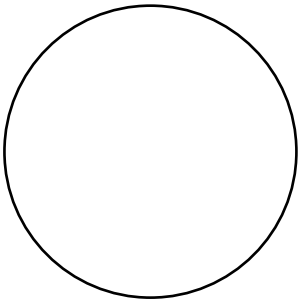
PENTAIR POOL

Product Catalog 2024

Engineering Data

607



Example:

Pool Length	=	40 ft.
Pool Width	=	20 ft.
Shallow Depth	=	3 ft.
Deep Depth	=	+8 ft.
Total Depth	=	11 ft.

Using formula A: 40 X 20 = 800 sq. ft., 800 X 5.5 = 4,400 cubic ft., 4,400 X 7.5 = 33,000 gallons

ENGINEERING DATA

UNITS OF LENGTH

UNIT	INCH	FOOT	YARD	METER
INCH	1.0	.0833	.0278	.0254
FOOT	12.0	1.0	.333	.305
YARD	36.0	3.0	1.0	.9144
METER	39.37	3.281	1.094	1.0

UNITS OF AREA

UNIT	SQUARE INCH	SQUARE FOOT	SQUARE YARD	SQUARE METER
SQUARE INCH	1.0	.00694	.000772	.000645
SQUARE FOOT	144.0	1.0	.1111	.0929
SQUARE YARD	1,296.0	9.0	1.0	.836
SQUARE METER	1,550.0	10.76	1.196	1.0

UNITS OF VOLUME

UNIT	U.S. GALLON	IMPERIAL GALLON	CUBIC FEET	POUNDS OF WATER	CUBIC METERS
U.S. GALLON	1.0	.833	.1337	8.33	.003785
IMPERIAL GALLON	1.2	1.0	.1605	10.0	.004546
CUBIC FEET	7.481	6.232	1.0	62.37	.0283
POUNDS OF WATER	.12	.09996	.0160	1.0	.00045
CUBIC METERS	264.2	220.0	35.31	2,204.0	1.0

UNITS OF FLOW

UNIT	U.S. G.P.M.	IMPERIAL G.P.M.	CUBIC FEET/ SECOND	CUBIC FEET/HOUR	LITERS/ SECOND
U.S. G.P.M.	1.0	.833	.00223	8.02	.0631
IMPERIAL G.P.M.	1.2	1.0	.00268	9.63	.0757
CUBIC FT. PER SECOND	448.8	374.0	1.0	3.600	28.32
CUBIC FT. PER HOUR	.1247	.104	.00028	1.0	.0078
LITERS PER SECOND	15.85	13.21	.0353	127.13	1.0

ENGINEERING DATA

Uw -5 TcND1ps5 8.1125c 0.07S.4 ((

PRESSURE AND EQUIVALENT FEET HEAD OF WATER

Lbs. per Sq. In.	Feet Head	Lbs. per Sq. In.	Feet Head	Lbs. per Sq. In.	Feet Head	Lbs. per Sq. In.	Feet Head
1	2.31	20	46.18	120	276.42	225	519.23
2	4.62	25	57.72	125	288.46	250	576.92
3	6.93	30	69.27	130	300.00	275	634.62
4	9.24	40	92.36	140	323.08	300	692.31
5	11.54	50	115.38	150	346.15	325	750.00
6	13.85	60	138.46	160	369.23	350	807.69
7	16.16	70	161.53	170	392.31	375	865.38
8	18.47	80	184.62	180	415.38	400	923.08
9	20.78	90	207.69	190	438.46	500	1153.85
10	23.09	100	230.77	200	461.54	1000	2307.69
15	34.63	110	253.85				

ENGINEERING DATA

EQUIVALENT VALUES OF PRESSURE

Inches of		

WEIGHT
1 U.S. GALLON OF WATER = 8.33 LBS.
1 CUBIC FOOT OF WATER = 62.35 LBS.
1 KILOGRAM (LITRE) = 2.2 LBS.
1 IMPERIAL GALLON = 10.0 LBS.

CURRENT CAPACITY (AMPS) OF WIRE *
Three wires in cable, ambient temp. 86°F

WIRE SIZE	AMPERES	
	COPPER	ALUMINIUM
14	20	–
12	25	20
10	30	25
8	40	30
6	55	40
4	70	55
3	85	65
2	95	75
1	110	85
0	125	100

* Wire size is minimum for amperes listed.

EFFICIENCY	
EFFICIENCY	$\frac{\text{POWER OUTPUT}}{\text{POWER INPUT}}$
MOTOR EFFICIENCY	$\frac{\text{HP OUTPUT}}{\text{K.W. INPUT}}$
PUMP EFFICIENCY	$\frac{\text{G.P.M x TOTAL HEAD (F.T.)}}{3960 \times \text{BHP}}$
OVERALL PLANT EFFICIENCY (OPE)	$\frac{\text{G.P.M x TOTAL HEAD (F.T.)}}{5310 \times \text{K.W. INPUT}}$

Amperage =	$\frac{\text{Watts}}{\text{Volts}}$
Watts =	Volts x Amperage
WHP =	Water Horsepower (output HP of pump) = $\frac{\text{g.p.m x total head}}{3960}$
HP input (to motor) =	KW input x 1.341
Total Head =	Discharge head + Pumping water level (ft)
Discharge Head =	Discharge Pressure (PSI) x 2.31 ft. of head

ENGINEERING DATA

Pool heaters can be sized by the volume method for maintenance heating or for spot heating. For many days during the swimming season, the sun maintains a desirable pool temperature of 78–80°F. and the pool requires no supplemental heating. However, during cooler periods a pool will usually lose 2–4°F. per day.

To get the water to the desired temperature, you could choose a smaller heater and run it during the daily ýlter cycle of 4 ï 6 hours every day. This would be sufýcient to overcome a slight temperature drop between ýlter cycles, but it would mean leaving the heater on every day. If you don't use the pool daily, it's more economical to spot heat the pool, say for the weekend. In this case, you could choose a larger heater which will heat the pool faster, and then can be turned off between uses. With either, maintenance heating or spot heating, you need to determine the size of heater to select and the time it will require to heat the pool.

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* For Commercial Heaters 500,000 BTU/hr and over please contact factory for sizing.

TIME IN HOURS POOL & SPA

$$= \frac{\text{Vol. in Gal. x 8.34 lb./gal. x temprise}}{\text{Heater BTUH input x efýciency of heater}}$$

TIME IN MINUTES SPA

$$= \frac{\text{Vol. in Gal. x 8.34 lb./gal. x temprise x 60 min}}{\text{Heater BTUH input x efýciency of heater}}$$

ENGINEERING DATA

ETi 400 ASME HIGH EFFICIENCY HEATER MODEL
REQUIRED TIME TO TEMPERATURE RISE

^{o} F Temperature Rise	Pool Volume (Gallons)									
	10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000	100,000
	Hours to Reach Temperature									
5	1.08	2.17	3.26	4.34	5.43	6.52	7.60	8.69	9.77	10.86
10	2.17	4.34	6.52	8.69	10.86	13.03	15.20	17.38	19.55	21.72
15	3.25	6.52	9.77	13.03	16.29	19.55	22.80	26.06	29.32	35.58
20	[illegible]									

ENGINEERING DATA

When installing any Pentair or Sta-Rite pool or spa heater, it is very important to have the proper amount of gas supplied to all Pentair or Sta-Rite Heaters for pools. Below, for your information, is a table which will assist you in selecting the correct size of piping for the installation.

When installing any gas appliance, it is very important to have the proper size gas meter and home pressure regulator installed. Once you have selected the correct size heater for the pool or spa, contact the local utility which supplies the gas and request a ýeld review of the installation and have them install the proper size meter and proper size pressure regulator.

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Natural gas at 1000 BTU per Cubic Foot

Propane Gas at 2500 BTU per Cubic Foot

MODEL	1/2 in.		3/4 in.		1 in.		1-1/4 in.		1-1/2 in.		2 in.		2-1/2 in.	
	NAT	PRO	NAT	PRO	NAT	PRO	NAT	PRO	NAT	PRO	NAT	PRO	NAT	PRO
100 & 75	20 ft.	50 ft.	50 ft.	150 ft.	150 ft.	600 ft.	-	-	-	-	-	-	-	-
150	10 ft.	40 ft.	50 ft.	150 ft.	150 ft.	600 ft.	-	-	-	-	-	-	-	-
200	-	20 ft.	30 ft.	80 ft.	125 ft.	250 ft.	450 ft.	600 ft.	-	-	-	-	-	-
250	-	10 ft.	20 ft.	50 ft.	70 ft.	150 ft.	250 ft.	500 ft.	600 ft.	-	-	-	-	-
300	-	-	10 ft.	30 ft.	50 ft.	100 ft.	200 ft.	350 ft.	400 ft.	600 ft.	-	-	-	-
350	-	-	10 ft.	20 ft.	30 ft.	70 ft.	125 ft.	250 ft.	250 ft.	500 ft.	500 ft.	-	-	-
400	-	-	-	10 ft.	20 ft.	60 ft.	100 ft.	150 ft.	200 ft.	E6t 0 Td				

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ENGINEERING DATA

"RESIDENTIAL" PROPANE GAS 2 STAGE REGULATION

In many Propane gas line installations, the gas supplier and or installer will utilize a two stage regulation process whereby, at the supply tank, they will install the ýrst stage gas regulator, which would be at a higher pressure, usually 10 psi. This higher pressure allows for much longer distance and in a much smaller pipe size. Then, within a short distance from the pool heater, generally around 24 inches, a second regulator, which is the second stage, would be installed and set at the required inlet pressure of the heater.

SEE "GAS PRESSURE REQUIREMENT CHART."

Stage One "High Pressure" Gas Pipe Sizing

10 PSI @ 2500 BTU Per CU. FT.

MAXIMUM EQUIVALENT PIPE LENGTH

Model	0 to 50 Feet	50 to 100 Feet	100 to 150 Feet
75 through 400	1/2 in.	1/2 in.	1/2 in.

Stage Two "Low Pressure" Gas Pipe Sizing

Stage 2 set at 14 in. W.C.

MAXIMUM EQUIVALENT PIPE LENGTH

Model	0 to 10 Feet	10 to 20 Feet
75 through 400	3/4 in.	3/4 in.

"RESIDENTIAL" NATURAL GAS 2 STAGE REGULATION

ENGINEERING DATA

AIR BLOWER SIZING GUIDE

BLOWER MOTOR SIZE	VOLTS	AMPS	MAXIMUM INCHES OF WATER DEPTH	JETS ONLY RECOMMENDED NUMBER OF JETS
1 HP	120V	6.6	35 in.	5–10
1-1/2 HP	120V	7.4	45 in.	9–15
2 HP	120V	9.3	55 in.	

BLOWER SIZING FORMULA	
Measure total depth of water in spa (not total spa depth)	
Add - 1 in. water for each 10 ft. of 2 in. air pipe	Add 1/2 in. water for each 90 deg. 2 in. elbow
Compare your total with maximum inches of water column and select that size or the next size higher blower than your total, in your selected voltage.	
The number of holes in the air channel (both þoor and seat) should be approximately 1.6 sq. in. total plus or minus .5	
1/8 in. hole = .0123 sq. in.	3/16 in. hole = .0276 sq. in.
5/32 in. hole = .0192 sq. in.	1/4 in. hole = .0491 sq. in.

NOTES: