

RECOMMENDED CONDENSING UNIT CAPACITY FOR WALK-IN COOLERS

35°F TEMPERATURE

9 feet height, 95°F ambient temperature, 4" insulation.

Outside Dimensions Ft.	BTU/Hr. For 16-Hr. Operation	
	Average Service	Heavy Service
6 x 5	2,580	3,180
6 x 6	2,960	3,540
7 x 5	2,930	3,540
7 x 6	3,380	4,080
7 x 7	3,790	4,620
8 x 5	3,240	3,920
8 x 6	3,710	4,530
8 x 7	4,200	5,170
8 x 8	4,680	5,680
9 x 6	4,080	4,960
9 x 7	4,600	5,640
9 x 8	5,080	6,260
9 x 9	5,580	6,920
10 x 6	4,450	5,450
10 x 7	6,010	6,200
10 x 8	5,520	6,880
10 x 9	6,080	7,520
10 x 10	6,630	8,150
11 x 6	4,820	5,910
11 x 7	5,380	6,630
11 x 8	6,000	7,350
11 x 9	6,520	8,050
11 x 10	7,100	8,800
12 x 6	5,150	6,350
12 x 8	6,400	7,700
12 x 10	7,590	9,380
12 x 12	8,800	10,800

Outside Dimensions Ft.	BTU/Hr. For 16-Hr. Operation	
	Average Service	Heavy Service
14 x 8	7,300	9,050
14 x 10	8,640	10,900
14 x 12	9,720	12,300
14 x 14	10,800	13,700
16 x 8	8,140	10,000
16 x 10	9,340	12,000
16 x 12	10,700	13,450
16 x 14	12,000	15,000
16 x 16	13,100	16,600
18 x 10	10,300	13,000
18 x 12	11,700	14,800
18 x 14	13,100	16,400
18 x 16	14,400	17,400
18 x 18	15,800	19,600
20 x 10	11,300	13,700
20 x 12	12,800	15,700
20 x 14	14,300	17,600
20 x 16	15,600	19,400
20 x 18	17,000	21,100
20 x 20	18,700	22,700
22 x 12	13,700	17,100
22 x 14	15,300	18,900
22 x 16	16,800	20,800
22 x 18	18,300	22,000
24 x 12	14,700	18,200
24 x 14	16,200	20,300
24 x 16	17,300	22,100
24 x 18	19,300	24,000

Note: Heat gain based on insulation with "K" factor of .25. Required capacity must be corrected for different "K" factor, or different thickness of insulation.

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RECOMMENDED CONDENSING UNIT CAPACITY FOR WALK-IN COOLERS

LOW TEMPERATURE – HOLDING LOAD ONLY

9 feet height, 90°F ambient temperature.

Outside Dimensions in Feet		BTU/Hr. For 18-Hr. Operation		
Length	Width	-20°F Storage	-10°F Storage	-0°F Storage
		8" Insulation	6" Insulation	6" Insulation
6	6	4,000	4,500	3,750
6	10	5,700	5,800	5,050
7	7	5,000	5,300	4,650
7	10	6,400	6,450	5,800
8	8	5,900	6,200	5,500
8	12	7,200	7,650	7,000
9	9	6,700	7,000	6,300
10	10	7,600	7,900	7,100
10	14	9,200	9,600	8,700
12	12	9,400	9,900	9,600
12	16	11,300	11,800	10,900
14	14	11,400	12,000	11,200
14	18	13,300	13,900	12,700
16	16	13,400	14,000	12,900
16	20	15,100	16,000	14,900
18	18	15,200	16,100	15,000
18	20	16,100	17,200	15,600
20	20	16,800	18,400	16,600

Note: Heat gain based on insulation with "K" factor of .25. Required capacity must be corrected for different "K" factor, or different thickness of insulation.

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The capacities given are for average applications. If the load is unusual, these tables should not be used. The low temperature tables do not include any allowance for a freezing load and if a product is to be frozen, additional capacity will be required.



HORSEPOWER RATINGS

Ratings of controls listed herein are in amperes, and correspond generally to the values for various horsepower as shown in this chart. Full load ratings are taken from the National Electrical Code, 1978 edition; locked motor ratings are 6 time full load rating (ac) or 10 times full load rating (dc).

All motors do not necessarily come within the maximum ampere ratings shown in the table, and control devices must be used which have a rating equal to, or greater than, the actual motor running and starting currents.

Approximate Horsepower	120V		240V	
	Full Load	Locked Rotor	Full Load	Locked Rotor
1/6 ac	4.4	26.4	2.2	13.2
1/6 dc	—	—	—	—
1/4 ac	5.8	34.8	2.9	17.4
1/4 dc	3.1	31.0	1.6	16.0
1/3 ac	7.2	43.2	3.6	21.6
1/3 dc	4.1	41.0	2.0	20.0
1/2 ac	9.8	58.8	4.9	29.4
1/2 dc	5.4	54.0	2.7	27.0
3/4 ac	13.8	82.8	6.9	41.4
3/4 dc	7.6	76.0	3.8	38.0
1 ac	16.0	96.0	8.0	48.0
1 dc	9.5	95.0	4.7	47.0
1 1/2 ac	20.0	120.0	10.0	60.0
1 1/2 dc	13.2	132.0	6.6	66.0
2 ac	24.8	144.0	12.0	72.0
2 dc	17.0	170.0	8.5	85.0
3 ac	34.0	204.0	17.0	102.0
3 dc	25.0	250.0	12.2	122.0

NEMA STANDARD CLASSIFICATION CODE FOR ENCLOSURES

NEMA 1 – General Purpose. For indoor protection, where conditions are not unusually severe.

NEMA 2 – Driptight. Designed to exclude falling moisture or dirt, particularly applicable to cooling rooms, laundries, etc., where condensation is prevalent. For indoor use.

NEMA 3 – Weather Resistant (weatherproof). For outdoor use; designed to withstand all normal exposure to natural elements. Controls mounted on pullout racks for easy access. With rain hood and weather seals.

NEMA 4 – Watertight. Withstands water pressure from 1 inch hose nozzle, 65 gallons per minute, from distance of not less than 10 feet for five minutes. Suitable for maritime applications, breweries, etc.

NEMA 5 – Dust-tight. Equipped with dust-tight gaskets. Suitable for mills and other high dust atmospheres.

NEMA 6 – Submersible. For submerged operation under specified pressures and time.

NEMA 7 – Hazardous Locations, National Electrical Code Class 1 (circuit breaks in air).

NEMA 8 – Hazardous Locations, National Electrical Code Class 1 (circuit breaks immersed in oil).

NEMA 9 – Hazardous Locations, National Electrical Codes Class 2.

NEMA 10 – Explosion-proof. Meets U.S. Bureau of Mines requirements for explosive atmospheres.

NEMA 11 – Acid or Fume Resistant. Provides for immersion of enclosed equipment in oil.

NEMA 12 – Industrial Use. Excludes oils, dust, moisture, to satisfy individual requirements.



APPROXIMATE PRESSURE CONTROL SETTINGS

Vacuum - Inches of Mercury - ()

Pressure - Pounds Per Square Inch Gage - Bold Figures

Application	12/134		22		502/AZ-50(507)	
	Out	In	Out	In	Out	In
Ice Cube Maker --Dry Type Coil	4	17	16	37	22	45
Sweet Water Bath --Soda Fountain	21	29	43	56	52	66
Beer, Water, Milk Cooler, Wet Type	19	29	40	56	48	66
Ice Cream Trucks, Hardening Rooms	2	15	13	34	18	41
Eutectic Plates, Ice Cream Truck	1	4	11	16	16	22
Walk-In, Defrost Cycle	14	34	32	64	40	75
Reach In, Defrost Cycle	19	36	40	68	48	78
Vegetable Display, Defrost Cycle	13	35	30	66	38	77
Vegetable Display Case --Open Type	16	42	35	77	44	89
Beverage Cooler, Blower Dry Type	15	34	34	64	42	75
Retail Florist -- Blower Coil	28	42	55	77	65	89
Meat Display Case --Defrost Cycle	17	35	37	66	45	77
Meat Display Case --Open Type	11	27	27	53	35	63
Dairy Case --Open Type	10	35	26	66	33	77
Frozen Food-- Open Type	(7)	5	4	17	8	24
Frozen Food--Open Type--Thermostat	2°F	10°F	--	--	--	--
Frozen Food--Closed Type	1	8	11	22	16	29

1. Determine suction pressure with accurate gauge at evaporator outlet. On close coupled installations, suction pressure may be read at compressor suction connection.
2. From refrigerant pressure- temperature tables, determine saturation temperature at observed suction pressure.
3. Measure temperature of suction gas at Thermo Valve Remote Bulb Location.
4. Subtract saturation temperature read from tables in step No.2 from temperature measured in step No.3. Difference is superheat of suction gas.

LOADS ON SALAD PANS--B.T.U./HR

Type Area Sq. Ft.	Open Type		Closed Type	
	90°F	100°F	90°F	100°F
6	660	780	534	630
8	880	1040	710	840
10	1100	1300	890	1050
12	1320	1560	1070	1260
14	1540	1820	1250	1470
16	1760	2080	1430	1680
18	1980	2340	1600	1890
20	2200	2600	1780	2100
22	2420	2860	1960	2310
24	2640	3120	2140	2520

HEAT GAINS

Source of Heat	BTU/HR
People at Rest	400
People at Work	500
Lights and Heating Devices	3.4/Watt
Motors 2 HP and Smaller	3600/HP
Motors 3 HP and Larger	3000/HP
Steam Tables per Sq. Ft. of Top Surface	2,000
Restaurant Coffee Urns	10,000

BACK BAR LOADS

(16 HR. BASIS)

2" INSULATION, 50° T.D.

Case	BTU/HR
4'	500
6'	700
8'	900
10'	1000

EST. COOLING REQUIREMENTS

SQ. FT. PER TON

Application	Average Load
Residential	600
Banks	240
Barber	250
Bars and Taverns	9*
Beauty	180
Churches	20*
Department Stores	
Basement	350
Main Floor	300
Upper Floor	400
Dress	280
Drug	150
Groceries-Supermarket	350
Hospital Room	280
Hotels-Public Service	220
Jewelry	220
Office Building	340
Office-Small Suite	280
Restaurant	200
Shoe	220
Theaters & Auditoriums	20*
Variety	220

*Person /Ton



ENGINEERING DATA

GENETRON REFRIGERANTS PRESSURE TEMPERATURE CHART

°F	°C	MP 39 (401A)				MP 66 (401B)		
		134a	12	Bubble	Dew	500	Bubble	Dew
-40	-40.0	14.7	11.0	8.1	13.2	7.6	6.5	11.8
-35	-37.2	12.3	8.4	5.1	10.7	4.6	3.3	9.1
-30	-34.4	9.7	5.5	1.7	7.9	1.2	.2	6.1
-25	-31.7	6.8	2.3	1.0	4.8	1.2	2.1	2.8
-20	-28.9	3.6	0.6	3.0	1.4	3.2	4.3	.5
-15	-26.1	0.0	2.4	5.2	1.2	5.4	6.6	2.5
-10	-23.3	2.0	4.5	7.7	3.3	7.8	9.2	4.7
-5	-20.6	4.1	6.7	10.3	5.5	10.4	12.0	7.1
0	-17.8	6.5	9.1	13.2	8.0	13.3	15.1	9.7
5	-15.0	9.1	11.8	16.3	10.7	16.4	18.4	12.6
10	-12.2	12.0	14.6	19.7	13.7	19.7	22.0	15.8
15	-9.4	15.1	17.7	23.4	16.9	23.3	25.9	19.2
20	-6.7	18.4	21.0	27.4	20.4	27.2	30.1	23.0
25	-3.9	22.1	24.6	31.7	24.2	31.5	34.6	27.0
30	-1.1	26.1	28.4	36.4	28.3	36.0	39.5	31.4
35	1.7	30.4	32.5	41.3	32.8	40.8	44.8	36.1
40	4.4	35.0	36.9	46.6	37.6	46.0	50.4	41.1
45	7.2	40.1	41.7	52.4	42.7	51.6	56.4	46.6
50	10.0	45.4	46.7	58.5	48.2	57.5	62.8	52.4
55	12.8	51.2	52.0	65.0	54.1	63.9	69.6	58.7
60	15.6	57.4	57.7	71.9	60.4	70.6	76.9	65.4
65	18.3	64.0	63.7	79.3	67.2	77.8	84.7	72.5
70	21.1	71.1	70.2	87.1	74.4	85.4	92.9	80.1
75	23.9	78.6	76.9	95.4	82.1	93.4	102.	88.2
80	26.7	86.7	84.1	104	90.2	102	111	96.8
85	29.4	95.2	91.7	114	98.9	111	121	106
90	32.2	104	99.7	123	108	121	131	116
95	35.0	114	108	134	118	131	142	126
100	37.8	124	117	145	128	141	153	137
105	40.6	135	127	156	139	152	166	148
110	43.3	146	136	169	151	164	178	160
115	46.1	158	147	181	163	176	192	173
120	48.9	171	158	195	176	189	206	187
125	51.7	185	169	209	189	203	220	201
130	54.4	199	181	224	203	217	236	216
135	57.2	214	193	239	218	232	252	231
140	60.0	229	207	255	234	247	269	248
145	62.8	246	220	272	250	264	287	265
150	65.6	263	235	290	267	281	305	283

BEARINGS

Bearing temperatures are a major factor in determining the useful life of a motor. The following are some typical "expected" life hours at various bearing temperatures.

SLEEVE BEARING

Bearing Temperature		Expected Motor Life (single oiling)
104°F	40°C	100,000
120°F	49°C	50,000
140°F	60°C	40,000
160°F	71°C	30,000
180°F	82°C	20,000

BALL BEARING

Bearing Temperature		Expected Motor Life (single oiling)
104°F	40°C	80,000 hrs.
120°F	49°C	40,000 hrs.
140°F	60°C	20,000 hrs.
160°F	71°C	10,000 hrs.
180°F	82°C	6,000 hrs.
200°F	94°C	4,000 hrs.
212°F	100°C	3,000 hrs.



GENETRON REFRIGERANTS PRESSURE TEMPERATURE CHART

°F	22	407C		502	404A*	AZ-50 (507)	HP 80 (402A)		409A	
		Bubble	Dew				Bubble	Dew	Bubble	Dew
-40	0.5	2.7	4.6	4.1	4.8	5.5	6.8	6.3	5.2	13.2
-35	2.6	5.1	0.9	6.5	7.4	8.2	9.6	9.1	1.9	10.7
-30	4.9	7.7	1.6	9.2	10.2	11.1	12.6	12.1	0.9	7.9
-25	7.4	10.5	3.9	12.1	13.3	14.3	16.0	15.4	2.9	4.8
-20	10.1	13.7	6.4	15.3	16.7	17.8	19.6	18.9	5.1	1.4
-15	13.2	17.1	9.2	18.8	20.4	21.7	23.6	22.9	7.4	1.2
-10	16.4	20.9	12.3	22.6	24.5	25.8	27.9	27.1	10.0	3.2
-5	20.0	25.0	15.7	26.7	28.9	30.3	32.6	31.7	12.9	5.5
0	23.9	29.5	19.4	31.1	33.6	35.2	37.6	36.7	16.0	8.0
5	28.2	34.3	23.4	35.9	38.8	40.5	43.1	42.1	19.3	10.6
10	32.8	39.5	27.8	41.0	44.3	46.1	49.0	48.0	22.9	13.6
15	37.7	45.2	32.6	46.5	50.3	52.2	55.3	54.2	26.8	16.8
20	43.0	51.3	37.8	52.5	56.7	58.8	62.1	60.9	31.0	20.0
25	48.7	57.8	43.4	58.8	63.6	65.8	69.3	68.1	35.5	24.0
30	54.9	64.8	49.4	65.6	71.0	73.3	77.1	75.8	40.4	28.0
35	61.5	72.4	56.0	72.8	78.9	81.3	85.4	84.0	45.6	32.4
40	68.5	80.4	63.0	80.5	87.3	89.8	94.2	92.8	51.1	37.1
45	76.0	89.0	70.6	88.7	96.3	98.9	104	102	57.1	42.1
50	84.0	98.2	78.7	97.4	106	109	114	112	63.4	47.6
55	92.5	108	87.3	107	116	119	124	123	70.1	53.4
60	102	118	96.7	116	127	130	136	134	77.3	59.6
65	111	129	107	127	138	141	147	146	84.9	66.2
70	121	141	117	138	151	154	160	158	92.9	73.2
75	132	154	129	149	163	167	173	171	101.5	80.7
80	144	167	140	161	177	180	187	185	110.5	88.7
85	156	180	153	174	191	195	202	200	120.0	97.2
90	168	195	167	187	206	210	218	215	130.0	106.2
95	182	210	181	201	222	226	234	232	140.6	115.7
100	196	227	196	216	239	244	251	249	151.7	125.8
105	211	244	212	232	257	252	269	267		
110	226	261	229	248	275	281	288	286	175.7	147.6
115	243	280	247	265	294	301	308	305		
120	260	300	266	283	315	322	338	326	202.1	171.9
125	278	320	285	301	336	344	350	347		
130	297	342	306	321	358	368	372	370	231.1	198.9
135	316	365	328	341	381	393	396	393		
140	337	388	351	363	406	419	420	418	262.7	228.6
145	359	413	375	385	431	446	446	443		
150	381	438	401	408	457	475	472	470	297.1	261.3

* Bubble Pressure

CONVERSIONS

1 Ton = 12,000 BTU per hour

1 Gal. Water = 8.33 lbs.

1 lb. = 7000 Grains

1 Watt = 3.42 BTU per hour

1 Kilowatt = 1000 watts

NO AIR CHANGES (N) = $\frac{60 \times \text{CFM}}{\text{CU. FT.}}$

MOTOR EFF. = $\frac{\text{HP} \times 746 \times 100\%}{\text{KW INPUT} \times 1000}$

$\Delta\text{TD} = \frac{\text{SENSIBLE HEAT}}{\text{CFM} \times 1.08}$

SH BTU/HR = CFM x 1.08 x ΔTD

LH BTU/HR = CFM x 0.68 x GR./# AIR

1 H.P. = 746 watts

1 H.P. = 2545 BTU per hour

$\text{C}^\circ = \frac{5}{9} \times (\text{F}^\circ - 32^\circ)$

$\text{F}^\circ = \frac{9}{5} \times (\text{C}^\circ + 32^\circ)$

$\text{CFM} = \frac{\text{N} \times \text{CU. FT.}}{60}$

$\text{SHR} = \frac{\text{SENSIBLE HEAT (BTU/HR)}}{\text{TOTAL HEAT (BTU/HR)}}$





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