standard tubing used for interior, above ground plumbing. Uses included heating, air conditioning, steam, gas, oil, and for underground drainage lines. This is flexible tubing but be very careful not to crimp the line when bending it. Special tools (inexpensive) are readily available to make bending much easier and safer. Although sweat, compression, and flare fittings are available, only compression fittings are legal for gas lines. Available in hard and soft types.

M: Typically used with interior heating and pressure line applications. Wall thickness is slightly less than types K and L. Normally used with sweat fittings. Available in hard and soft types.

CAPACITIES OF WATER PIPING PER 100 FT. LENGTH (IN U.S. G.P.M.)

Nominal Pipe Size Pressure	¾"	1"	1¼"	1½"	2"	2½"	3"	4"
17 lbs.	9.1	18.7	33.5	51.6	106	200	290	589
30 lbs.	14	28	52	78	160	308	436	885
40 lbs.	16	33	60	90	184	350	504	1023
50 lbs.	17.5	37	70	101	206	390	564	1143
60 lbs.	19.5	40	76	110	226	430	617	1252
75 lbs.	22	45	85	123	253	480	690	1400
100 lbs.	25	52	99	142	292	558	797	1607