Hydronic Systems
CANADA INCORPORATED

Pahlen

POOL & SPA HEAT EXCHANGER

APPLICATION GUIDE
&
WARRANTY

May 28, 2014

PRODUCT SPECIFICATIONS

(Figure 1)

Item Number	Model	*Nominal Capacity		Primary Side/Hot Water		Secondary Side/Cold Water	
		kW	MBH	US GPM	Pressure Drop in Feet	US GPM	Pressure Drop in Feet
11392	HF28	28	95	6.6	5.6	79.2	5.2
11365	MF135	40	135	6.6	0.2	52.8	2.6
11366	MF200	60	200	7.9	0.5	66.0	4.6
11367	MF260	75	260	9.2	1.3	79.2	5.9
11368	MF400	120	400	13.2	2.1	95.0	7.9
11332	T28	28	95	5.3	4.3	79.2	5.2
11333	T40	40	135	10.6	9.2	92.4	5.2
11334	T75	75	260	11.9	23.6	92.4	6.2
11312	HT40	40	135	9.0	7.9	79.2	1.6
11314	HT75	75	260	11.4	19.7	79.2	3.3
11322	HTT40	40	135	13.7	5.6	79.2	2.6
11324	HTT75	75	260	15.03	9.2	79.2	4.6
11316	AM40	40	135	5.3	2.0	66.0	1.3
11317	AM70	70	240	7.9	5.2	79.2	2.0
11318	AM100	100	340	10.6	8.5	87.9	2.6
11326	AM40T	40	135	5.03	1.3	66.0	1.3
11327	AM70T	70	240	7.9	4.6	79.2	2.0
11328	AM100T	100	340	10.6	7.5	87.9	2.6

* Based on 108°F temperature difference between incoming primary (hot water) and incoming secondary (pool water) temperature.

SELECTION PROCEDURE

This sizing guide for pool & spa heating applications has been prepared to assist in the proper selection of boiler output and heat exchanger. Proper boiler output/heat exchanger selection is based on the following criteria – type of use (heat-up rate required), size of pool or spa (gallons) and heat loss to surroundings (pool surface).

STEP 1: DETERMINE HEAT UP RATE BASED ON TYPE OF POOL USE

The desired heat-up rate is usually the most important factor affecting boiler/heat exchanger selection. It depends on the type of use for the pool or spa and may be selected as follows:

Type of Use	Heat-Up Rate	
	Pool	Spa
Periodic Use Only (weekends, holidays)	2°F/hour	10°F/hour
Extended Use (summer season)	1°F/hour	5°F/hour
Minimum suggested	1/2°F/ hour	2°F/hour

STEP 2: DETERMINE POOL CAPACITY

Rectangular Pools/Spas

Capacity = 7.5 X Length X Width X Average Depth
(Gals) (Feet) (Feet) (Feet)

Circular Pools/Spas

Capacity = 5.9 X Diameter² X Average Depth
(Gals) (Feet) (Feet)

Note: The typical average depth for in-ground pools is 5.5 feet.

STEP3: SELECT BOILER OUTPUT & HEAT EXCHANGER REQURIED

Enter selection table Figure 2 for pool capacity or selection table Figure 3 for spa capacity. Select boiler output and heat exchanger, based on desired heat-up rate.

STEP 4: CHECK HEAT LOSS TO SURROUNDINGS

Heat Loss (Btu/hr) = 12 X Pool Surface Area (sq. ft.) X (Desired Pool/Spa Temp (°F) - Coldest Avg Air Temp During Use (°F))

Boiler output selected in Step 3 must be larger than the heat loss to the surroundings.

Note 1) The typical desired pool temperature is 80°F. The typical desired spa temperature is 104°F.

Note 2) The heat-up rate will decrease as outdoor temperature drops.

EXAMPLE

Determine the boiler output and heat exchanger required for a 30-foot long by 16-foot wide by 5.5-foot average depth pool. The pool is for extended use during the summer season and the coldest air temperature anticipated is 65°F.

Step 1

For extended use, the desired heat-up rate is 1°F/hour

Step 2

Pool capacity = 7.5 X 30’ X 16 X 5.5 = 19,800 gallons.

Step 3

From selection table, Figure 2, for 20,000 gallons and 1°F heat-up rate:

Required Boiler Output = 166,830 Btu/hr.
Required Heat Exchanger = Model MF200 (60 kW)

Step 4

Surface Area = 30 ft X 16 ft = 480 sq. ft.
Heat Loss = 12 X 480 X (80°F - 65°F) = 86,400 Btu/hr

Heat loss is well within required boiler output capacity.

POOL CHART

(Figure 2)

Pool Capacity (Gallons)	1/2°F/Hr Heat-Up Rate		1°F/Hr Heat-Up Rate		2°F/Hr Heat-Up Rate	
	Boiler Output Required (Btu/Hr)	Heat Exchanger Model	Boiler Output Required (Btu/Hr)	Heat Exchanger Model	Boiler Output Required (Btu/Hr)	Heat Exchanger Model
2,000	8,342	28 kW	16,683	28 kW	33,366	28 kW
4,000	16,683	28 kW	33,366	28 kW	66,732	28 kW
6,000	25,025	28 kW	50,049	28 kW	100,098	40 kW
8,000	33,366	28 kW	66,732	28 kW	133,464	40 kW
10,000	41,708	28 kW	83,415	28 kW	166,830	60 kW
12,000	50,049	28 kW	100,098	40 kW	200,196	60 kW
14,000	58,391	28 kW	116,781	40 kW	233,562	75 kW
16,000	66,732	28 kW	133,464	40 kW	266,928	75 kW
18,000	75,074	28 kW	150,147	60 kW	300,294	120 kW
20,000	83,415	28 kW	166,830	60 kW	333,660	120 kW
22,000	91,757	28 kW	183,513	60 kW	367,026	120 kW
24,000	100,098	40 kW	200,196	60 kW	400,392	120 kW
26,000	108,440	40 kW	216,879	75 kW	433,758	2 – 75 kW
28,000	116,781	40 kW	233,562	75 kW	467,124	2 – 75 kW
30,000	125,123	40 kW	250,245	75 kW	500,490	2 – 75 kW
32,000	133,464	40 kW	266,928	75 kW	533,856	2 – 75 kW
34,000	141,806	60 kW	283,611	120 kW	567,222	1 – 120, 1 – 60 kW
36,000	150,147	60 kW	300,294	120 kW	600,588	1 – 120, 1 – 60 kW
38,000	158,489	60 kW	316,977	120 kW	633,954	1 – 120, 1 – 75 kW
40,000	166,830	60 kW	333,660	120 kW	677,320	1 – 120, 1 – 75 kW
42,000	175,172	60 kW	350,343	120 kW	700,686	2 – 120 kW
44,000	183,513	60 kW	367,026	120 kW	734,052	2 – 120 kW
46,000	191,855	60 kW	383,709	120 kW	767,418	2 – 120 kW

SPA/HOT TUB CHART

(Figure 3)

Spa Capacity (Gallons)	2°F/Hr Heat-Up Rate		5°F/Hr Heat-Up Rate		10°F/Hr Heat-Up Rate	
	Boiler Output Required (Btu/Hr)	Heat Exchanger Model	Boiler Output Required (Btu/Hr)	Heat Exchanger Model	Boiler Output Required (Btu/Hr)	Heat Exchanger Model
1,000	16,667	28 kW	41,667	28 kW	83,333	28 kW
1,500	25,000	28 kW	62,500	28 kW	125,000	40 kW
2,000	33,334	28 kW	83,333	28 kW	166,667	60 kW
2,500	41,667	28 kW	104,167	40 kW	208,333	60 kW
3,000	50,000	28 kW	125,000	40 kW	250,000	75 kW
3,500	58,334	28 kW	145,833	60 kW	291,667	120 kW
4,000	66,668	28 kW	166,667	60 kW	333,333	120 kW
4,500	75,000	28 kW	187,500	60 kW	375,000	120 kW
5,000	83,334	28 kW	208,333	75 kW	416,667	120 kW

HEAT EXCHANGER PERFORMANCE
CORRECTION FACTORS

The capacity of a heat exchanger varies according to the liquid flow through the primary (hot) and secondary (cold) circuits and the temperature difference between both media.

From Figure 1 on page 2 a nominal thermal output for each heat exchanger may be obtained.

This output is based upon given liquid flow through both circuits, which is quoted in the table, and a temperature difference of 60°C (108°F) between the incoming primary and incoming secondary media.

As an example, heat exchanger type MF 135 has a thermal output of 40 kW when the liquid flow is 6.6 US GPM on the primary side and 52.8 US GPM on the secondary side and the temperature difference between both incoming media is 60°C (108°F).

By the use of **DIAGRAM A** and **B** the thermal output may be calculated for other liquid flows and temperature differences than those quoted in the table.

DIAGRAM A shows the variation in thermal output with changes in temperature differences between the incoming media. The output is virtually proportional to this temperature difference. The nominal value is based upon a temperature difference of 60°C (108°F) and this value represents 100% on the graph.

DIAGRAM B represents the variation in thermal output with changes in liquid flow. This diagram is based upon the nominal values given in Figure 1 on page 2, which values represent 100% on the graph.

If the flow in both primary and secondary circuits is in the same relationship to the nominal values then the rate of thermal output from the heat exchanger may be read from the graph. If, however, the flow in both circuits does not have the same relationship to the nominal values, the thermal output can be approximated as the average of the two separate readings from the graph.

PAHLEN is Scandinavia's largest manufacturer of specialized equipment that can be used for various applications in industry, Swimming Pools, Spa and Solar Collector systems.

The company is based in Sweden near the capital Stockholm. Here they manufacture a complete range of heat exchangers by using the most sophisticated technology combined with the finest engineers and designers in the industry.

Their products are exported to countries around the world including the United States and Canada.

DIAGRAM A

Nominal heat effect %

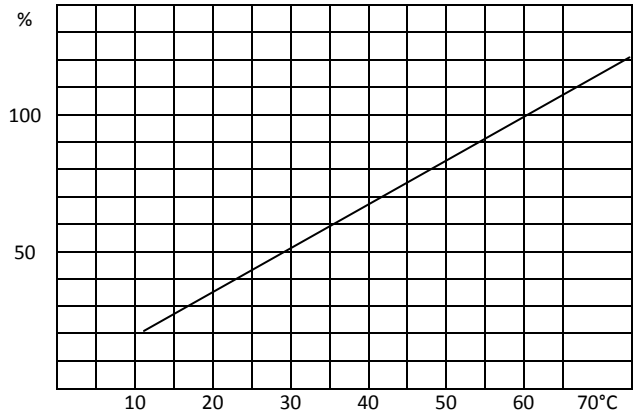
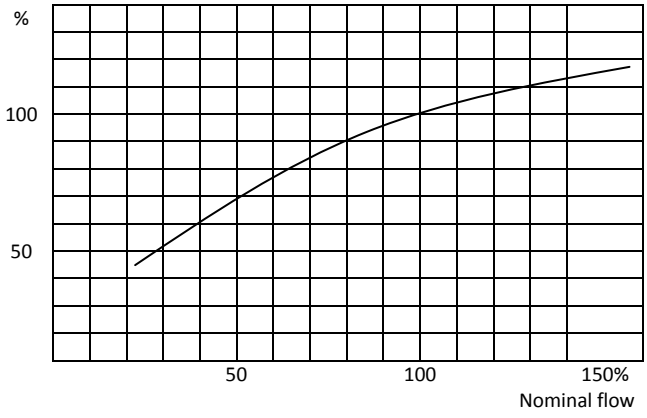


DIAGRAM B

Nominal heat effect %



LIMITED WARRANTY

PAHLEN POOL AND SPA HEAT EXCHANGERS

We, Hydronic Systems Canada Inc. (H.S.C.I.), warrant to the original owner that Pahlen Pool and Spa heat exchangers will remain free from defects in material and workmanship for a period of one year from date of installation provided same are used for the intended purpose and installed and operated in accordance with manufacturer's instructions.

Our sole and only liability and the original user's sole remedy under this warranty shall be limited to the repair or replacement, at H.S.C.I.'s option, of the defective heat exchanger. Any and all costs required to disassemble, remove, ship, reassemble and reinstall a heat exchanger or part there of ARE NOT COVERED under this warranty and shall be borne by original user.

EXCLUSIONS AND LIMITATIONS

H.S.C.I. shall not be liable for any special, indirect, incidental or consequential damages whether arising out of breach of warranty, breach of contract or otherwise. All the warranties implied by law, including the implied warranties of merchantability and fitness for a particular purpose, are hereby expressly limited to the duration of the limited one-year warranty. This warranty is not transferable and shall apply only if the heat exchanger is correctly installed.

- H.S.C.I. does not warrant heat exchangers damaged by corrosive water.

  The recommended chemical levels in the pool or spa water are:

Free Chlorine	1.0 – 3.0 ppm
pH	7.2 to 7.8
Calcium hardness	200 – 400 ppm
Alkalinity	100 – 150 ppm
Total dissolved solids	Less than 1000 ppm
Bromine	2.0 – 4.0 ppm
Copper	0 ppm
Chloride	Less than 140 ppm

- H.S.C.I. recommends that owners purchase a test kit and use it regularly.
  At a minimum the kit must measure chlorine and pH levels.
- Stainless steel heat exchangers cannot be used with sea water or salt water containing chloride levels exceeding 140 ppm. Use only titanium models for applications with sea, salt water or salt chlorinators.
- This warranty is void and shall not apply if unit failed due to faulty installation and operation of a chlorinator. Chlorinators must feed downstream of the heat exchanger and have an antisiphoning device to prevent chemical back-up in the heat exchanger when the pump is shut off. High chemical concentrations from improperly adjusted feeders and chlorinators can cause rapid corrosion of stainless steel heat exchangers.
- When adjusting chlorinator feeder, or when shock-chlorinating the pool, isolate the heat exchanger (by closing isolation valves and opening the bypass line) until the Chlorine level in the pool returns to the proper level.
- **Damage to heat exchangers due to improper water chemistry is not covered under warranty. Pin holes in stainless steel are a common example of such aggressive pool water conditions due to improper chemistry. These conditions are not covered under warranty.**

All heat exchangers claimed defective must be subjected to factory inspection and if found defective, will be repaired or replaced at the manufacturer's option. Please allow up to 60 days for warranty determination and resultant repair or replacement if applicable.

All warranty claims are F.O.B. our place of business and subject to prior return authorization.