Multi Circuiting

LRC's Air Cooled Condensers units are available with separate refrigeration circuits within a single condenser that can be sized to meet the needs of your specific applications. Multi-circuiting enables a single condenser to service several refrigeration systems, which saves money by eliminating multiple small condensing units.

Individual circuits within the condenser are manufactured to ensure an even distribution of refrigerant throughout each zone. Each circuit is supplied with a separate inlet and outlet connection that is individually labeled for easy installation.

When ordering a multi-circuited condenser, please be sure the system numbers are in numerical sequence, as the circuit connections will be installed in order. For example, when facing the header end of the unit, circuit #1 will be on the left side of the header, with all the other circuits following in sequence to the right.

The example below will assist you in selecting a multi-circuited condenser. LRC's Application Engineering department can help you lay out a system to meet the needs of your project. Call us today, 562-944-1969, and we'll be happy to help you design the system you need.

Example

4 Refrigerant systems
Compressor type – suction cooled
Altitude – 4,000 feet
Ambient temperature - 95°F
See spreadsheet below for Refrigerant Type, Evaporator Temperature, Condensing Temperature, and Compressor Capacity for each system.

Calculation procedure

Step 1

Set up a spreadsheet similar to Multi-circuiting Equation Example, and input your system data into Columns A, B, C, D and E.

Step 2

As the Total Heat Rejection value is not given, select from Table D the heat rejection value for each compressor and input the data into Column F. (If the compressor's THR is available, enter the value into Column E and enter 1.0 into Column F.)

Capacities (Table B)

Model Number	Fan Qty	# of Cir.	Max. # Cir.	Cap./ Cir. (lbs)	BTUH/ Cir. 1° TD	Condenser capacities for R22. 1° TD	10° TD	15° TD	20° TD	25° TD	30° TD
Single Wide Units											
ACC-5	1	3	35	1.1	94.0	3.29	32.9	49.3	65.8	82.2	98.7
ACC-6	1	3	35	1.1	102.9	3.60	36.0	54.0	72.0	90.0	108.0
ACC-7	1	3	35	1.7	167.3	4.35	43.5	65.2	87.0	108.7	130.4
ACC-8	1	4	35	1.7	178.8	4.65	46.5	69.7	93.0	116.2	139.5
ACC-9	1	4	35	1.7	143.4	5.02	50.2	75.3	100.4	125.5	150.6
ACC-11	2	5	35	1.3	188.6	6.60	66.0	99.0	132.0	165.0	198.0
ACC-13	2	7	35	1.4	301.5	7.84	78.4	117.6	156.8	196.0	235.2
ACC-15	2	7	35	1.4	333.5	8.67	86.7	130.1	173.4	216.7	260.2
ACC-16	2	7	35	1.8	359.2	9.34	93.4	140.1	186.8	233.5	280.2
ACC-17	2	8	35	1.6	288.6	10.10	101.0	151.5	202.0	252.5	303.0
ACC-19	2	8	35	2.0	304.0	10.64	106.4	159.1	212.8	266.0	319.2
ACC-21	2	10	35	1.7	270.7	11.64	116.4	174.6	232.8	291.0	349.2
ACC-23	3	10	35	1.9	500.4	13.01	130.1	195.1	260.2	325.2	390.3
ACC-24	3	11	35	1.7	539.2	14.02	140.2	210.3	280.4	350.5	420.6
ACC-28	3	13	35	1.8	458.3	16.04	160.4	240.6	320.8	401.0	481.2
ACC-30	4	13	35	1.4	667.3	17.35	173.5	260.2	347.0	433.7	520.4
ACC-37	4	16	35	1.5	577.1	20.20	202.0	303.0	404.0	505.0	606.0
ACC-40	4	17	35	1.8	611.1	21.39	213.9	320.8	427.8	534.7	641.7
ACC-46	5	18	35	1.7	887.7	23.08	230.8	346.2	461.6	577.0	692.4
ACC-50	5	21	35	1.8	777.4	27.21	272.1	408.1	544.2	680.2	816.3
Double Wide Units											
ACC-25	4	5	70	2.5	190.6	13.34	133.4	200.1	266.8	333.5	400.2
ACC-31	4	7	70	2.7	334.2	17.38	173.8	260.7	347.6	434.5	521.4
ACC-35	4	7	70	4.6	364.8	18.97	189.7	284.5	379.4	474.2	569.1
ACC-44	6	10	70	2.8	501.2	26.06	260.6	390.9	521.2	651.5	781.8
ACC-51	6	11	70	3.4	539.2	28.04	280.4	420.6	560.8	701.0	841.2
ACC-57	6	13	70	3.6	457.7	32.04	320.4	480.6	640.8	801.0	961.2
ACC-61	8	13	70	2.8	667.7	34.72	347.2	520.8	694.4	868.0	1041.6
ACC-75	8	16	70	3.1	578.6	40.50	405.0	607.5	810.0	1012.5	1215.0
ACC-80	8	17	70	3.6	613.9	42.97	429.7	644.5	859.4	1074.2	1289.1
ACC-93	10	18	70	3.4	898.7	46.73	467.3	700.9	934.6	1168.2	1401.9
ACC-100	10	21	70	3.7	777.3	54.41	544.1	816.1	1088.2	1360.3	1632.3

All capacities are in MBH (MBH x 1000 = BTUH)
For R12 or R134A multiply above rating by .95
For R502,R404, or R507 multiply above rating by .98

Standard condenser circuiting are based on: 25ºF TD for R22
20ºF TD for R12 or R134A
15ºF TD for R404A, R502 or R507

Multi-Circuit Equation Example

Syst. No.	Refrig. Type	Evap. Temp.	F	BTUH	X	Heat rej. factor	X	Altitude		Factor		Design T.D.	=	Corr. THR BTUH/1 T.D.		(Table B)	=	Required	Required	N Actual T.D.
1	R-22	+25	110	235,000	x	1.32	x	1.1		1.00		15	=	22,748		613.9	=	37.1	38	14.63
2	R-22	+20	110	61,000	x	1.33	x	1.1		1.00		15	=	5,950		613.9	=	9.7	10	14.54
3	R-134A	-10	105	31,000	x	1.47	x	1.1		0.95		10	=	5,277		613.9	=	8.6	9	9.55
4	R-22	-20	105	46,000	x	1.54	x	1.1		1.00		10	=	7,792		613.9	=	12.7	13	9.76
												Total	=	41,766				Total =	70	

41,766 / 1,000 = 41.8 MBH/ T.D.

Step 3
From Table C, select the appropriate altitude correction factor and enter it into Column G.

Step 4
Using the notes below Table B, obtain the refrigerant capacity correction factor and enter it into Column H.

Step 5
Calculate the Design Condensing T.D. for each circuit using the following equation:
Design Condensing Temperature – Ambient Temperature = Design Condensing T.D.
Enter the Design Condensing T.D. value in Column I.

Step 6
Calculate the Corrected THR at 1 F by multiplying Columns E, F, and G, then dividing the total by Column H, and dividing the new total by Column I. Enter the result in Column J.

Step 7
Add all values in Column J to determine the total required THR. Enter the total at the bottom of the column. Divide this total by 1,000 to determine MBH/T.D.

Step 8
Using Table B, read down the 1 T.D. column, until you find a MBH value equal or greater than 41.6. The MBH value just above 41.6 is 42.97, which corresponds to ACC-80. Using Table B, note the number of circuits available for an ACC-80, which is 70.

Step 9
From Table B, determine the capacity per circuit for the model selected in Step 8, and enter the value in Column K. For ACC-80 the capacity per circuit is 613.9.

Step 10
Find the number of circuits required by dividing Column J by Column K. Enter result into Column L. To ensure adequate capacity, round the numbers in Column L up to the next largest whole number and enter the value into Column M. Total the number of circuits required in Column M. If the total in Column M exceeds the unit's maximum number of circuits (as shown in Table B), then it may be necessary to use a higher condensing temperature in one or more of the systems. If a higher condensing temperature is not acceptable, then a larger condenser should be considered, and you should recalculate steps 8–10.

Step 11
Calculate the actual T.D. for each circuit using the following equation
Actual T.D. = (Design T.D. [I] **x** No. of Circuits Required [L]) (No. Circuits [M])

Example for Circuit #1

Actual T.D. = (15 x 37.1) (38)= 14.64º Actual T.D.

Input these T.D. values into Column N.

If the Actual Condensing Temperature is to high for each circuit, it may be necessary to adjust the number of circuits or select a larger condenser and recalculate the number of circuits. LRC's Application engineers are available to help you with multicircuiting calculations, and will assist you in selecting the proper Air Cooled Condenser for your project. Give us a call, 562-944-1949, and we'll be happy answer any of your questions.

Altitude Correction (Table C)

Sea Level	1.000
1,000 FT.	1.030
2,000 FT.	1.050
3,000 FT.	1.075
4,000 FT.	1.100
5,000 FT.	1.125
6,000 FT.	1.150
7,000 FT.	1.175
8,000 FT.	1.205
9,000 FT.	1.230
10,000 FT.	1.260

Heat Rejection Factors (Table D)

Evap. Temp.	Condensing Temperature 90°	100°	105°	110°	115°	120°	125°	130°
-40	1.62	1.67	1.71	1.76	1.80	1.86	1.88	1.94
-35	1.58	1.63	1.67	1.70	1.75	1.79	1.81	1.87
-30	1.54	1.59	1.62	1.65	1.69	1.74	1.75	1.80
-25	1.50	1.55	1.58	1.61	1.65	1.69	1.73	1.75
-20	1.46	1.51	1.54	1.57	1.61	1.64	1.68	1.73
-15	1.43	1.48	1.51	1.53	1.57	1.60	1.64	1.68
-10	1.40	1.45	1.47	1.50	1.53	1.56	1.61	1.64
0	1.35	1.39	1.41	1.44	1.47	1.50	1.53	1.56
5	1.34	1.38	1.40	1.43	1.46	1.49	1.53	1.56
10	1.30	1.34	1.36	1.39	1.41	1.44	1.48	1.51
15	1.29	1.33	1.35	1.37	1.40	1.42	1.46	1.49
20	1.25	1.29	1.31	1.33	1.35	1.38	1.41	1.44
25	1.24	1.28	1.30	1.32	1.34	1.37	1.40	1.43
30	1.21	1.25	1.26	1.28	1.30	1.33	1.36	1.38
40	1.18	1.21	1.22	1.24	1.26	1.28	1.30	1.33
50	1.14	1.17	1.18	1.20	1.22	1.24	1.26	1.28