

CHAPTER 2 - HOT WATER PIPING - RESIDENTIAL

3. INDIRECT DOMESTIC HOT WATER CONCERN

Scalding: Temperature - Minimum Time - Degree of Burn

<u>Temp (°F)</u>	<u>1st Degree</u>	<u>2nd & 3rd Degree</u>
111.2°	5 hrs.	7 hrs.
116.6°	35 min.	45 min.
118.4°	10 min.	14 min.
122.0°	1 min.	5 min.
131.0°	5 sec.	22 sec.
140.0°	2 sec.	5 sec.
149.0°	1 sec.	2 sec.
158.0°	1 sec.	1 sec.

INDIRECT SWIMMING POOL HEATING

APPLICATION

The use of a house heating boiler to indirectly heat a swimming pool is possible and even desirable. A factor of major significance would be comparable heat loads.

SIZING CONSIDERATIONS

Gallons of water to heat, temperature rise, and time allotted for temperature rise.

1. SIZING FORMULA (INITIAL RAISING OF WATER TEMPERATURE)

Gallons of Water = Pool (width x length x avg. depth) x 7.48
(gal. per cu. ft.)

Gallons of water x 8.34 x temp. rise ÷ hours to heat pool = BTUH

Example:

Pool (40' x 20' x 5' avg.) with initial pool water of 55°F to be raised to 75°F allowing 48 hours to raise temperature

40' x 20' x 5' x 7.48 = 29,920 gallons of water

29,920 x 8.34 x 20 ÷ 48 = 103,972 BTUH (I=B=R Net Ratings)

2. HEAT LOSS FROM POOL SURFACE* (MAINTAINING WATER TEMPERATURE)

Temperature Difference °F	10°	15°	20°	25°	30°
BTUH/per Sq. Ft.	105	158	210	263	368

NOTES:

- Assumed wind velocity: 3.5 mph
Wind velocity of 5 mph multiply BTUH by 1.25
Wind velocity of 10 mph multiply BTUH by 2.00
- Temperature Difference: Ambient air and desired water temp.

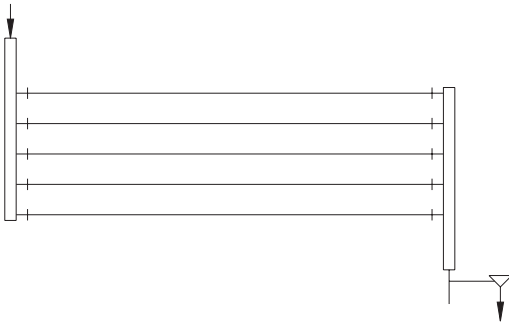
*Maintaining pool temperature when outside air is 20° to 30°F lower than pool water may require a larger boiler.

CHAPTER 5 INSTALLED RADIATION: DETERMINING HEAT LOAD

STEEL PIPE COILS - Sq Ft of Radiating Surface Per Linear Ft of Coil

Nominal Pipe Size (inches)	Number of Rows of Pipe in Coil							
	1	2	3	4	5	6	8	10
1	.57	1.09	1.53	1.90	2.20	2.44	2.83	3.14
1-1/4	.71	1.36	1.91	2.37	2.74	3.04	3.52	3.90
1-1/2	.81	1.55	2.18	2.70	3.12	3.46	4.02	4.45
2	.95	1.81	2.55	3.17	3.66	4.05	4.71	5.22

- Notes:**
1. Based on 70°F room temperature.
 2. Pipes are positioned level, on vertical wall.
 3. For coils positioned along floor or ceiling.
- Multiply chart value for 1 row of pipe x no. of rows of pipe.



CORRECTION FACTORS IF ROOM TEMPERATURE IS OTHER THAN 70°F DIVIDE SQ. FT. OF RADIATION BY

Room Temp.	80°	75°	70°	65°	60°	55°	50°
Divisor	1.10	1.05	1.00	0.96	0.92	0.88	0.85

Heat Emissions for Cast Iron Radiators			
Design or Average Water Temperature	Heat Emission Rates Btuh per Sq. Ft.	Design or Average Water Temperature	Heat Emission Rates Btuh per Sq. Ft.
110°	30	180°	170
120°	50	185°	180
130°	70	190°	190
140°	90	195°	200
150°	110	200°	210
160°	130	205°	220
170°	150	210°	230
175°	160	215°	240