OHM's LAW

Watts

Watts = Ohms x Amps^2

Watts = Volts x Amps

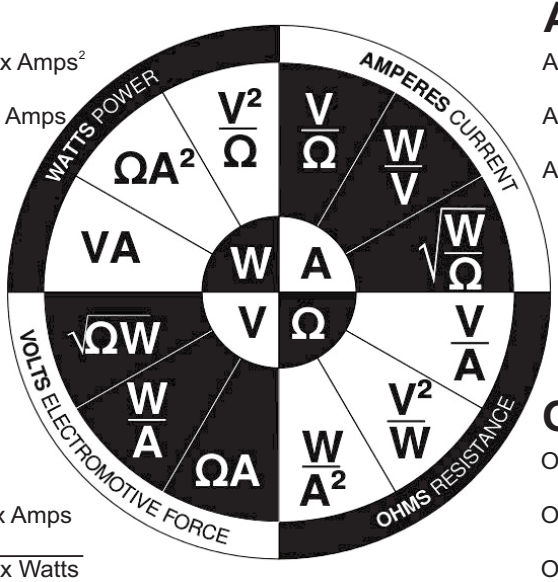
Watts = $\frac{\text{Volts}^2}{\text{Ohms}}$

Amps

Amps = $\frac{\text{Volts}}{\text{Ohms}}$

Amps = $\frac{\text{Watts}}{\text{Volts}}$

Amps = $\sqrt{\frac{\text{Watts}}{\text{Ohms}}}$



Volts

Volts = $\frac{\text{Watts}}{\text{Amps}}$

Volts = Ohms x Amps

Volts = $\sqrt{\text{Ohms x Watts}}$

Ohms

Ohms = $\frac{\text{Volts}}{\text{Amps}}$

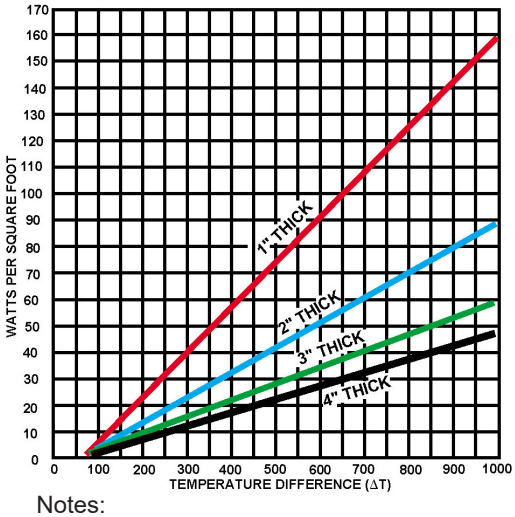
Ohms = $\frac{\text{Volts}^2}{\text{Watts}}$

Ohms = $\frac{\text{Watts}}{\text{Amps}^2}$

Single Phase = Amps	$\frac{\text{Watts}}{\text{Volts}}$
Three Phase = Amps	$\frac{\text{Total Watts}}{\text{Volts x 1.73}}$

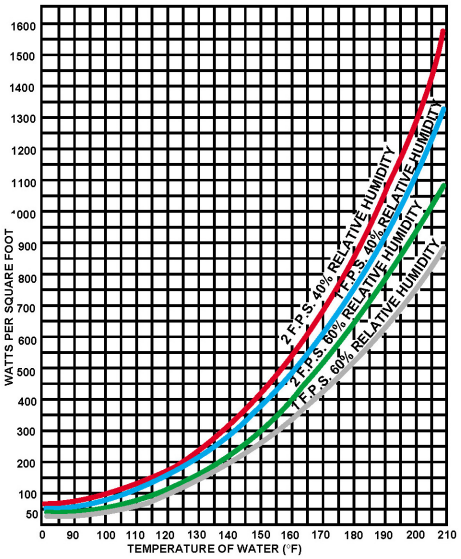
SURFACE HEAT LOSSES

Heat Losses From Insulated Surfaces

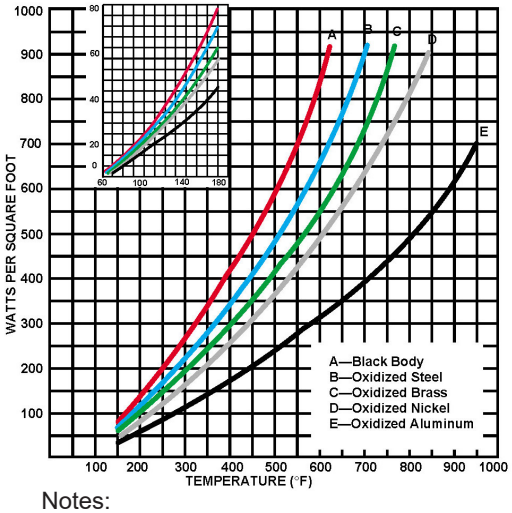


Notes:
1. Combined Radiant and Convection heat losses.
2. Based on 70°F ambient temperature.
3. Fiberglass insulation used.
3. For horizontal surfaces, use 50% of value.

Heat Losses From Water Surfaces



Heat Losses From Uninsulated Metal Surfaces



Notes:
1. Combined Radiant and Convection heat losses.
2. Based on 70°F ambient temperature.
3. For horizontal surfaces, use 50% of value

QUICK WATTAGE ESTIMATES

NOTES

MPI Morheat engineers have more than 60 years experience with industrial process heating systems

The below charts give guidelines on wattage requirements for most standard heating applications.

CAUTION

Always ask an MPI Morheat engineer to double check any values obtained from the below tables.

There can be many factors that may effect the wattage required in a system.

Kilowatts to heat - AIR

	Temperature Rise °F				
	50	100	150	200	250
CFM Air	Kilowatts to heat in one hour				
100	1.7	3.3	5	6.7	8.3
200	3.3	6.7	10.0	13.3	16.7
300	5.0	10.0	15.0	20.0	25.0
400	6.7	13.3	20.0	26.7	33.3
500	8.3	16.7	25.0	33.3	41.7
600	10.0	20.0	30.0	40.0	50.0
700	11.7	23.3	35	46.7	58.3
800	13.3	26.7	40	53.3	66.7
900	15.0	30.0	45.0	60.0	75.0
1,000	16.7	33.3	50	66.7	83.3
1,100	18.3	36.7	55	73.3	91.7
1,200	20	40	60	80.0	100.0

Note: Assuming insulated duct, incoming air at 70°F and 15psi(not compressed)

Kilowatts to heat - STEEL

	Temperature Rise °F					
	50°	100°	200°	300°	400°	500°
Lbs of Steel	Kilowatts to heat in one hour					
25	0.06	0.12	0.25	0.37	0.50	0.65
50	0.12	0.25	0.50	0.75	1.00	1.25
100	0.25	0.50	1.00	1.50	2.00	2.50
200	0.50	1.00	2.00	3.00	4.00	5.00
300	0.75	1.50	3.00	4.50	6.00	7.50
400	1.00	2.00	4.00	6.00	8.00	10.00
500	1.25	2.50	5.00	7.50	10.00	12.50
600	1.50	3.00	6.00	9.00	12.00	15.00
700	1.75	3.50	7.00	10.50	14.00	17.50
800	2.00	4.00	8.00	12.00	16.00	20.00
900	2.25	4.50	9.00	13.50	18.00	22.50
1000	2.50	5.00	10.00	15.00	20.00	25.00

Note: includes 15% safety factor

Kilowatts to heat - WATER

		Temperature Rise °F				
Amount of Liquid		20°	40°	60°	80°	100°
Cubic FT	US Gallons	Kilowatts to heat in one hour				
0.66	5	0.3	0.5	0.8	1.1	1.3
1.3	10	0.5	1.1	1.6	2.1	2.7
2.7	20	1.1	2.2	3.2	4.3	5.3
4.0	30	1.6	3.2	4.8	6.4	8
5.3	40	2.1	4	6.4	8.5	11
6.7	50	2.7	5.4	8	10.7	13
8.0	60	3.3	6.4	9.6	12.8	16
9.4	70	3.7	7.5	11.2	15	19
10.7	80	4.3	8.5	13	17	21
12.0	90	5	10	14.5	19	24
13.4	100	5.5	11	16	21	27
26.7	200	11	21	32	43	53
40	300	16	32	47	64	80
53.4	400	21	43	64	85	107
66.8	500	27	53	80	107	133

Note: For use with heating water in a tank

Kilowatts to heat - OIL

		Temperature Rise (°F)				
Amount of Oil		50°	100°	200°	300°	400°
Cubic Feet	Gallons	Kilowatts to heat in one hour				
0.5	3.74	0.3	0.5	1	2	2
1	7.48	0.5	1	2	3	4
2	14.96	1	1	2	4	6
3	22.25	2	3	6	9	12
4	29.9	2	4	8	12	16
5	37.4	3	4	9	15	20
10	74.8	5	9	18	29	40
20	149.6	9	18	37	58	80
30	222.5	13	27	56	86	120
40	299	18	36	74	115	158
50	374	22	45	93	144	197
60	449	27	54	112	172	236
65	486	29	58	121	186	255
70	524	32	62	130	200	275
75	562	34	67	140	215	294

Note: For use with heating oil in a tank