

## KILOWATT HOURS TO HEAT AIR

Amount of Air		Temperature Rise										
		°F	50	100	150	200	250	300	350	400	450	500
CFM	CMH	°C	10	37.8	66	93	121	149	117	204	232	260
100	58.85	1.7	3.3	5.0	6.7	8.3	10.0	11.7	13.3	15.0	16.7	
200	117.70	3.3	6.7	10.0	13.3	16.7	20.0	23.3	26.7	30.0	33.3	
300	176.55	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	
400	235.40	6.7	13.3	20.0	26.7	33.3	40.0	46.7	53.3	60.0	66.7	
500	294.25	8.3	16.7	25.0	33.3	41.7	50.0	58.3	66.7	75.0	83.3	
600	353.10	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	
700	411.95	11.7	23.3	35.0	46.7	58.3	70.0	81.7	93.3	105.0	116.7	
800	470.80	13.3	26.7	40.0	53.3	66.7	80.0	93.3	106.7	120.0	133.3	
900	529.65	15.0	30.0	45.0	60.0	75.0	90.0	105.0	120.0	135.0	150.0	
1000	588.50	16.7	33.3	50.0	66.7	83.3	100.0	116.7	133.3	150.0	166.7	
1100	647.35	18.3	36.7	55.0	73.3	91.7	110.0	128.3	146.7	165.0	183.3	
1200	706.20	20.0	40.0	60.0	80.0	100.0	120.0	140.0	160.0	180.0	200.0	

Use the maximum anticipated airflow. This equation assumes insulate duct (negligible heat loss).

Equation to calculate kilowatts

$$KW = \text{Cubic Meters/Min}^* \times \text{Temperature Rise (}^\circ\text{C)} / 47$$

For Compressed Air

$$KW = \text{Cubic Meters/Min}^* \times \text{Temperature Rise (}^\circ\text{C)} \times \text{Density (kg/m}^3\text{)**} / 57.5$$

\* Measured at normal temperature and pressure.

\*\*Measured at heater system inlet temperature and pressure.

## KILOWATT HOURS TO HEAT OIL

Amount of Oil			Temperature Rise						
Cubic Ft.	Gallons	Litres	°F	50	100	200	300	400	500
			°C	10	37.8	93	149	204	260
			Kilowatts to heat in hour						
0.50	3.74	14.16	0.30	0.50	1	2	2	3	
1	7.48	28.32	0.5	1	2	3	4	6	
2	14.96	56.64	1	1	2	4	6	11	
3	22.44	84.96	2	3	6	9	12	16	
4	29.92	113.26	2	4	8	12	16	22	
5	37.41	141.60	3	4	9	15	20	25	
10	74.81	283.20	5	9	18	29	40	52	
15	112.22	424.80	7	14	28	44	60	77	
20	149.62	566.40	9	18	37	58	80	102	
25	187.03	708.00	11	22	46	72	100	127	
30	224.43	849.60	13	27	56	86	120	151	
35	261.84	991.20	16	31	65	100	139	176	
40	299.24	1132.80	18	36	74	115	158	201	
45	336.55	1274.40	20	40	84	129	178	226	
50	374.05	1416.00	22	45	93	144	197	252	
55	411.46	1557.60	25	49	102	158	217	276	
60	448.86	1699.20	27	54	112	172	236	302	
65	486.27	1840.80	29	58	121	186	255	326	
70	523.67	1982.40	32	62	130	200	275	350	
/5	561.08	2124.00	34	67	140	215	294	375	

Add 5% for uninsulated Tanks.

Equation to calculate kilowatts:

$$KW = (\text{Liters} \times \text{Temperature Rise } (^\circ\text{C})) / (1680 \times \text{Heat-up Time (hrs.)})$$

Prepared By Western Dynamics, LLC

## KILOWATT HOURS TO HEAT WATER

Quantity of Water			Temperature Rise							
Cubic Ft.	Gals	Litres	°F	20	40	60	80	100	120	140
			°C	6.67	4.44	15.60	26.70	37.80	49.00	60.00
Kilowatts to heat in one hour										
0.66	5	18.7	0.3	5.0	0.8	1.1	1.3	1.6	1.9	
1.3	10	36.8	0.5	1.1	1.6	2.1	2.7	3.2	3.7	
2.0	15	56.6	0.8	1.6	2.4	3.2	4.0	4.8	5.6	
2.7	20	76.5	1.1	2.2	3.2	4.3	5.3	6.4	7.5	
3.3	25	93.5	1.3	2.7	4.0	5.3	6.7	8.0	9.3	
4.0	30	113.3	1.6	3.2	4.8	6.4	8.0	9.6	12.0	
5.3	40	150.1	2.1	4.0	6.4	8.5	11.0	13.0	15.0	
6.7	50	189.7	2.7	5.4	8.0	10.7	13.0	16.0	19.0	
8.0	60	226.6	3.3	6.4	9.6	12.8	16.0	19.0	22.0	
9.4	70	266.2	3.7	7.5	11.2	15.0	19.0	22.0	26.0	
10.7	80	303.0	4.3	8.5	13.0	17.0	21.0	26.0	30.0	
12.0	90	339.8	5.0	10.0	14.5	19.0	24.0	29.0	34.0	
13.4	100	379.5	5.5	11.0	16.0	21.0	27.0	32.0	37.0	
16.7	125	472.9	7.0	13.0	20.0	27.0	33.0	40.0	47.0	
20.0	150	566.4	8.0	16.0	24.0	32.0	40.0	48.0	56.0	
23.4	175	662.7	9.0	18.0	28.0	37.0	47.0	56.0	65.0	
26.7	200	756.1	11.0	21.0	32.0	43.0	53.0	64.0	75.0	
33.7	250	954.4	13.0	27.0	40.0	53.0	67.0	80.0	93.0	
40.0	300	1132.8	16.0	32.0	47.0	64.0	80.0	96.0	112.0	
53.4	400	1512.3	21.0	43.0	64.0	85.0	107.0	128.0	149.0	
66.8	500	1891.8	27.0	53.0	80.0	107.0	133.0	160.0	187.0	

**For Heating Flowing Water**

$$KW = \text{Liters/min.} \times \text{Temperature Rise (}^\circ\text{C)} \times 0.076$$

**For Heating Water in Tanks**

$$KW = (\text{Liters Temperature Rise (}^\circ\text{C)}) / (790 \times \text{Heat-up Time (hrs.)})$$

<b>600</b>
<b>316</b>
<b>20.0</b>
<b>40.0</b>
<b>60.0</b>
<b>80.0</b>
<b>100.0</b>
<b>120.0</b>
<b>140.0</b>
<b>160.0</b>
<b>180.0</b>
<b>200.0</b>
<b>220.0</b>
<b>240.0</b>