

# RENTAL PLANNER WORKSHEET

## kVA/kW AMPERAGE CHART

80% Power Factor

kVA	kW	208V	220V	240V	380V	400V	440V	450V	480V	600V	2400V	3300V	4160V
6.3	5.	17.5	16.5	15.2	9.6	9.1	8.3	8.1	7.6	6.1			
9.4	7.5	26.1	24.7	22.6	14.3	13.6	12.3	12.	11.3	9.1			
12.5	10.	34.7	33.	30.1	19.2	18.2	16.6	16.2	15.1	12.			
18.7	15.	52.	49.5	45.	28.8	27.3	24.9	24.4	22.5	18.			
25.	20.	69.5	66.	60.2	38.4	36.4	33.2	32.4	30.1	24.	6.	4.4	3.5
31.3	25.	87.	82.5	75.5	48.	45.5	41.5	40.5	37.8	30.	7.5	5.5	4.4
37.5	30.	104.	99.	90.3	57.6	54.6	49.8	48.7	45.2	36.	9.1	6.6	5.2
50.	40.	139.	132.	120.	77.	73.	66.5	65.	60.	48.	12.1	8.8	7.
62.5	50.	173.	165.	152.	96.	91.	83.	81.	76.	61.	15.1	10.9	8.7
75.	60.	208.	198.	181.	115.	109.	99.6	97.5	91.	72.	18.1	13.1	10.5
93.8	75.	261.	247.	226.	143.	136.	123.	120.	113.	90.	22.6	16.4	13.
100.	80.	278.	264.	240.	154.	146.	133.	130.	120.	96.	24.1	17.6	13.9
125.	100.	347.	330.	301.	192.	182.	166.	162.	150.	120.	30.	21.8	17.5
156.	125.	433.	413.	375.	240.	228.	208.	204.	188.	150.	38.	27.3	22.
187.	150.	520.	495.	450.	288.	273.	249.	244.	225.	180.	45.	33.	26.
219.	175.	608.	577.	527.	335.	318.	289.	283.	264.	211.	53.	38.	31.
250.	200.	694.	660.	601.	384.	364.	332.	324.	301.	241.	60.	44.	35.
312.	250.	866.	825.	751.	480.	455.	415.	405.	376.	300.	75.	55.	43.
375.	300.	1040.	990.	903.	576.	546.	498.	487.	451.	361.	90.	66.	52.
438.	350.	1220.	1155.	1053.	672.	637.	581.	568.	527.	422.	105.	77.	61.
500.	400.	1390.	1320.	1203.	770.	730.	665.	650.	602.	481.	120.	88.	69.
625.	500.	1735.	1650.	1504.	960.	910.	830.	810.	752.	602.	150.	109.	87.
750.	600.	2080.	1980.	1803.	1150.	1090.	996.	975.	902.	721.	180.	131.	104.
875.	700.	2430.	2310.	2104.	1344.	1274.	1162.	1136.	1052.	842.	210.	153.	121.
1000.	800.	2780.	2640.	2405.	1540.	1460.	1330.	1300.	1203.	962.	241.	176.	139.
1125.	900.	3120.	2970.	2709.	1730.	1640.	1495.	1460.	1354.	1082.	271.	197.	156.
1250.	1000.	3470.	3300.	3009.	1920.	1820.	1660.	1620.	1504.	1202.	301.	218.	174.
1563.	1250.	4350.	4130.	3765.	2400.	2280.	2080.	2040.	1885.	1503.	376.	273.	218.
1875.	1500.	5205.	4950.	4520.	2880.	2730.	2490.	2440.	2260.	1805.	452.	327.	261.
2188.	1750.			5280.	3350.	3180.	2890.	2830.	2640.	2106.	528.	380.	304.
2500.	2000.			6020.	3840.	3640.	3320.	3240.	3015.	2405.	602.	436.	348.
2812.	2250.			6780.	4320.	4095.	3735.	3645.	3400.	2710.	678.	491.	392.
3130.	2500.			7520.	4800.	4560.	4160.	4080.	3765.	3005.	752.	546.	435.
3750.	3000.			9040.	5760.	5460.	4980.	4880.	4525.	3610.	904.	654.	522.
4375.	3500.			10550.	6700.	6360.	5780.	5660.	5285.	4220.	1055.	760.	610.
5000.	4000.			12040.	7680.	7280.	6640.	6480.	6035.	4810.	1204.	872.	695.

## AMPACITY TABLES

### AMPACITY OF CABLES TYPES W AND G

Based on Ambient Temperature of 30°C (86°F).

Temperature rating of cable

SIZE AWG/ kcmil	60°C (140°F)			75°C (167°F)			90°C (194°F)		
	D	E	F	D	E	F	D	E	F
8	60	55	48	70	65	57	80	74	65
6	80	72	63	95	88	77	105	99	87
4	105	96	84	125	115	101	140	130	114
3	120	113	99	145	135	118	165	152	133
2	140	128	112	170	152	133	190	174	152
1	165	150	131	195	178	156	220	202	177
1/0	195	173	151	230	207	181	260	234	205
2/0	225	199	174	265	238	208	300	271	237
3/0	260	230	201	310	275	241	350	313	274
4/0	300	265	232	360	317	277	405	361	316
250	340	296	259	405	354	310	455	402	352
300	375	330	289	445	395	346	505	449	393
350	420	363	318	505	435	381	570	495	433
400	455	392	343	545	469	410	615	535	468
500	515	448	392	620	537	470	700	613	536

The ampacities under subheading D are the allowable ampacity for single-conductor Types W cable only, where the individual conductors are not installed in raceways and are not in physical contact with each other except in lengths not to exceed 24 inches (610 mm) where passing through the wall of an enclosure.

1. Ampacities at ambient temperatures other than those shown in the tables by means use the following formula:

$$I_2 = I_1^{1/8} \sqrt{\frac{TC - TA_2 - \text{DELTA TD}}{TC - TA_1 - \text{DELTA TD}}}$$

Where,

- $I_1$  = Ampacity from tables at ambient  $TA_1$ ,
- $I_2$  = Ampacity at desired ambient  $TA_2$ ,
- TC = Conductor temperature in degrees C,
- $TA_1$  = Surrounding ambient from tables in degrees C,
- $TA_2$  = Desired ambient in degrees C,
- DELTA TD = Dielectric loss temperature rise.

The ampacities under subheading E apply to 2-conductor cables and other multi-conductor cables connected to utilization equipment so that only 2 conductors are current carrying. The ampacities under subheading F apply to 3-conductor cables and other multi-conductor cables connected to utilization equipment so that only 3 conductors are current carrying.

**NOTE:** Ultimate Insulation Temperature. In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method used, or the number of conductors that the limiting temperature of the conductors will be exceeded.

**NOTE:** The ampacity tables shown in this brochure are for general reference only. Cable installation conditions vary and require full compliance with the National Electrical Code.

# CHILLER RENTAL CHECKLIST

For your reference, the following list of questions are among the additional factors your Cat® Rental Power dealer will consider when evaluating your application.

## Questions to answer:

How long will you need the rental? \_\_\_\_\_

What capacity (tonnage) do you require? \_\_\_\_\_

What supply and return temperature does your system require? \_\_\_\_\_

What chilled water flow rate do you require? \_\_\_\_\_

What kind of water will be running through the chiller? \_\_\_\_\_

Will there be any contaminant's in the water? \_\_\_\_\_

How far away will the rental be from the point of connection? \_\_\_\_\_

How much water pressure will be on the chiller? \_\_\_\_\_

Do you have connections for a temporary chiller, if so what size? \_\_\_\_\_

Where are the connections located in the building? \_\_\_\_\_

What is your supply voltage? \_\_\_\_\_

Do you have a spare breaker, or will we tie into an existing breaker? \_\_\_\_\_

Will the rental be running along with other existing chillers or alone? \_\_\_\_\_

**NOTE:** This is intended as a guideline and should provide most information required for proper installation of a Cat Rental chiller, but should not preclude a job site visit by a competent installing contractor, if necessary.

## TEMPERATURE CONTROL EQUIPMENT/AUXILIARY EQUIPMENT

Sizes of chillers needed: \_\_\_\_\_

Transportation arrangements: \_\_\_\_\_

Required response time: \_\_\_\_\_

Auxiliary equipment needed (hose, duct, etc.): \_\_\_\_\_

Is company check needed for chiller pick-up? Yes \_\_\_\_\_ No \_\_\_\_\_

(Not applicable if arrangements are made for pre-approved credit.)

# COOLING LOAD CALCULATION

If you do not know your cooling load, the following information will help your Cat Rental dealer calculate your load and your cooling equipment needs:

Fluid Cooling Applications	English	Metric
Liquid temperature entering process	_____ °F	_____ °C
Liquid temperature leaving process	_____ °F	_____ °C
Flow rate of process liquid	_____ gpm	_____ L/s
Percent brine content (if applicable)	_____ %	_____ %
Pressure loss through chilled water system	_____ psi	_____ kPa
Outside air temperature	_____ °F	_____ °C

Air Conditioning Applications	English	Metric
Size of space to be cooled	_____ ft <sup>2</sup>	_____ m <sup>2</sup>
Height of space	_____ ft	_____ m
Space temperature desired	_____ °F	_____ °C
Humidity desired	_____ %	_____ %
Expected temperature outside	_____ °F	_____ °C
Expected relative humidity outside	_____ %	_____ %
Number of people in structure	_____	_____
Type of structure and insulation (e.g., masonry, wood-frame, pole building, tent)	_____	_____

Activity of people in structure (Describe briefly what people will be doing, e.g., office/clerical, light manufacturing, heavy physical labor, maintenance, event spectators, dancing) \_\_\_\_\_

Equipment used in structure (List equipment that contributes significant heat, e.g., computers/electronics, intense incandescent lighting, industrial vehicles/forklifts, industrial processes) \_\_\_\_\_

*NOTE: When estimating outdoor conditions, plan for the highest temperature and humidity likely to occur during the term of the rental. This will ensure your rental equipment is sized for the most taxing conditions.*

## TEMPERATURE CONVERSION CHART FAHRENHEIT TO CELSIUS

(Celsius temperatures shown are rounded to the nearest degree)

°F	°C	°F	°C	°F	°C	°F	°C
0	-18	26	-3	50	10	76	24
1	-17	27	-3	51	11	77	25
2	-17	28	-2	52	11	78	26
3	-16	29	-2	53	12	79	26
4	-16	30	-1	54	12	80	27
5	-15	31	-1	55	13	81	27
6	-14	32	0	56	13	82	28
7	-14	33	1	57	14	83	28
8	-13	34	1	58	14	84	29
9	-13	35	2	59	15	85	29
10	-12	36	2	60	16	86	30
11	-12	37	3	61	16	87	31
12	-11	38	3	62	17	88	31
13	-11	39	4	63	17	89	32
14	-10	40	4	64	18	90	32
15	-9	41	5	65	18	91	33
16	-9	42	6	66	19	92	33
17	-8	43	6	67	19	93	34
18	-8	44	7	68	20	94	34
19	-7	45	7	69	21	95	35
20	-7	46	8	70	21	96	36
21	-6	47	8	71	22	97	36
22	-6	48	9	72	23	98	37
23	-5	49	9	73	23	99	37
24	-4			74	24	100	38
25	-4			75	24		

To convert any Fahrenheit temperature not shown to a Celsius temperature, subtract 32° and multiply by 0.5556.  
To convert a temperature difference from degrees Fahrenheit (°F) to degrees Celsius (°C), multiply by 0.5556.  
Values provided in this guide are in the English inch-pound (I-P) system.

## CONVERSION FORMULAS

The following factors can be used to convert from English to the most common SI Metric values.

MEASUREMENT	MULTIPLY THIS ENGLISH VALUE	BY	TO OBTAIN THIS METRIC VALUE
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Kilowatts (kW)	No Change	Kilowatts (kW)
	Horsepower (hp)	0.7457	Kilowatts (kW)
Flow Rate	Gallons/Minute (gpm)	0.0631	Liters/Second (L/s)
Length	Feet (ft)	304.8	Millimeters (mm)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lb)	0.4536	Kilograms (kg)
Velocity	Feet/Second (fps)	0.3048	Meters/Second (m/s)
Pressure Drop	Feet of Water (ft)	2.090	Kilopascals (kPa)
	Pounds/Sq. Inch (psi)	6.895	Kilopascals (kPa)
Volume	Square Feet (ft <sup>2</sup> )	0.09289	Square Meters (m <sup>2</sup> )

### English – English Conversions

1 ton = 12,000 BTU per hour      1 psi = 2.31 Feet Water Column

### Formulas - English

$$1. \text{ Tons} = \text{GPM} \times \frac{(T_i - T_o)}{24}$$

GPM = Gallons per minute to application  
 $T_i$  = Temperature of water from application  
 $T_o$  = Temperature of water to application

$$2. \text{ BTU per hour} = \text{CFM} \times 1.08 \times (T_i - T_o)$$

BTU per hour = British Thermal Units per hour  
 CFM = Cubic Feet Per Minute Airflow  
 $T_i$  = Temperature of air from application  
 $T_o$  = Temperature of air to application

# CHILLER OUTAGE WORKSHEET: IN-HOUSE CHILLER INFORMATION

In order to ensure a quick, accurate response in the event of an emergency, use this worksheet to record information about your cooling installation. List needs in order of priority, and whether each is critical or non-critical.

Prioritized list of cooling loads: \_\_\_\_\_

Equipment name, model, and serial number: \_\_\_\_\_

Tonnage/BTU per hour or kW/kCal: \_\_\_\_\_

Physical location of cooling loads (verbal description, distance from entry point, etc.):

\_\_\_\_\_

\_\_\_\_\_

Location where schematic drawings, electrical diagrams, Rental Planner Worksheet and other instructions are kept: \_\_\_\_\_

List electrical load connections which must be isolated from main breaker: \_\_\_\_\_

\_\_\_\_\_

## KEY CONTACT TELEPHONE NUMBERS

### CONTACT

### OFFICE

### HOME

In-house operations/  
maintenance staff:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Person responsible for computers  
security/data recovery/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Person in charge during  
power outages/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Supplying utility or chiller  
contact/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Generator set dealership  
contact/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Person responsible for equipment  
hookup/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Person responsible for equipment  
operation/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Electrical engineer or contractor,  
if necessary:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Mechanical /  
contractor/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Fuel supplier/alternate:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

# IN-HOUSE ELECTRICAL INFORMATION

Prioritized list of critical loads:

EQUIPMENT	VOLTAGE/AMPERAGE
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Physical location of critical loads: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Location where schematic drawings, electrical diagrams, Rental Planner WorkSheet and other instructions are kept: \_\_\_\_\_

Loads to isolate from main breaker: \_\_\_\_\_

\_\_\_\_\_

## GENERATOR SETS/AUXILIARY EQUIPMENT

Sizes of generator sets needed: \_\_\_\_\_

Transportation arrangements: \_\_\_\_\_

\_\_\_\_\_

Time needed to locate generator sets on site: \_\_\_\_\_

Auxiliary equipment needed: \_\_\_\_\_

\_\_\_\_\_

Is company check needed for generator set pick-up? Yes \_\_\_\_\_ No \_\_\_\_\_

(Not applicable if arrangements are made for pre-approved credit)

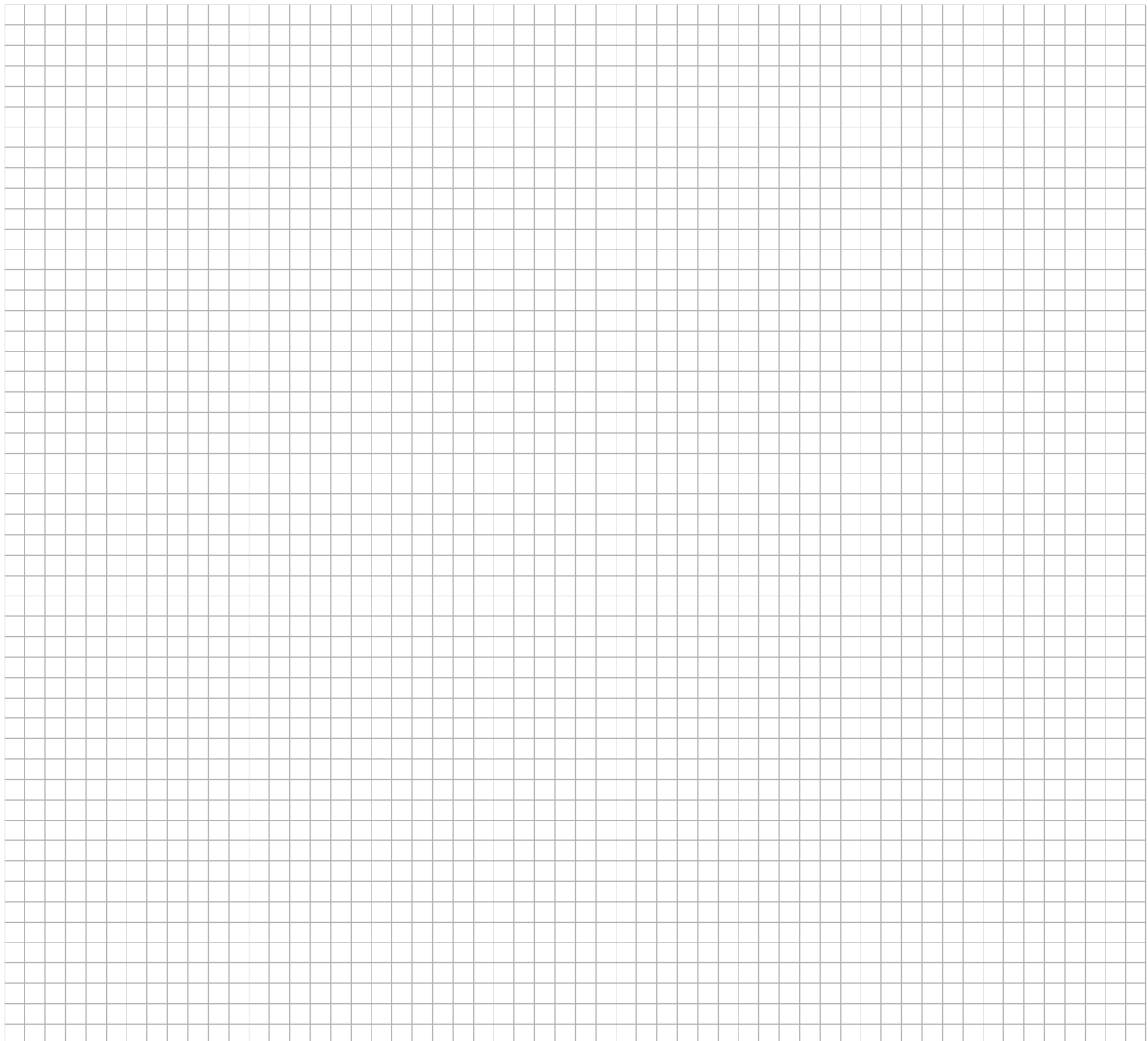
Generator set features to be specified (e.g., sound-attenuation, etc): \_\_\_\_\_

\_\_\_\_\_

## USEFUL ELECTRICAL FORMULAS

TO OBTAIN	SINGLE PHASE*	THREE PHASE*
Kilowatts	$\frac{V \times I \times pf}{1000}$	$\frac{1.732 \times V \times I \times pf}{1000}$
kVA	$\frac{V \times I}{1000}$	$\frac{1.732 \times V \times I}{1000}$
Horsepower require when generator kW unkown (if generator efficiency is unknown, use 0.93)	$\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$	$\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$
kW inut when motor hp known (if motor efficiency unkown, use 0.85 x hp)	$\frac{hp \times 0.746}{\text{Efficiency (Motor)}}$	$\frac{hp \times 0.746}{\text{Efficiency (Motor)}}$
Amperes when motor hp known	$\frac{hp \times 0.746}{V \times pf \times \text{Efficiency}}$	$\frac{hp \times 0.746}{1.732 \times V \times pf \times \text{Efficiency}}$
Amperes when kW known	$\frac{kW \times 1000}{V \times pf}$	$\frac{kW \times 1000}{1.732 \times V \times pf}$
Amperes when kVA known	$\frac{kVA \times 1000}{V}$	$\frac{kVA \times 1000}{1.732 \times V}$

\* Alternating Current



**CAT RENTAL POWER.  
GLOBAL RESOURCES.  
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FAST RESPONSE.**

Your local Cat Rental Power dealer is available 24/7 to answer your questions about Cat Electric Power and Temperature Control Systems, contingency planning, or customer service and support solutions from over 1,800 locations worldwide. To contact the Cat dealer nearest you, call **1-800-RENTCAT**, or the subsidiary office in your corner of the world.

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