



Catalog 222-16

Air-Cooled Split System Condensing Units for Remote DX Coils and Air Handlers

Models RCS 015D to 140D
R-410A Refrigerant



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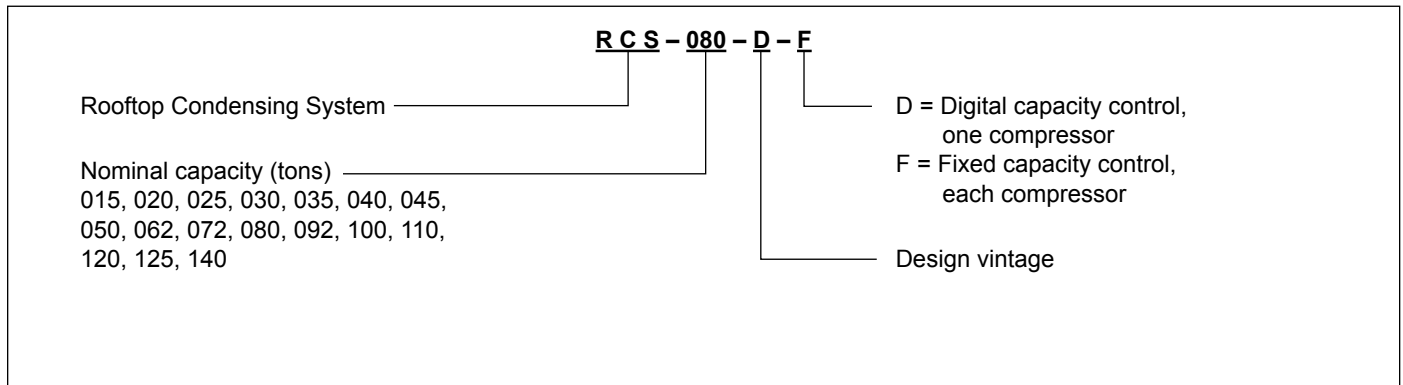
The Condensing Unit for Applied Rooftop and Air Handler Systems

- The Daikin Applied RCS air cooled, remote condenser offers a wide selection of nominal capacities from 15 to 140 tons.
- Units are designed for quiet and energy efficient operation meeting ASHRAE 90.1 efficiency requirements.
- Dual circuits with scroll compressors with multiple stages for maximum capacity control.
- The RCS unit can be matched to a Daikin Applied Vision®, Skyline®, or Destiny® air handling unit, as well as Hi F5 and E5 DX coils.

Agency Listed



Nomenclature



R-410A Refrigerant

- R-410A is environmentally friendly HFC refrigerant with zero ozone depletion. Customers have no phase out and replacement concerns.
- R-410A efficiency is excellent. Daikin Applied R-410A condensing units are available with EERs that exceed ASHRAE 90.1-2007. R-407C inevitably forces the unit to be significantly less efficient or more expensive, while R-410A reduces energy costs.
- R-410A refrigerant components are always evenly mixed, which is not true for R-407C. If R-407C leaks, the remaining charge may not have a proper mix of components. R-410A does not have this problem so leaks are easier to repair.
- Micro-channel condensers are used and are much more robust and corrosion resistant than traditional copper tube and aluminum fin coils. Micro-channel condensers also have smaller diameter tubes so they require less refrigerant. Daikin Applied micro-channel condensers last longer than competitive condensers and are perfect for LEED® buildings.

Condensing Section Standard Features

- Open design permits unrestricted condenser airflow, access to compressors, refrigeration components and piping, and access for roof maintenance.
- High efficiency Copeland® scroll compressors.
- All units feature dual refrigeration circuits for redundancy and efficient capacity control.
- Large face area condenser constructed of high efficiency, aluminum micro-channel coils for high operating efficiencies.
- Vertical air discharge minimizes noise.
- Three-phase condenser fan motors eliminate reverse rotation failures.
- Up to six steps of compressor capacity control with optional hot gas bypass (on one or both circuits) provides for stable discharge temperature and humidity control.
- Recessed V-bank condenser coils have built-in hail damage protection.
- Field powered, 115 volt, GFI, electrical outlet.

Optional Components

In addition to the unique features included with the standard RCS Condensing Unit, additional component options are available:

- Baked epoxy coating with a 5000-hour salt spray test per ASTM B117.
- Phase loss protection.
- Ground fault protection.
- VFD controlled head pressure control allows mechanical cooling to 0°F ambient temperatures.
- Non-fused disconnect switch with through-the-door handle.
- Vandalism guards.
- IBC 2006 and/or ASCE 7-05 seismic certified construction.
- Factory powered, 115 volt, GFI, electrical outlet.
- Suction and discharge isolation valves for each refrigeration circuit.

Accessories

Accessories can also be added to further enhance the unit:

- HGBP kit including control valve.
- Liquid line kit with sight glass, solenoid valve, and replaceable core filter drier (see wiring diagram for wiring instructions).

NOTE: Items not included in liquid line kit: manual shutoff valve mounted on the condensing unit liquid line outlet, expansion valve, and distributor.

Figure 1: Liquid Line Accessories

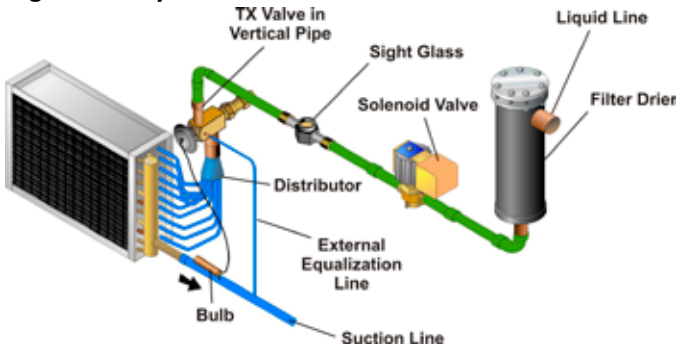


Figure 2: Typical 2-Pass Construction

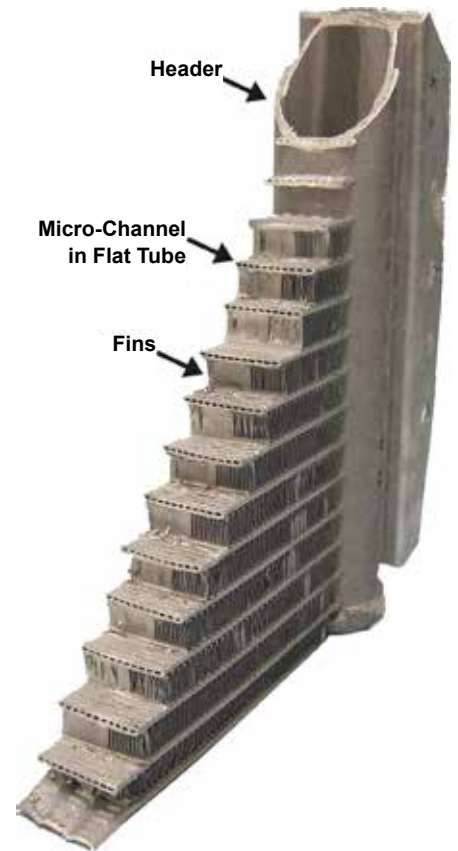


Micro-Channel Condensers

Micro-channel coils are an all-aluminum construction composed of:

1. Extended flat tubes (Figure 3) with many small flow channels.
 2. Flat fins (Figure 3) that are brazed to adjoining tubes.
 3. Two refrigerant manifold headers (Figure 3) that are arranged in a two-pass configuration (Figure 2).
- Flat tubes have better fluid-to-tube heat transfer. Therefore, micro-channel coils have more heat transfer per square foot than traditional coils and require much less refrigerant charge per ton of cooling.
 - All aluminum construction eliminates galvanic corrosion associated with dissimilar metals. All aluminum coils are much more resistant to normal condenser corrosion in any location including the sea coast.
 - Aluminum is lighter than copper so Daikin Applied R-410A condensers are lighter than competitive condensers.
 - Micro-channel coils were pioneered in the auto industry and one reason is their more robust construction. Fins are brazed between adjoining tubes so there are no exposed and vulnerable edges. Fin damage is therefore virtually eliminated.

Figure 3: Supply and Return Manifolds



Daikin Applied's Unique Features

Controls

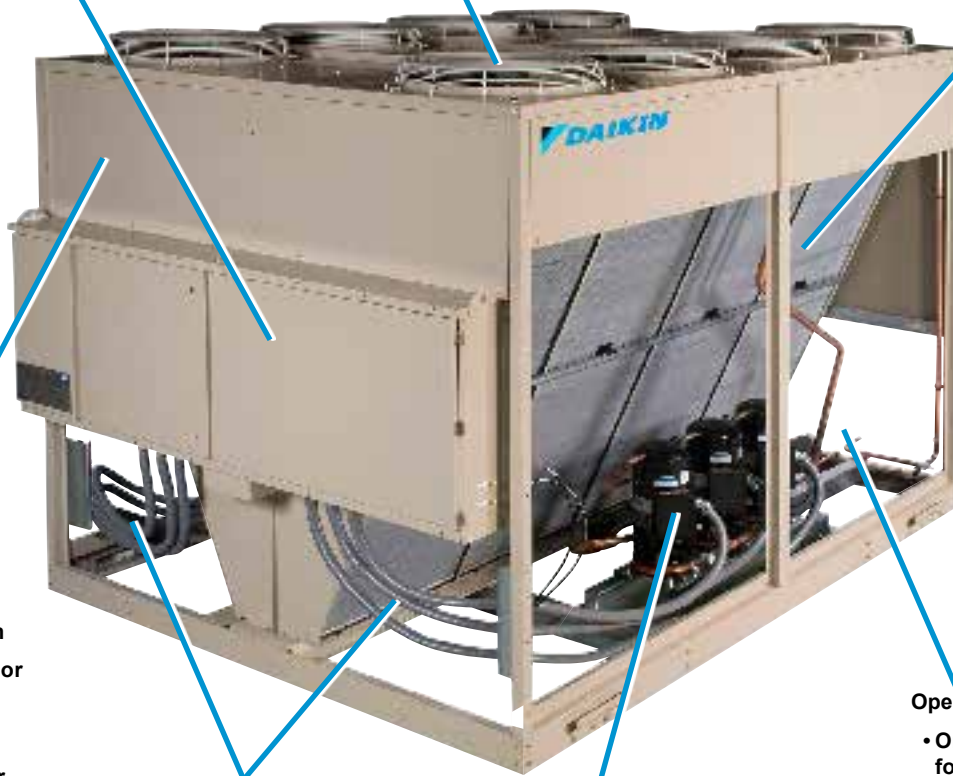
- Easily accessible control panel
- Single-point power connection
- Control transformer allows 24 volt, field control connections
- Compressor crank case heaters and anti-cycle timers
- Compressor temperature and current sensing overload/short circuit protection

Condenser fans

- Vertical air discharge for quiet operation
- Three-phase fan motors eliminate reverse rotation for prolonged performance
- Heavy-gauge vinyl-coated guards

Condenser coils

- Large face area with integral subcooling circuits
- Micro-channel condensers
- Recessed to provide hail protection



Durable construction

- Pre-painted exterior surfaces that surpass the 750-hour ASTM B 117 Salt Spray Test for durability

Dual refrigerant circuits

- Provide for redundancy and efficient capacity control
- Liquid and discharge line manual shutoff valves as an option
- High pressure switch
- Low pressure switch
- Mechanical charging/evacuation valve

Copeland scroll compressors

- Provide maximum dependability, efficiency and quiet operation
- Multiple step capacity control with hot gas bypass provides stable discharge temperature and humidity control

Open access

- On all sides of unit for easy access to all component

Unit Placement

RCS units are for outdoor applications and can be mounted either on a roof or at ground level. For roof mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. For ground level applications, install the unit on a substantial base that will not settle. Use a one piece concrete slab with footings that extend below the frost line. Be sure the foundation is level within 1/2" (13mm) over its length and width. The foundation must be strong enough to support the weights listed in the Unit Physical Data, page 9 tables.

Refrigerant Piping

Incorrect line sizing cannot only rob the RCS unit of capacity and efficiency, but significantly shorten the operational life of the equipment. Refrigerant piping layout and sizing should take the following into consideration:

1. Installed cost.
2. Refrigerant flow velocities to maintain oil return to compressors, especially in the suction lines.
3. Line pressure drop in horizontal and vertical pipes.

The RCS unit should be piped according to Daikin Applied's Piping Application Guide (AG 31-011) or the ASHRAE Refrigeration book guidelines.

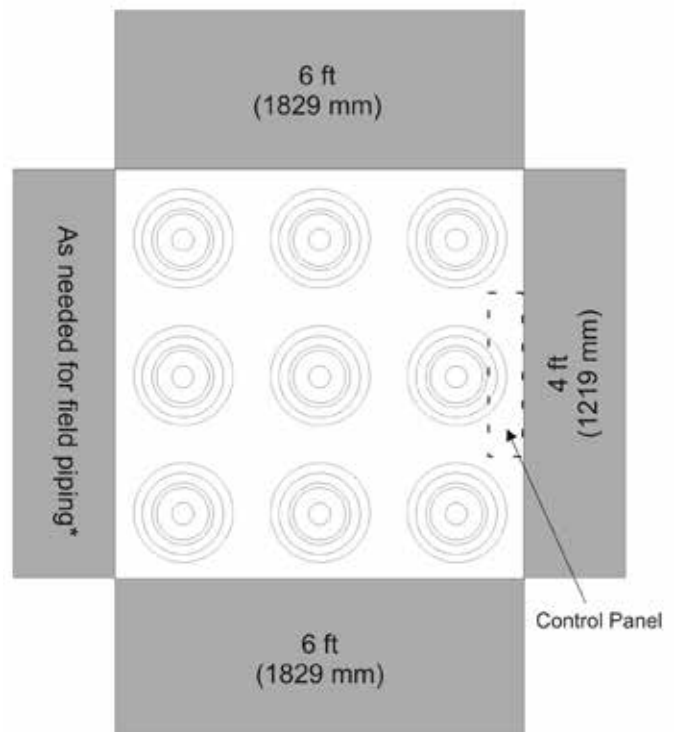
Service Clearances

Do not block the flow of air to and from the condenser coil. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency because the unit discharge pressure is increased. There must be no obstruction above the unit that would deflect discharge air downward where it could be recirculated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork.

Install the unit with enough side clearance (Figure 4) for air entrance to the coil and for servicing. Provide sufficient service access to the compressors, electrical control panel, and piping components.

Do not allow debris to accumulate near the unit where it could be drawn into the condenser coil. Keep condenser coils and fan discharge free of snow and other obstructions to permit adequate airflow for proper operation.

Figure 4: RCS 015D – 140D Service Clearance



* Condenser coil replacement is simplified if the following access can be provided:

- 015D-025D – 61"
- 030D-062D – 83"
- 072D-100D – 106"
- 110D-140D – 38"

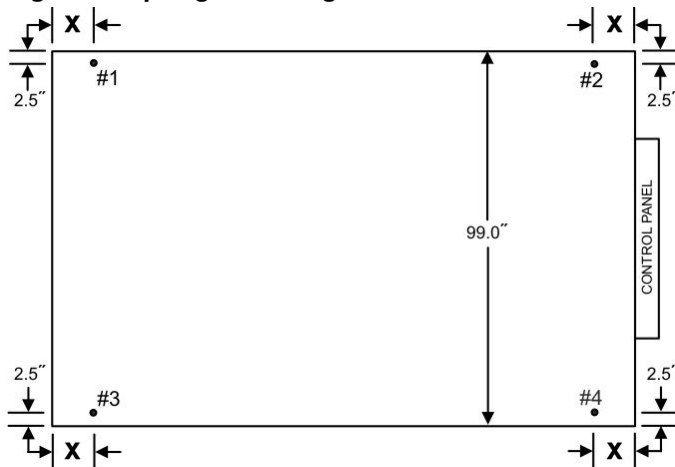
Spring Isolation and Corner Weights

The sum of the corner weights (Table 1) exceeds the total weight by about 10% to allow a safety factor in spring selections.

Table 1: Corner Weights (refer to Figure 5)

Unit Size	Weight #1 (lbs)	Weight #2 (lbs)	Weight #3 (lbs)	Weight #4 (lbs)
015	408	571	399	559
020	427	583	434	593
025	445	563	455	575
030	540	706	492	644
035	624	770	593	731
040	632	776	600	737
045	632	729	630	726
050	617	732	615	730
062	654	766	652	764
072	872	1048	882	1060
080	846	1029	919	1118
092	921	1100	995	1190
100	903	1083	978	1173
110	1075	1321	1031	1266
120	1144	1377	1275	1535
125	1389	1645	1344	1592
140	1422	1678	1407	1661

Figure 5: Spring Mounting Hole Locations



Unit Model	"X" (inches)
015 – 025	4.5
030 – 140	9.5

Recommended Temperature Control

The primary requirements for condensing unit controls are to maintain proper entering and leaving temperatures. Details vary with each job and are related to design saturated suction temperatures and conditioned air temperature.

If the project design conditions are:

- 74-84 EDB and 62-70 EWB
- 52-57 LAT off the DX coil
- 42-48 SST
- Constant volume space or return air temperature control

Then:

- Compressors can be sequenced to maintain design space temperatures \pm about two degrees DB. If excessive cycling occurs, then:
 - The sensor location is suspect or air changes are unusually high.
 - Consider widening the space temperature control range beyond \pm two degrees.
- Warning should be generated if LAT drops more than seven degrees below design.
- HGBP is desired and allows even lower LAT limits.

To minimize compressor cycling, it is recommended to include (at minimum) three minute anti-cycling timers on the condensing unit. Programmable controls should include additional time delay logic.

- Minimum OFF time for a stage is five minutes
- Minimum ON time for a stage is five minutes (unless an alarm occurs).

For additional MicroTech control information and compressor staging, refer to OM 920, page 65, 75, 76 and 94.

Unit Physical Data

Table 2: RCS 015D – 030D Physical Data

Model	RCS			
	015D	020D	025D	030D
Basic Data				
Number of refrigeration circuits	2	2	2	2
Unit operating charge (lb) ¹ per circuit	6.5	7.1	8.0	9.6
Operating weight (lb)	1761	1851	1853	2166
Compressors				
Qty–hp	2–7	2–4.5, 1–10	2–5.5, 1–11.5	2–6, 1–13
Capacity control	100–50	100–78–55–22	100–78–55–22	100–78–55–22
Condenser Fans				
Qty–diameter	2–26"	2–26"	2–26"	4–26"
Qty–hp	2–1.0	2–1.0	2–1.0	4–1.0

NOTE: ¹Unit shipped with dry nitrogen holding charge

Table 3: RCS 035D – 045D Physical Data

Model	RCS		
	035D	040D	045D
Basic Data			
Number of refrigeration circuits	2	2	2
Unit operating charge (lb) ¹ per circuit	10.4	10.8	12.6
Operating weight (lb)	2471	2496	2470
Compressors			
Qty–hp	4–7.5	4–8.5	4–10
Capacity control	100–75–50–25	100–75–50–25	100–75–50–25
Condenser Fans			
Qty–diameter	4–26"	4–26"	4–26"
Qty–hp	4–1.0	4–1.0	4–1.0

NOTE: ¹Unit shipped with dry nitrogen holding charge.

Table 4: RCS 050D – 072D Physical Data

Model	RCS		
	050D	062D	072D
Basic Data			
Number of refrigeration circuits	2	2	2
Unit operating charge (lb) ¹ per circuit	12.6	12.7	15.1
Operating weight (lb)	2450	2578	3422
Compressors			
Qty–hp	4–11.5	4–13	6–10
Capacity control	100–75–50–25–0	100–75–50–25–0	100–83–67–50–33–17–0
Condenser Fans			
Qty–diameter	4–26"	6–26"	8–26"
Qty–hp	4–1.0	6–1.0	8–1.0

NOTE: ¹Unit shipped with dry nitrogen holding charge.

Table 5: RCS 080D – 100D Physical Data

Model	RCS		
	080D	092D	100D
Basic Data			
Number of refrigeration circuits	2	2	2
Unit operating charge (lb) ¹ per circuit	19.0	19.2	19.2
Operating weight (lb)	3556	3762	3762
Compressors			
Qty-hp	6-11.5	6-13	3-13 3-15
Capacity control	100-83-67-50-33-17-0	100-83-67-50-33-17-0	100-81-67-48-33-15-0
Condenser Fans			
Qty-diameter	6-26"	9-26"	9-26"
Qty-hp	6-1.0	9-1.0	9-1.0

NOTE: ¹Unit shipped with dry nitrogen holding charge.

Table 6: RCS 110D – 140D Physical Data

Model	RCS			
	110D	120D	125D	140D
Basic Data				
Number of refrigeration circuits	2	2	2	2
Unit operating charge (lb) ¹ per circuit	29.1	29.1/34.7	32.3	32.3/37.5
Operating weight (lb)	4267	4847	5428	5608
Compressors				
Qty-hp	6-15	3-15 3-20	6-20	3-20 3-25
Capacity control	100-84-67-50-33-17-0	100-81-67-48-33-15-0	100-84-67-50-33-17-0	100-81-67-48-33-15-0
Condenser Fans				
Qty-diameter	8-26"	9-26"	10-26"	12-26"
Qty-hp	8-1.0	9-1.0	10-1.0	12-1.0

NOTE: ¹Unit shipped with dry nitrogen holding charge.

Unit Capacities

Table 7: RCS 015D – 140D Unit Capacities

Unit Size	Suction Temp (°F)	Ambient Air Temperature (°F)												Cond Fan Watts
		85			95			105			115			
		Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	
015D	35	166390	12.3	13500	156424	10.6	14800	146012	9.0	16300	135236	7.5	18100	2200
	40	181302	13.2	13700	170716	11.4	15000	159646	9.7	16500	148160	8.1	18200	2200
	45	197236	14.2	13900	185962	12.3	15200	174170	10.4	16700	161922	8.8	18400	2200
	50	214190	15.2	14100	202196	13.1	15400	189664	11.2	16900	176594	9.4	18700	2200
020D	35	226943	12.5	18100	212729	10.6	20100	197696	8.8	22400	181735	7.3	25000	2200
	40	247999	13.5	18400	232690	11.4	20400	216597	9.6	22600	199626	7.9	25300	2200
	45	270292	14.5	18700	253774	12.3	20700	236535	10.3	23000	218377	8.5	25600	2200
	50	293728	15.4	19100	275941	13.1	21000	257446	11.0	23300	238068	9.2	26000	2200
025D	35	256517	11.4	22599	239471	9.6	25004	221511	8.0	27754	202508	6.6	30897	2200
	40	279247	12.2	22983	261132	10.3	25388	242150	8.6	28126	222091	7.1	31253	2200
	45	303316	13.0	23381	283868	11.0	25806	263711	9.2	28540	242502	7.7	31649	2200
	50	328437	13.8	23830	307859	11.7	26238	286461	9.9	28960	263725	8.2	32087	2200
030D	35	295175	11.9	24892	276933	10.1	27285	257850	8.6	30012	237685	7.2	33122	4300
	40	323520	12.8	25284	303651	11.0	27673	282999	9.3	30402	261273	7.8	33523	4300
	45	353668	13.8	25719	332053	11.8	28097	309644	10.0	30829	286202	8.4	33956	4300
	50	385608	14.7	26205	362129	12.7	28567	337880	10.8	31290	312535	9.1	34425	4300
035D	35	341372	11.3	30240	321412	9.7	33156	301480	8.3	36512	281110	7.0	40410	4300
	40	373486	12.2	30702	351760	10.5	33628	330212	8.9	37000	308328	7.5	40916	4300
	45	407778	13.1	31198	384188	11.3	34130	360834	9.6	37516	337238	8.1	41452	4300
	50	444492	14.0	31708	418716	12.1	34664	393356	10.3	38072	367920	8.8	42014	4300
040D	35	398446	11.6	34340	374076	9.8	38020	348084	8.2	42294	320278	6.8	47276	4300
	40	434708	12.4	34952	408400	10.6	38634	380538	8.9	42898	350938	7.3	47842	4300
	45	473092	13.3	35640	444738	11.3	39304	414824	9.5	43546	383034	7.9	48480	4300
	50	513558	14.1	36424	482976	12.1	40066	450768	10.2	44286	416792	8.5	49172	4300
045D	35	459446	11.7	39174	429786	9.9	43402	396796	8.2	48204	359816	6.7	53634	4300
	40	501770	12.6	39944	469910	10.6	44156	434842	8.9	48934	395870	7.3	54332	4300
	45	546746	13.4	40832	512450	11.4	45010	474966	9.5	49758	433686	7.9	55118	4300
	50	594956	14.2	41798	557370	12.1	45998	517194	10.2	50706	473382	8.5	56008	4300
050D	35	513350	11.4	45046	476774	9.6	49722	437874	7.9	55228	397114	6.4	61594	4300
	40	559744	12.2	45934	521042	10.3	50640	479696	8.5	56120	436342	7.0	62382	4300
	45	608338	13.0	46874	567522	11.0	51604	523462	9.2	57090	477100	7.5	63308	4300
	50	658544	13.7	47924	615422	11.7	52700	569126	9.8	58138	519880	8.1	64292	4300
062D	35	562570	10.9	51576	526734	9.3	56902	489646	7.8	63032	451290	6.5	69932	6500
	40	622652	11.8	52824	584012	10.0	58150	543846	8.5	64346	502074	7.0	71390	6500
	45	688066	12.7	54220	645764	10.8	59614	602400	9.1	65838	556948	7.6	72996	6500
	50	758168	13.6	55876	713002	11.7	61194	665738	9.9	67482	616532	8.3	74688	6500
072D	35	678031	11.2	60735	628386	9.3	67539	576237	7.6	75483	521593	6.2	84704	8480
	40	740064	11.9	62029	687159	10.0	68897	631520	8.2	76797	572816	6.7	85902	8480
	45	804295	12.7	63503	748976	10.6	70468	689699	8.8	78193	626439	7.2	87257	8480
	50	871421	13.4	65061	812627	11.3	71966	749489	9.4	79840	682600	7.7	88735	8480

NOTE: Based on sea level altitude and ARI standard 365.
 Interpolation is allowed; extrapolation is not permitted. Consult Daikin Applied for performance outside the cataloged ratings.
 Total watts comprised of compressors and condenser fans.

Table 7 (continued): RCS 015D – 140D Unit Capacities

Unit Size	Suction Temp (°F)	Ambient Air Temperature (°F)												Cond Fan Watts
		85			95			105			115			
		Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	Capacity (Btuh)	Unit EER	Total Watts	
080D	35	766780	11.2	68388	715980	9.5	75696	662572	7.9	84136	606280	6.5	93842	6500
	40	832982	11.9	69872	778456	10.1	77268	721972	8.4	85700	662512	6.9	95390	6500
	45	902216	12.6	71502	844500	10.7	78872	784582	9.0	87300	720776	7.4	97106	6500
	50	974136	13.3	73320	912790	11.3	80696	849172	9.5	89124	781874	7.9	98862	6500
092D	35	863690	11.0	78420	808526	9.4	85995	749216	7.9	94628	685072	6.6	104427	9540
	40	940232	11.7	80243	879664	10.0	87944	815750	8.4	96628	746808	7.0	106530	9540
	45	1019752	12.4	82328	954888	10.6	89953	886046	9.0	98659	811464	7.5	108700	9540
	50	1103440	13.1	84534	1033000	11.2	92189	958830	9.5	100915	879238	7.9	110937	9540
100D	35	933060	10.9	85882	871527	9.2	94231	806325	7.8	103717	736461	6.4	115676	9800
	40	1015117	11.5	88029	948826	9.8	96391	878606	8.3	105923	803259	6.8	117987	9800
	45	1100681	12.2	90414	1029439	10.4	98765	953934	8.8	108324	873248	7.3	120404	9800
	50	1189651	12.8	93049	1112954	11.0	101408	1032093	9.3	110956	945619	7.7	123058	9800
110D	35	1030480	11.6	89022	964184	9.9	97560	893672	8.3	107386	819030	6.9	118676	8700
	40	1122188	12.3	91230	1051238	10.5	99732	975514	8.9	109560	895316	7.4	120854	8700
	45	1218492	13.0	93642	1141640	11.2	102212	1060658	9.5	112008	974866	7.9	123266	8700
	50	1318534	13.7	96370	1236686	11.8	104866	1149416	10.0	114702	1057026	8.4	126008	8700
120D	35	1159070	11.2	103065	1083547	9.6	112912	1005242	8.1	124587	923690	6.7	138553	9800
	40	1264539	11.9	105844	1183247	10.2	115735	1098244	8.6	127495	1010026	7.1	141426	9800
	45	1374733	12.6	108909	1286887	10.8	118931	1195993	9.2	130642	1100859	7.6	144541	9800
	50	1489471	13.3	112267	1395592	11.4	122349	1297368	9.7	134184	1194663	8.1	148131	9800
125D	35	1287660	11.0	117008	1202910	9.4	128164	1116812	7.9	141688	1028350	6.5	158330	10800
	40	1406890	11.7	120358	1315256	10.0	131638	1220974	8.4	145330	1124736	6.9	161898	10800
	45	1530974	12.3	124076	1432134	10.6	135550	1331328	8.9	149176	1226852	7.4	165716	10800
	50	1660408	13.0	128064	1554498	11.1	139732	1445320	9.4	153566	1332300	7.8	170154	10800
140D	35	1439178	10.7	134529	1343902	9.1	147240	1245752	7.7	162092	1143934	6.4	179611	13000
	40	1567918	11.3	138279	1465152	9.7	151101	1358559	8.2	166099	1248214	6.8	183650	13000
	45	1703397	12.0	142221	1592273	10.3	155228	1476578	8.7	170420	***	***	***	13000
	50	1844431	12.6	146462	1724551	10.8	159679	1600715	9.2	174902	***	***	***	13000

NOTE: Based on sea level altitude and ARI standard 365.
 Interpolation is allowed; extrapolation is not permitted. Consult Daikin Applied for performance outside the cataloged ratings.
 Total watts comprised of compressors and condenser fans.

Unit Capacity Charts

Figure 6: RCS 015D Unit Capacity Chart

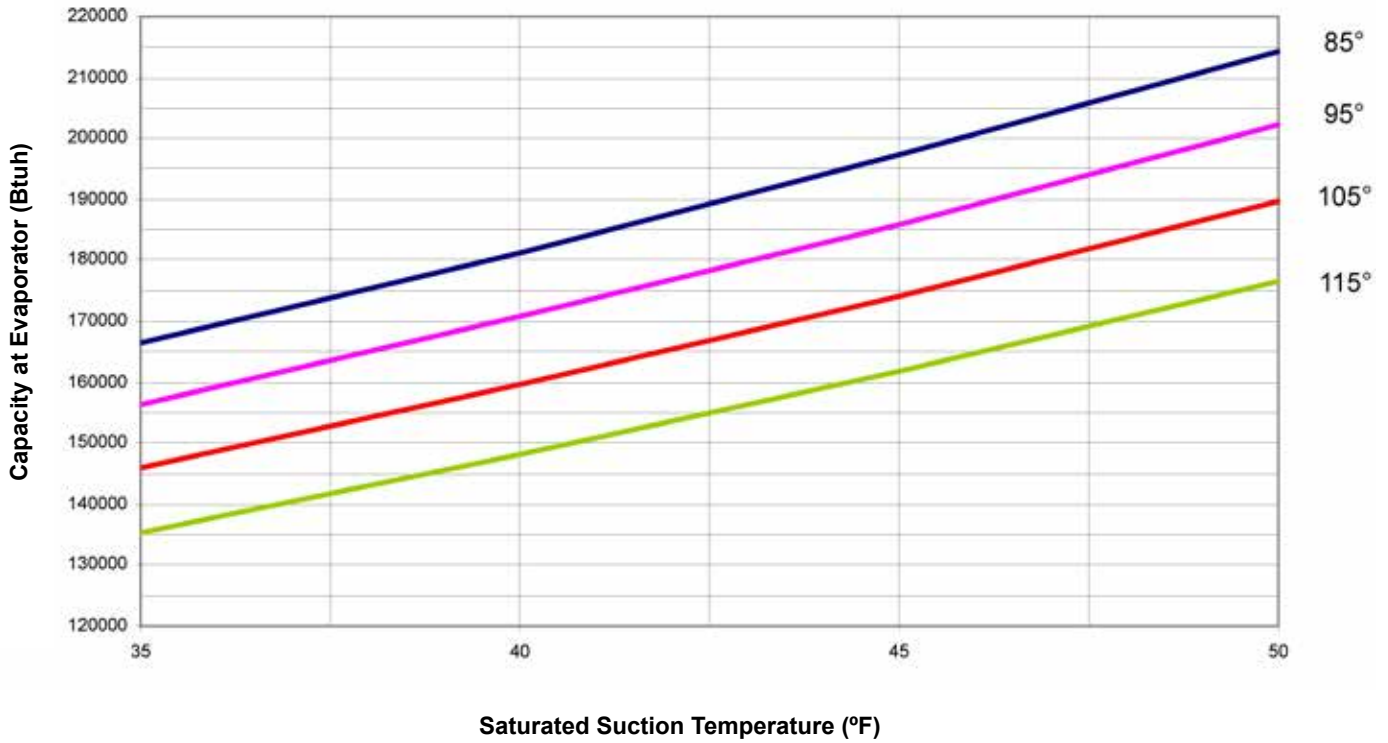


Figure 7: RCS 020D Unit Capacity Chart

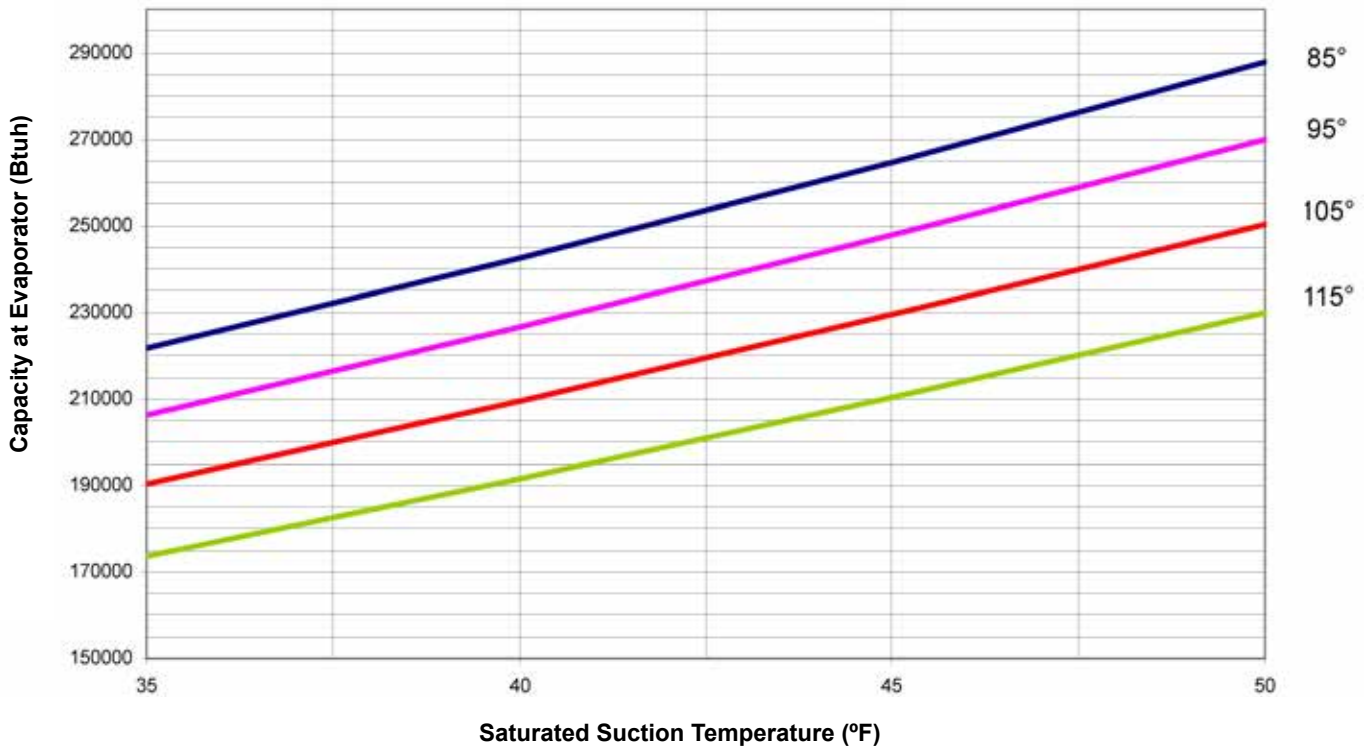


Figure 8: RCS 025D Unit Capacity Chart

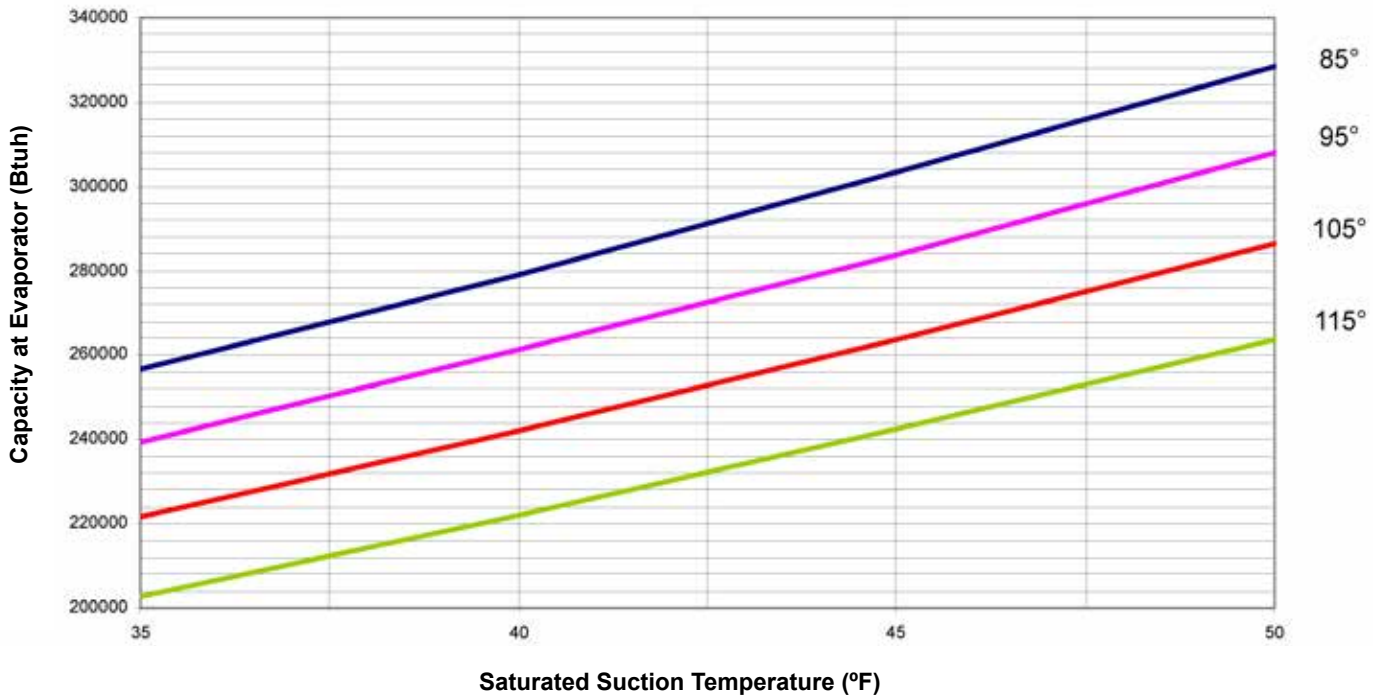


Figure 9: RCS 030D Unit Capacity Chart

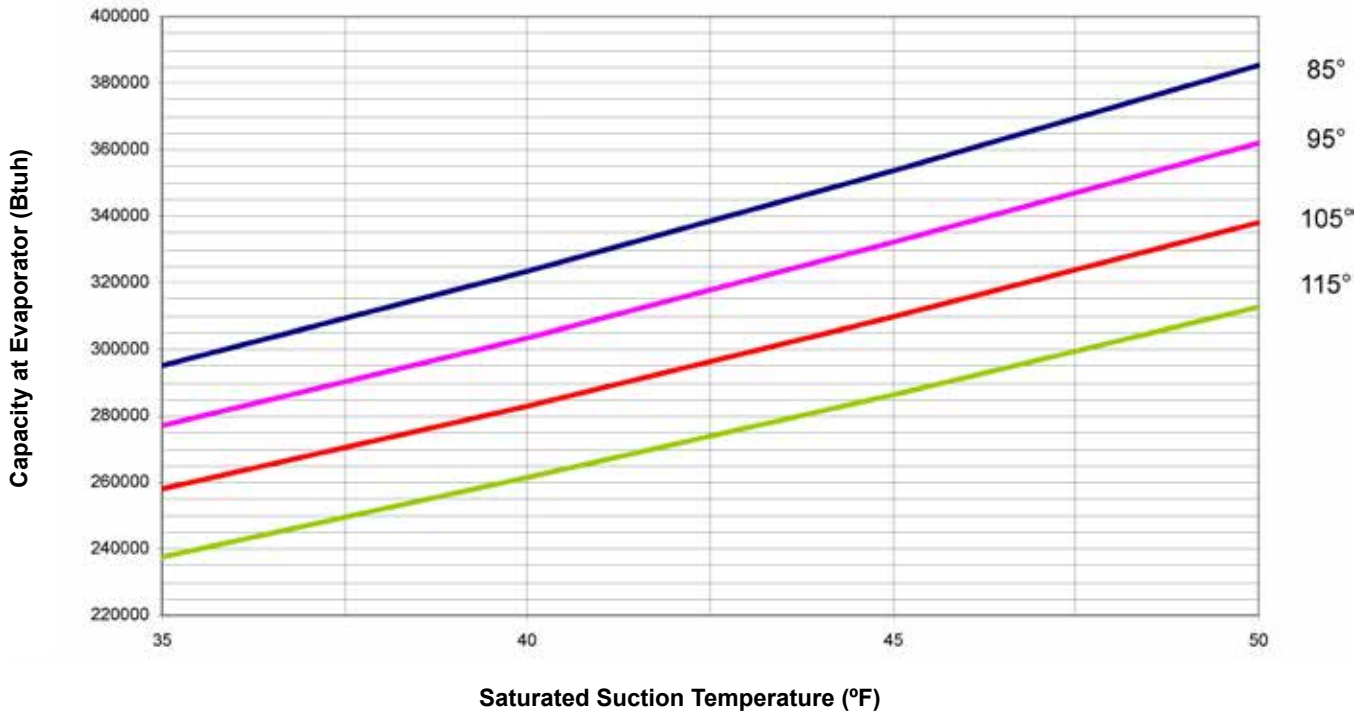


Figure 10: RCS 035D Unit Capacity Chart

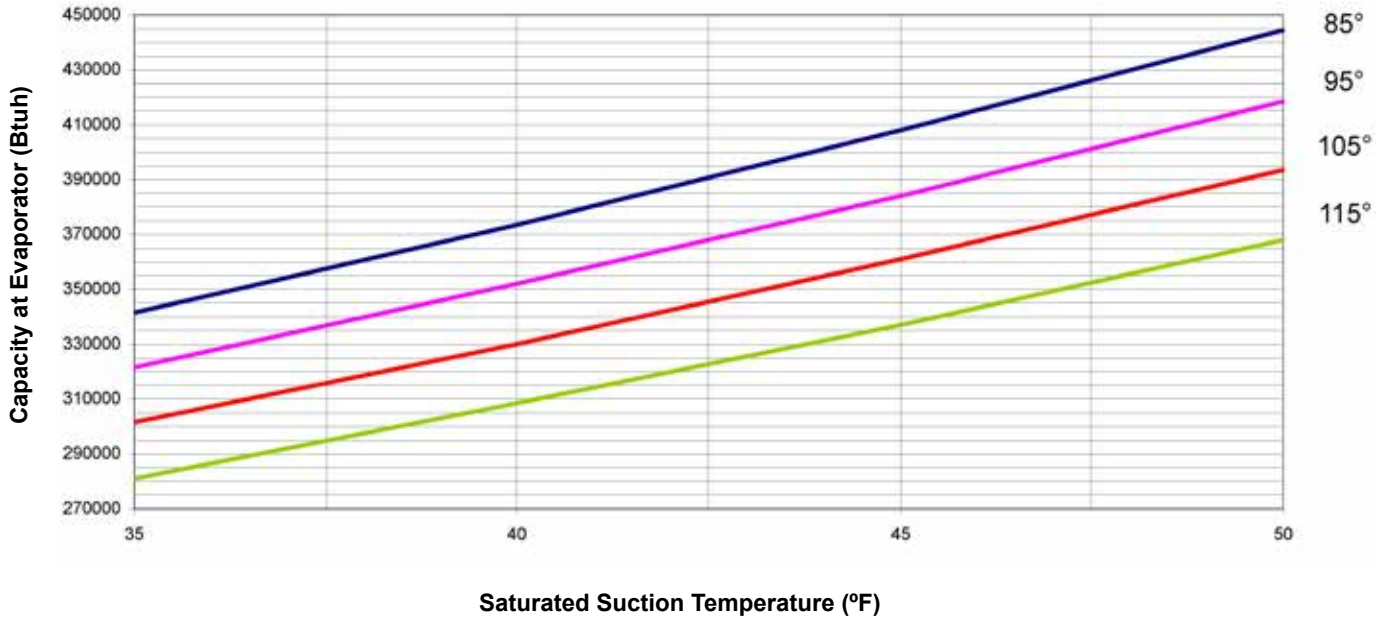


Figure 11: RCS 040D Unit Capacity Chart

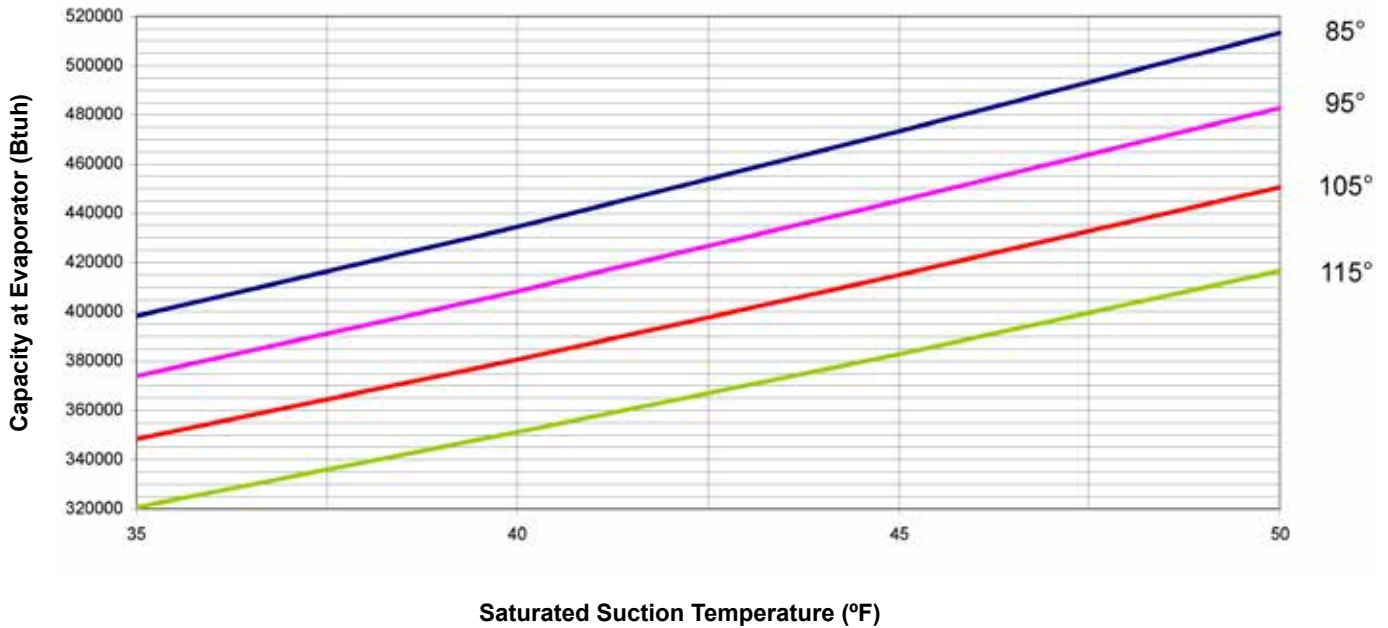


Figure 12: RCS 045D Unit Capacity Chart

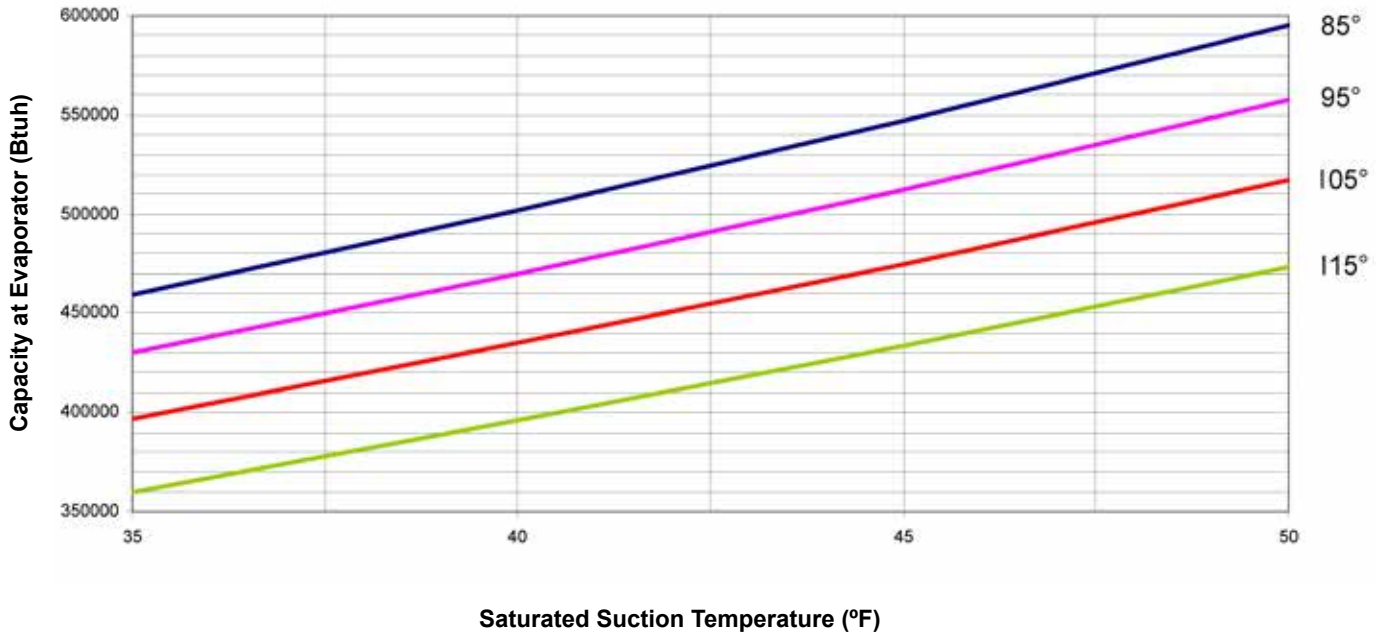


Figure 13: RCS 050D Unit Capacity Chart

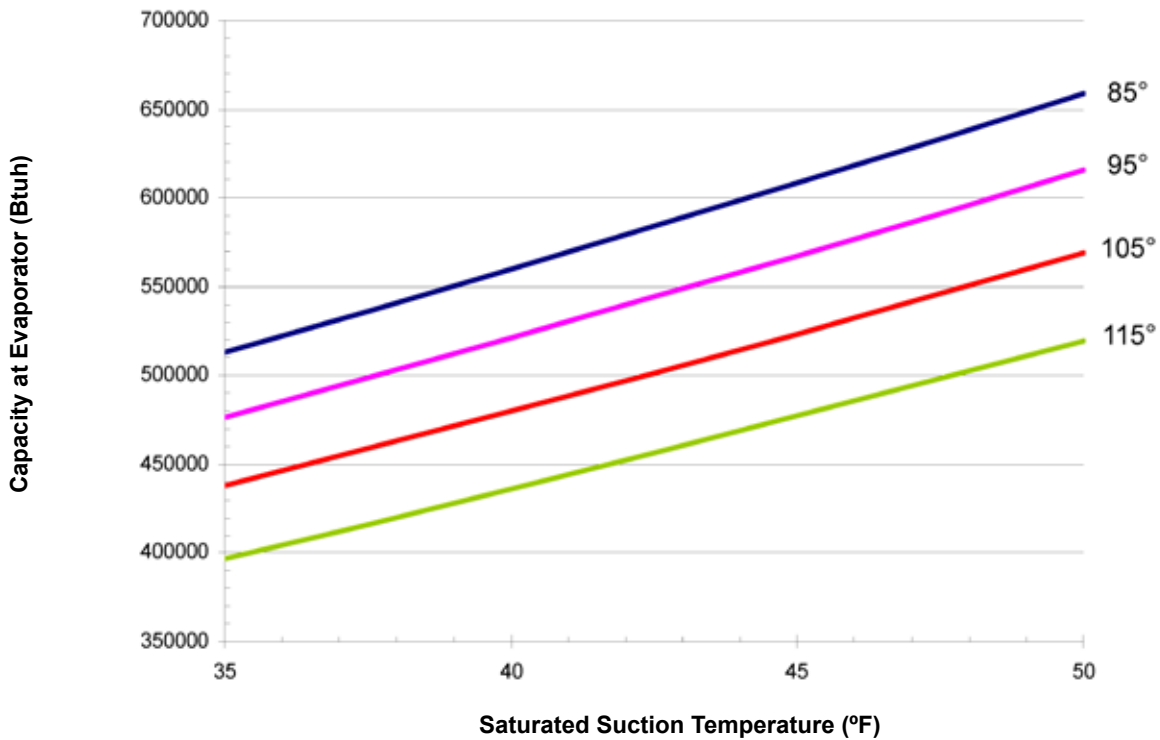


Figure 14: RCS 062D Unit Capacity Chart

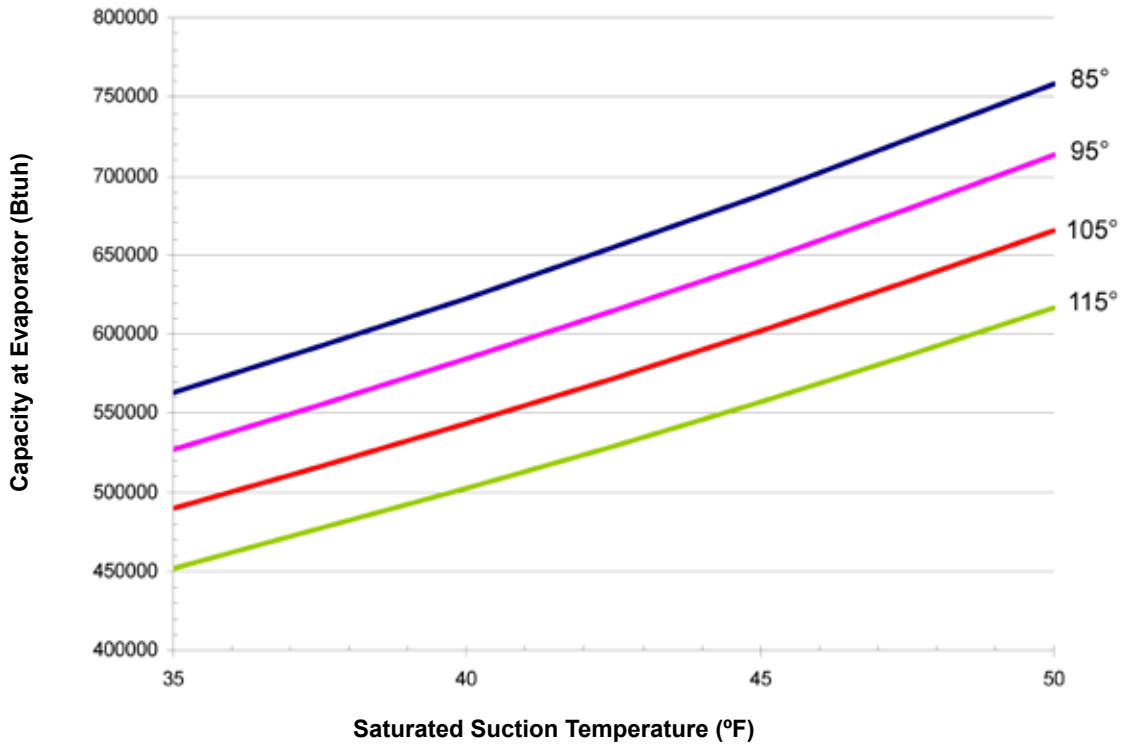


Figure 15: RCS 072D Unit Capacity Chart

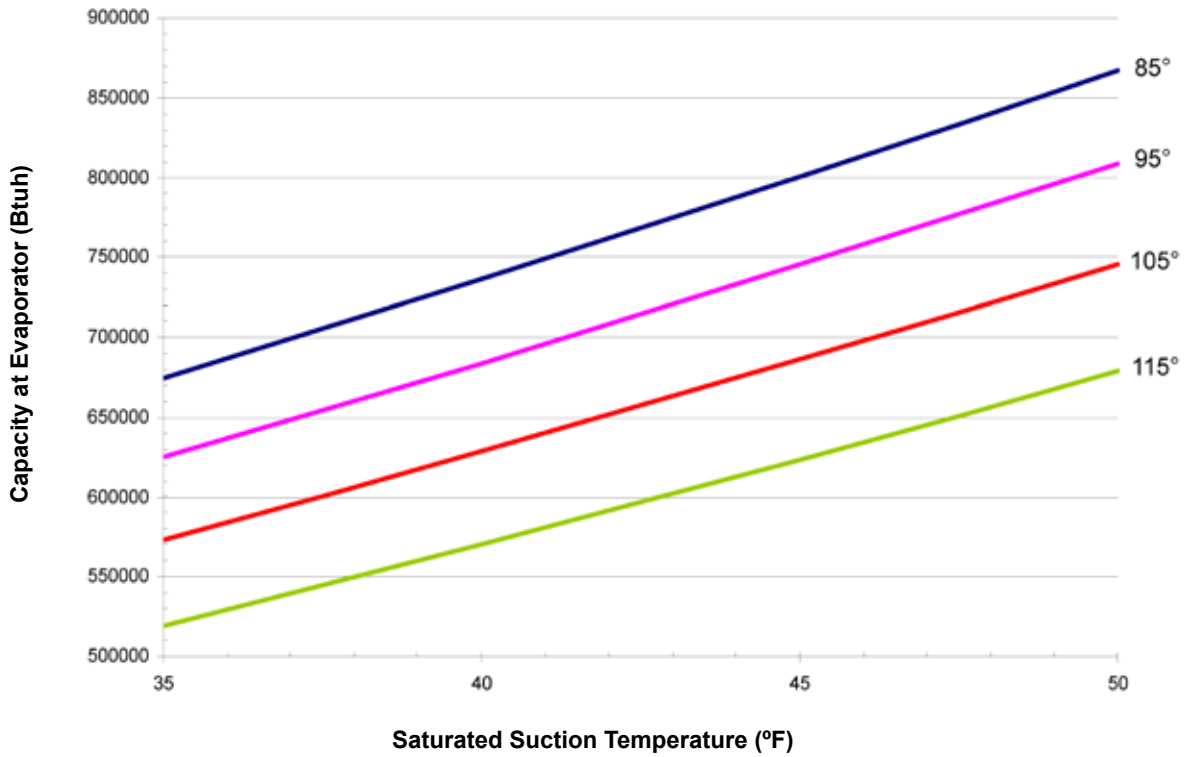


Figure 16: RCS 080D Unit Capacity Chart

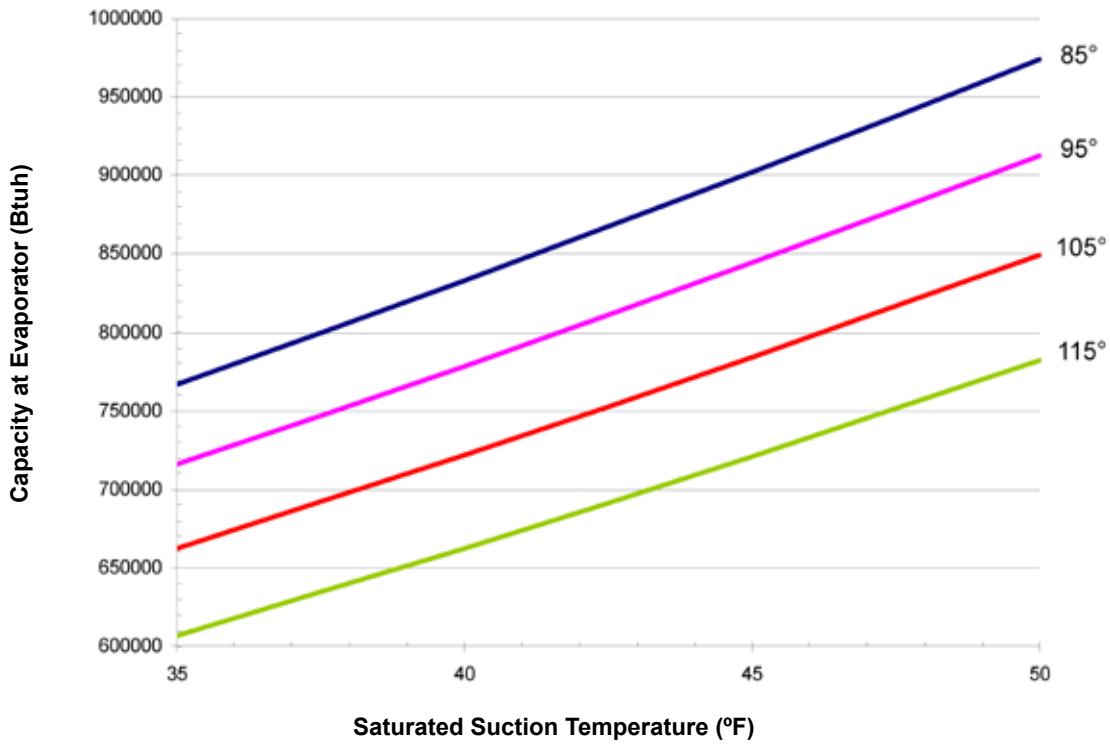


Figure 17: RCS 092D Unit Capacity Chart

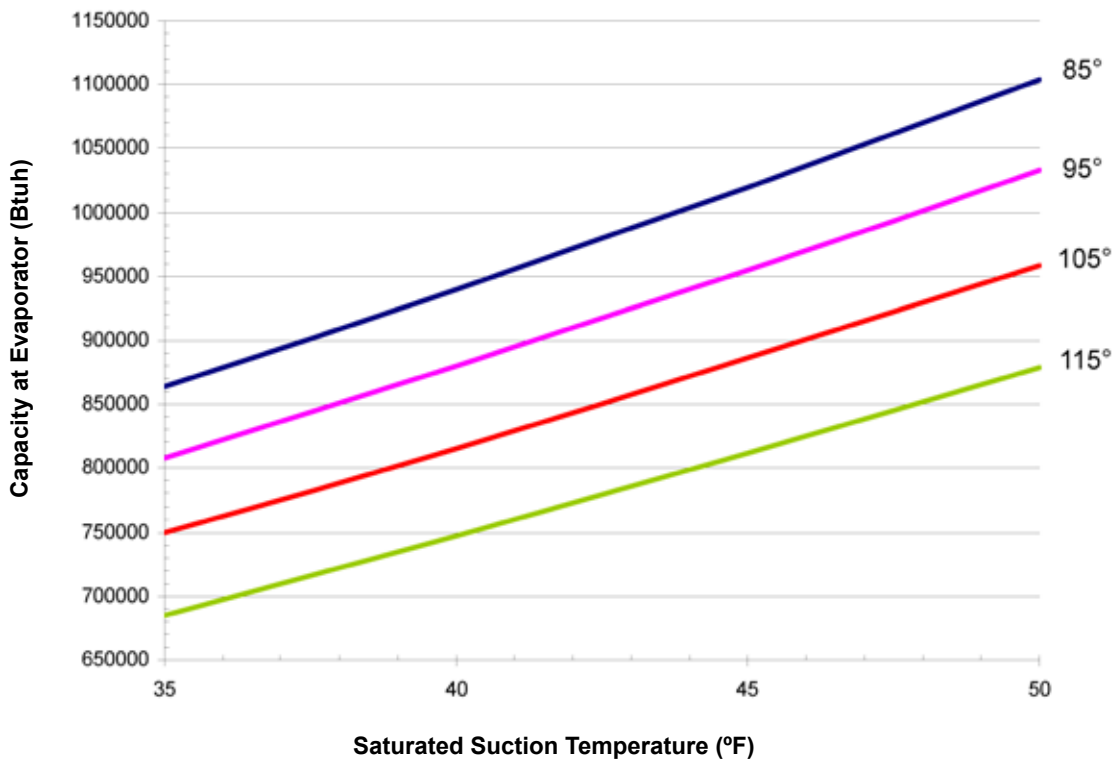


Figure 18: RCS 100D Unit Capacity Chart

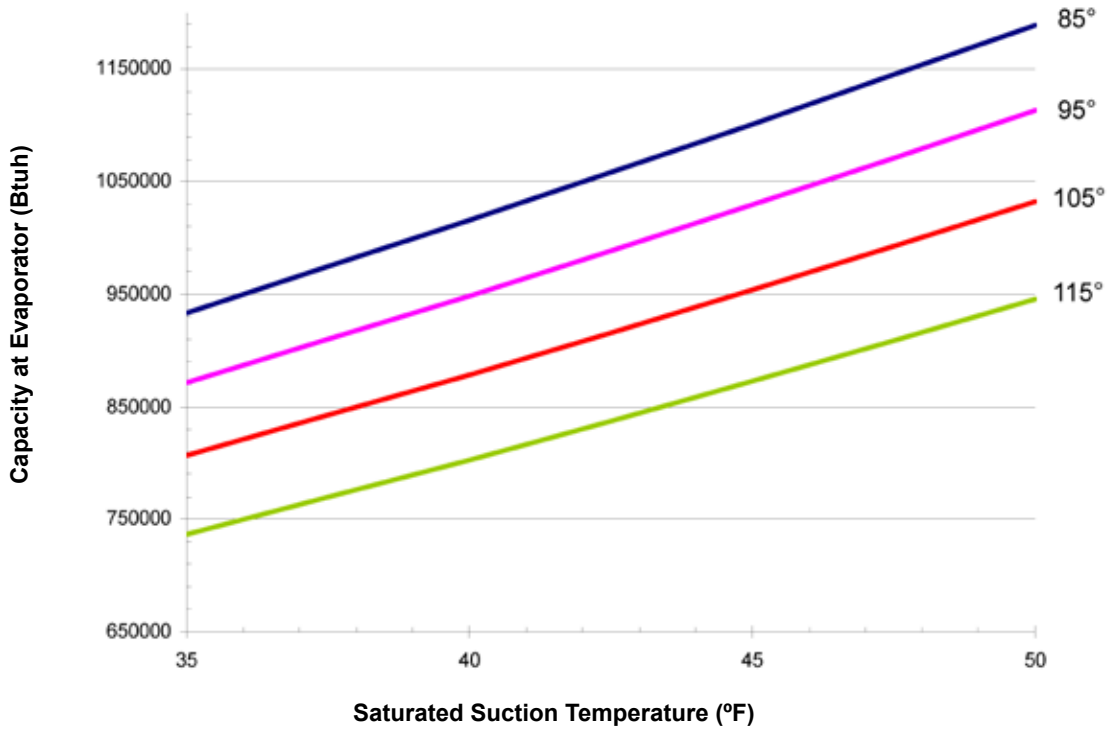


Figure 19: RCS 110D Unit Capacity Chart

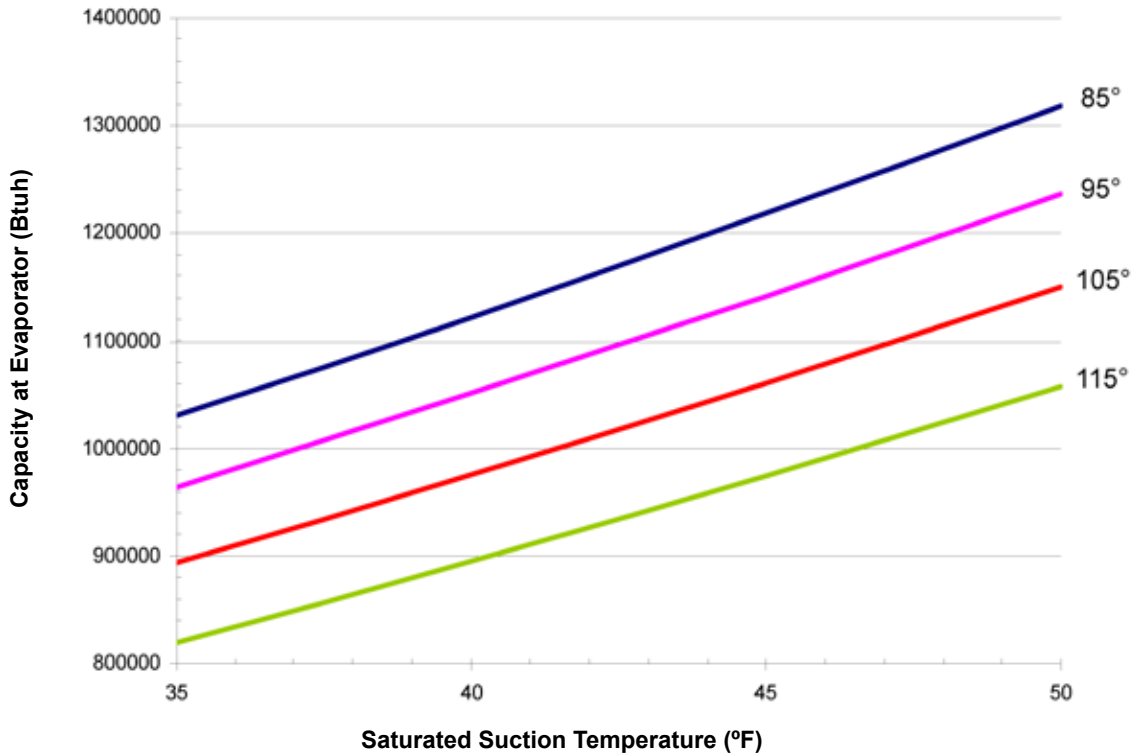


Figure 20: RCS 120D Unit Capacity Chart

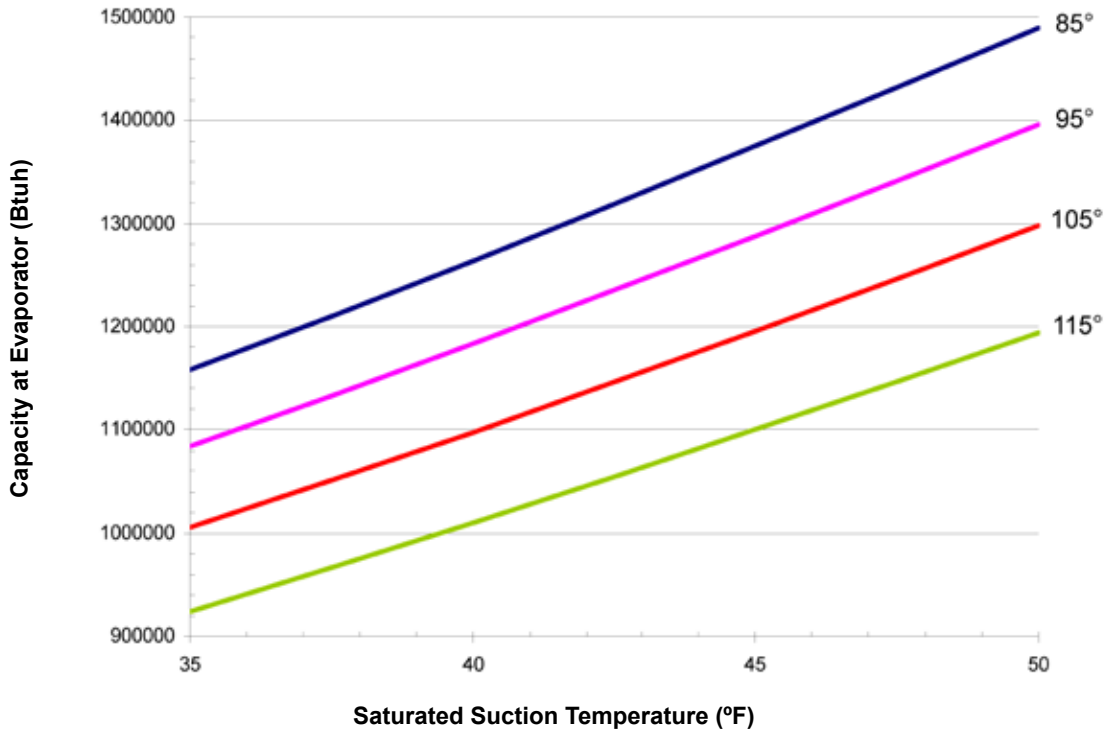


Figure 21: RCS 125D Unit Capacity Chart

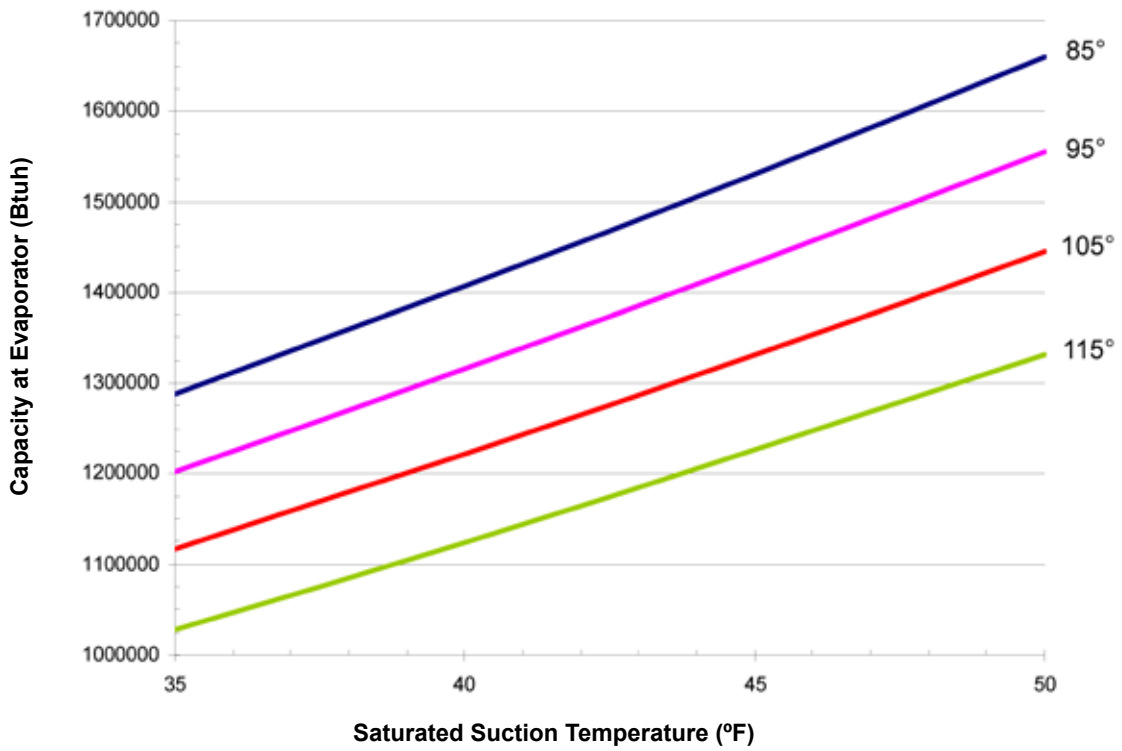
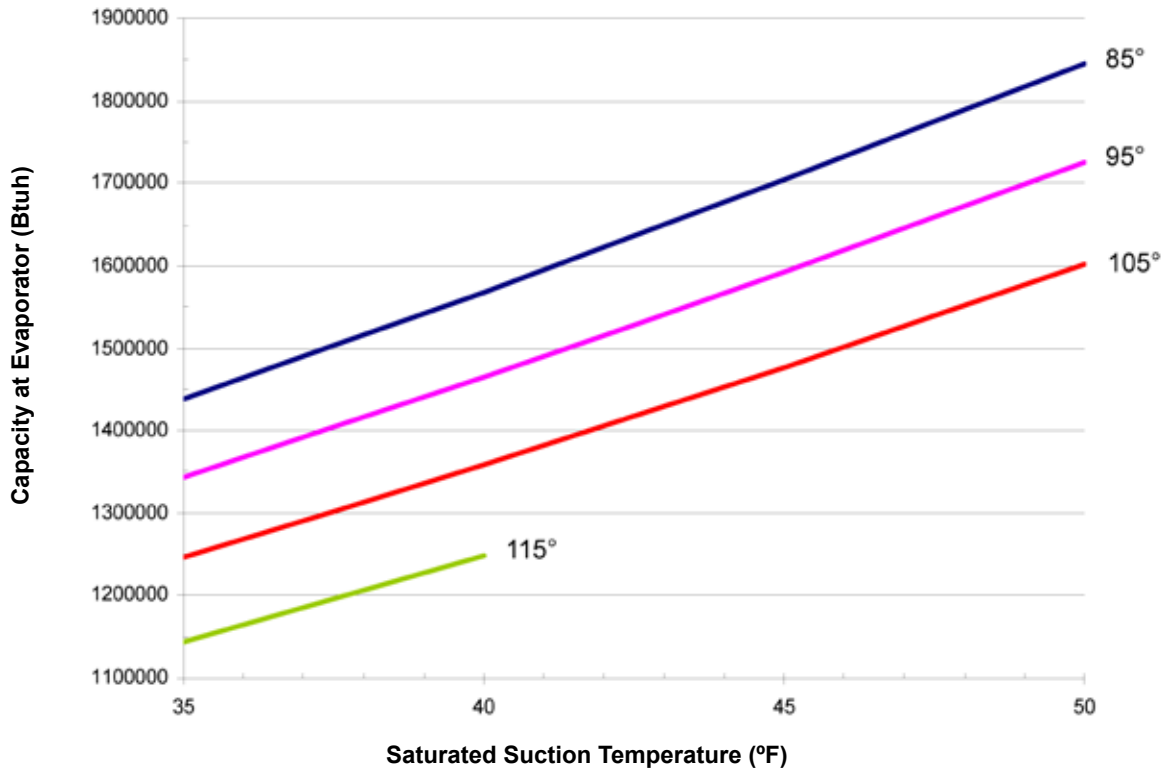


Figure 22: RCS 140D Unit Capacity Chart



Unit Dimensions

Figure 23: RCS 015D – 025D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).

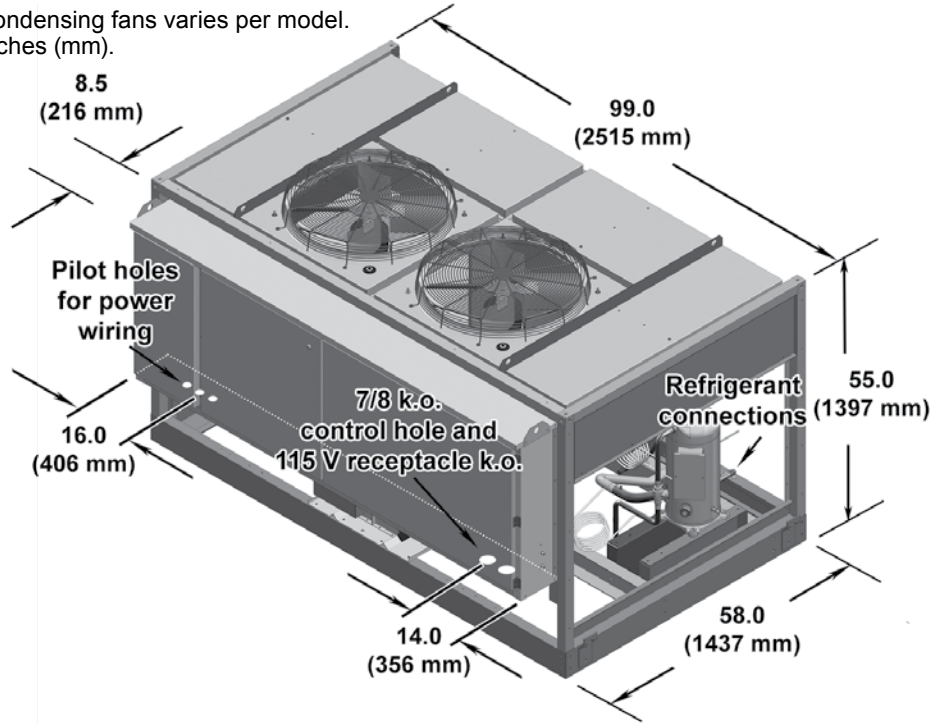


Figure 24: RCS 030D - 040D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).

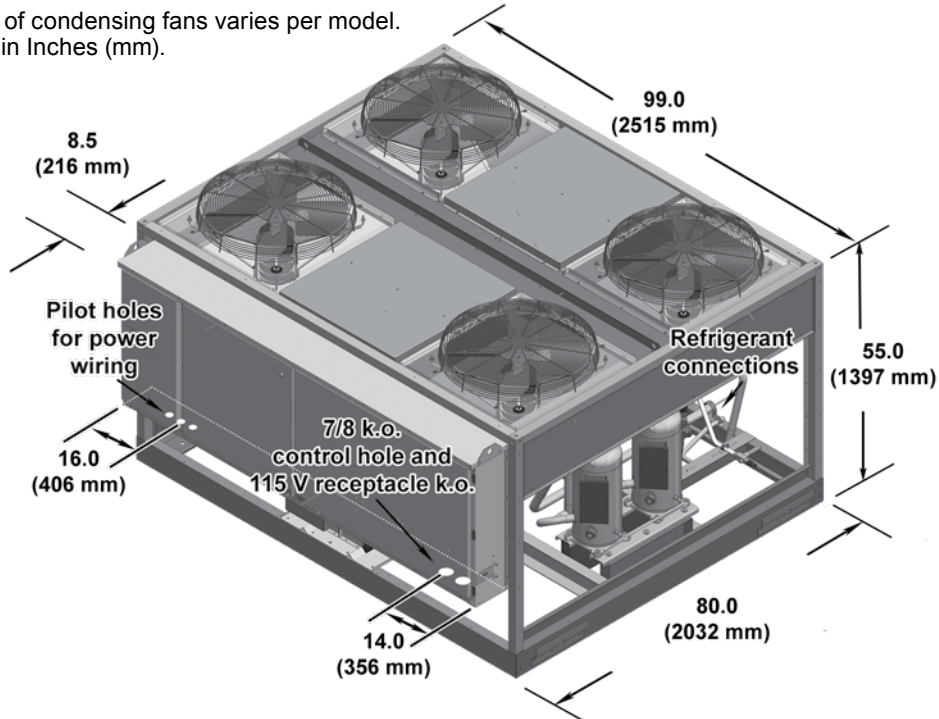


Figure 25: RCS 045D – 062D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).

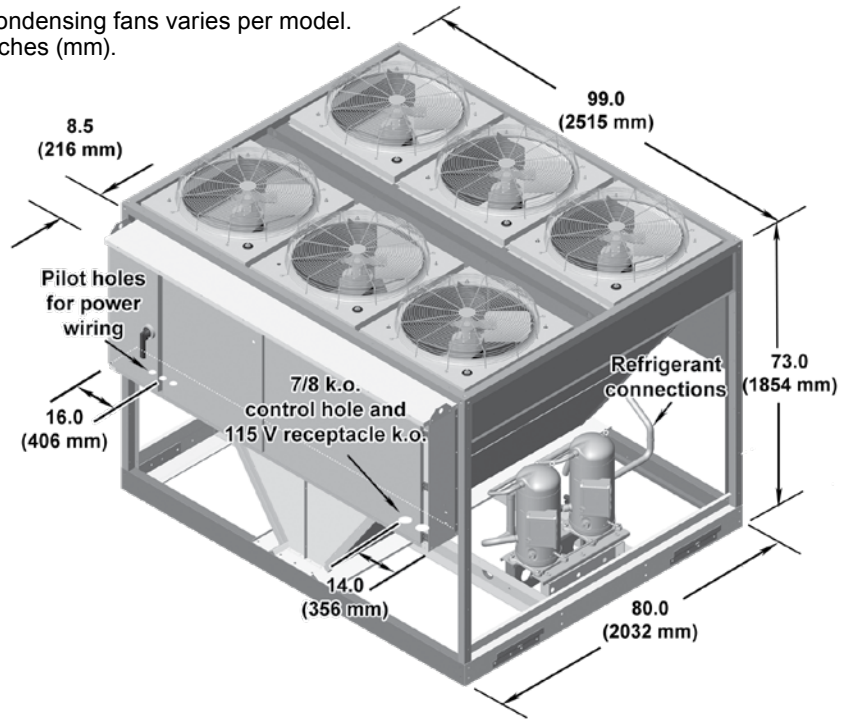


Figure 26: RCS 070D - 072D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).

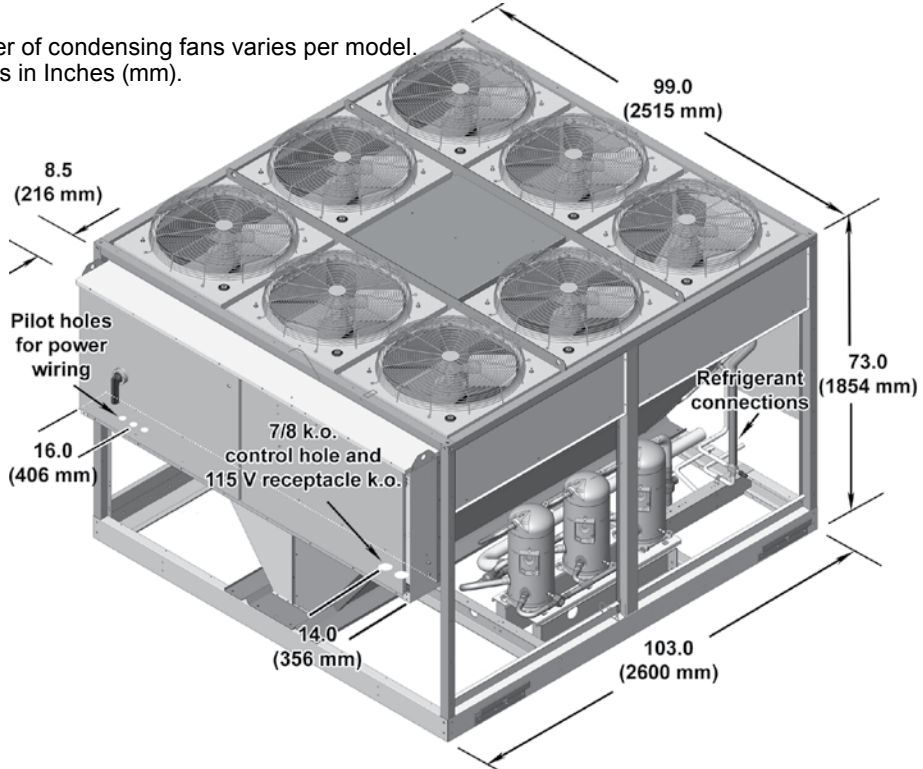


Figure 27: RCS 080D - 100D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).

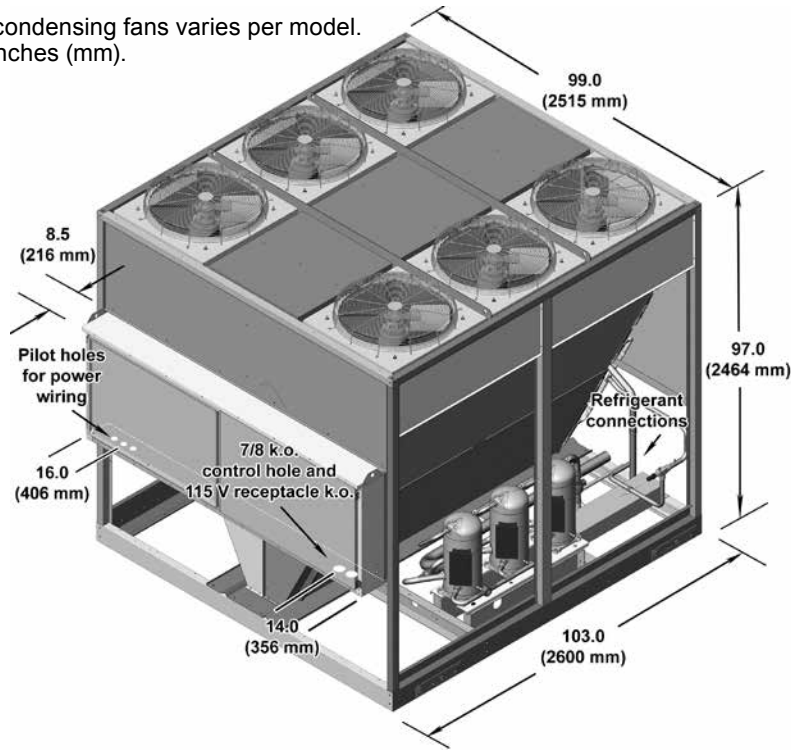
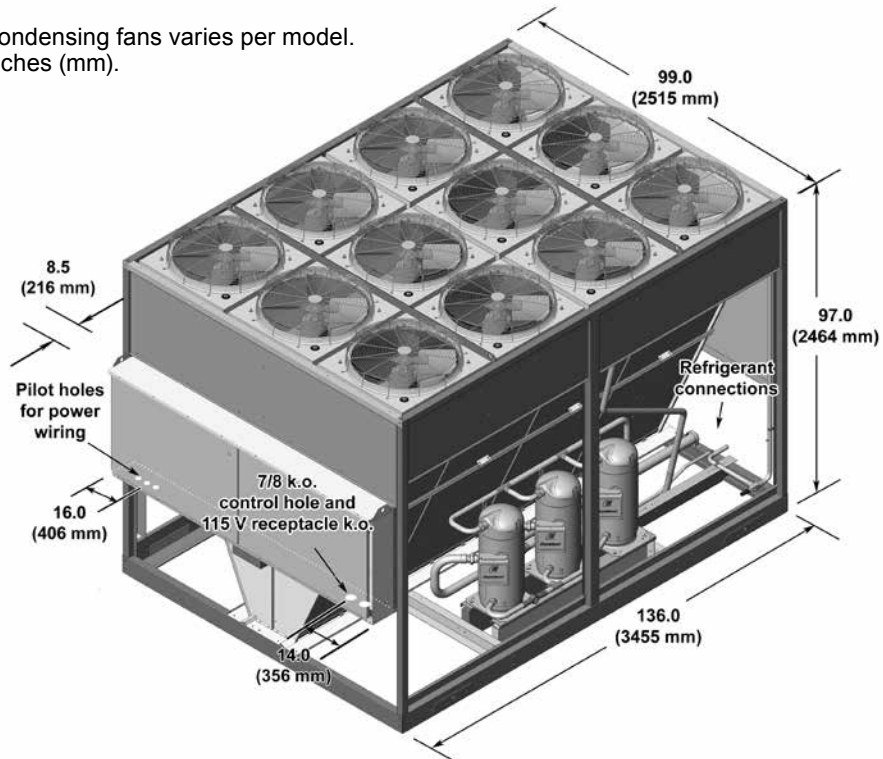


Figure 28: RCS 110D - 140D

NOTE: The number of condensing fans varies per model.
Dimensions in Inches (mm).



Piping Connections

NOTE: Piping locations are symmetrical on both sides.

Figure 29: Refrigerant Piping Connection Locations Example (040 Shown)

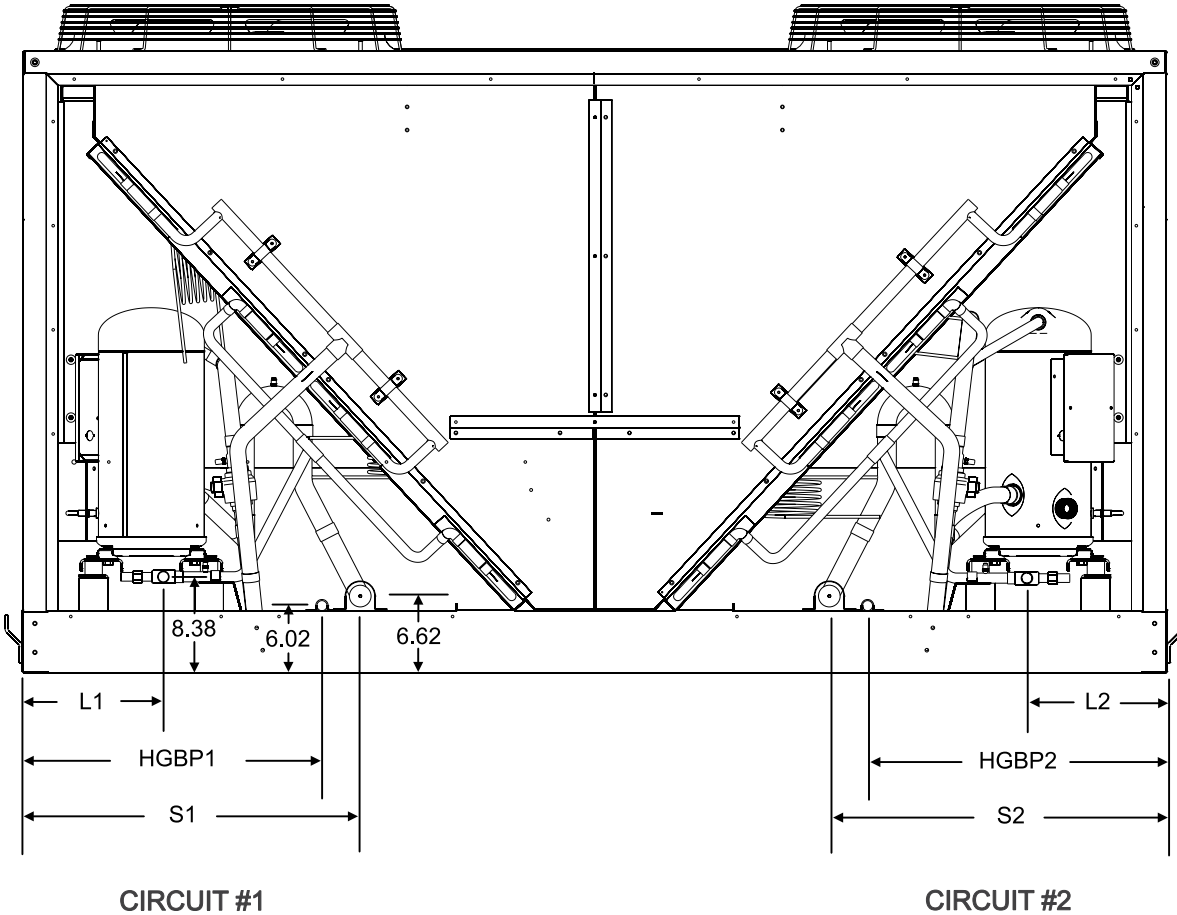


Table 8: 015D – 140D Connection Locations

Component Circuit			Connection Location (inches) refer to Figure 29								
			015D	020D	025D	030D	035D	040D	045D	050D	
S1	Suction line #1	Ckt.1	32.1	32.1	32.1	29.3	29.3	29.3	29.4	29.4	
S2	Suction line #2	Ckt.2	32.1	32.1	32.1	29.3	29.3	29.3	29.4	29.4	
L1	Liquid line #1	Ckt.1	16.7	16.7	16.7	12.9	12.9	12.9	12.0	12.0	
L2	Liquid line #2	Ckt.2	16.7	16.7	16.7	12.9	12.9	12.9	12.0	12.0	
HG1	HGBP line #1	Ckt.1	24.0	24.0	24.0	25.4	25.4	25.4	25.9	25.9	
HG2	HGBP line #2	Ckt.2	24.0	24.0	24.0	25.4	25.4	25.4	25.9	25.9	
Component Circuit			Connection Location (inches) refer to Figure 29								
			062D	072D	080D	092D	100D	110D	120D	125D	140D
S1	Suction line #1	Ckt.1	29.4	32.3	32.3	32.3	32.3	32.4	32.4	32.4	32.4
S2	Suction line #2	Ckt.2	29.4	32.3	32.3	32.3	32.3	32.4	32.4	32.4	32.4
L1	Liquid line #1	Ckt.1	12.0	13.5	11.2	11.2	11.2	20.8	20.8	20.8	20.8
L2	Liquid line #2	Ckt.2	12.0	13.5	11.2	11.2	11.2	20.8	20.8	20.8	20.8
HG1	HGBP line #1	Ckt.1	25.9	25.9	28.1	28.1	28.1	25.9	25.9	25.9	25.9
HG2	HGBP line #2	Ckt.2	25.9	25.9	28.1	28.1	28.1	25.9	25.9	25.9	25.9

Figure 30: Refrigerant Piping Connections Example (080D Shown)

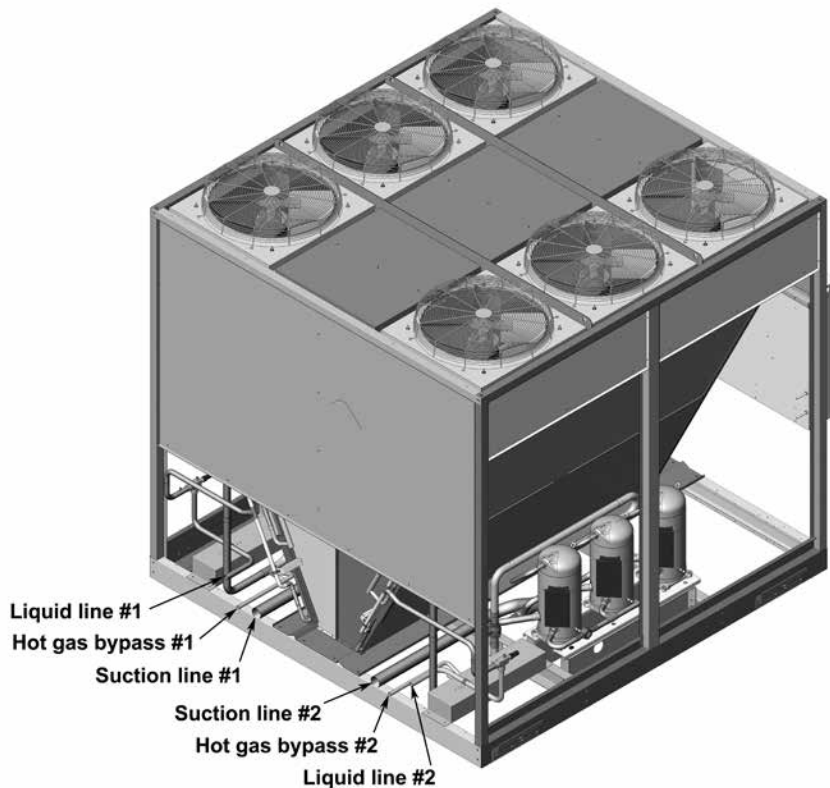


Table 9: 015D – 140D Connection Sizes

Component Circuit			Piping Connection Size (inches) refer to Figure 30								
			015D	020D	025D	030D	035D	040D	045D	050D	062D
S1	Suction line #1	Ckt.1	1.12	1.38	1.62	1.62	1.62	1.62	1.62	2.12	2.12
S2	Suction line #2	Ckt.2	1.12	1.38	1.62	1.62	1.62	1.62	1.62	2.12	2.12
L1	Liquid line #1	Ckt.1	0.62	0.62	0.88	0.88	0.88	0.88	0.88	0.88	0.88
L2	Liquid line #2	Ckt.2	0.62	0.62	0.88	0.88	0.88	0.88	0.88	0.88	0.88
HG1	HGBP line #1	Ckt.1	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
HG2	HGBP line #2	Ckt.2	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Component Circuit			Piping Connection Size (inches) refer to Figure 30								
			072D	080D	092D	100D	110D	120D	125D	140D	
S1	Suction line #1	Ckt.1	2.12	2.12	2.12	2.62	2.62	2.62	2.62	2.62	2.62
S2	Suction line #2	Ckt.2	2.12	2.12	2.12	2.62	2.62	2.62	2.62	2.62	2.62
L1	Liquid line #1	Ckt.1	0.88	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
L2	Liquid line #2	Ckt.2	0.88	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
HG1	HGBP line #1	Ckt.1	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
HG2	HGBP line #2	Ckt.2	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88

Power Wiring

Table 10: Compressor Rated Load Amps

Unit Size	Voltage	Compressor					
		#1 RLA	#2 RLA	#3 RLA	#4 RLA	#5 RLA	#6 RLA
015D	208	27.6	27.6	—	—	—	—
	230	25.0	25.0	—	—	—	—
	460	12.2	12.2	—	—	—	—
	575	9.4	9.4	—	—	—	—
020D	208	38.5	19.3	19.3	—	—	—
	230	34.8	17.4	17.4	—	—	—
	460	19.2	8.6	8.6	—	—	—
	575	13.9	6.5	6.5	—	—	—
025D	208	53.2	24.8	24.8	—	—	—
	230	48.1	22.4	22.4	—	—	—
	460	19.2	10.6	10.6	—	—	—
	575	16.0	7.7	7.7	—	—	—
030D	208	56.7	25.7	25.7	—	—	—
	230	51.3	23.2	23.2	—	—	—
	460	23.1	11.2	11.2	—	—	—
	575	19.9	8.2	8.2	—	—	—
035D	208	32.6	32.6	32.6	32.6	—	—
	230	29.5	29.5	29.5	29.5	—	—
	460	14.7	14.7	14.7	14.7	—	—
	575	12.2	12.2	12.2	12.2	—	—
040D	208	33.7	33.7	33.7	33.7	—	—
	230	30.5	30.5	30.5	30.5	—	—
	460	16.7	16.7	16.7	16.7	—	—
	575	12.2	12.2	12.2	12.2	—	—
045D	208	42.2	42.2	42.2	42.2	—	—
	230	38.2	38.2	38.2	38.2	—	—
	460	19.2	19.2	19.2	19.2	—	—
	575	13.9	13.9	13.9	13.9	—	—
050D	208	53.2	53.2	53.2	53.2	—	—
	230	48.1	38.2	48.1	38.2	—	—
	460	19.2	19.2	19.2	19.2	—	—
	575	16.0	13.9	16.0	13.9	—	—
062D	208	56.7	56.7	56.7	56.7	—	—
	230	51.3	51.3	51.3	51.3	—	—
	460	23.1	23.1	23.1	23.1	—	—
	575	19.9	19.9	19.9	19.9	—	—
072D	208	42.2	42.2	42.2	42.2	42.2	42.2
	230	38.2	38.2	38.2	38.2	38.2	38.2
	460	19.2	19.2	19.2	19.2	19.2	19.2
	575	13.9	13.9	13.9	13.9	13.9	13.9
080D	208	53.2	53.2	53.2	53.2	53.2	53.2
	230	48.1	48.1	48.1	48.1	48.1	48.1
	460	19.2	19.2	19.2	19.2	19.2	19.2
	575	16.0	16.0	16.0	16.0	16.0	16.0
092D	208	56.7	56.7	56.7	56.7	56.7	56.7
	230	51.3	51.3	51.3	51.3	51.3	51.3
	460	23.1	23.1	23.1	23.1	23.1	23.1
	575	19.9	19.9	19.9	19.9	19.9	19.9
100D	208	63.9	56.7	63.9	56.7	63.9	56.7
	230	57.8	51.3	57.8	51.3	57.8	51.3
	460	29.0	23.1	29.0	23.1	29.0	23.1
	575	23.7	19.9	23.7	19.9	23.7	19.9
110D	208	63.9	63.9	63.9	63.9	63.9	63.9
	230	57.8	57.8	57.8	57.8	57.8	57.8
	460	29.0	29.0	29.0	29.0	29.0	29.0
	575	23.7	23.7	23.7	23.7	23.7	23.7
120D	208	63.9	84.3	63.9	84.3	63.9	84.3
	230	57.8	76.3	57.8	76.3	57.8	76.3
	460	29.0	34.8	29.0	34.8	29.0	34.8
	575	23.7	28.4	23.7	28.4	23.7	28.4
125D	208	84.3	84.3	84.3	84.3	84.3	84.3
	230	76.3	76.3	76.3	76.3	76.3	76.3
	460	34.8	34.8	34.8	34.8	34.8	34.8
	575	28.4	28.4	28.4	28.4	28.4	28.4
140D	208	84.3	99.6	84.3	99.6	84.3	99.6
	230	76.3	90.1	76.3	90.1	76.3	90.1
	460	34.8	45.1	34.8	45.1	34.8	45.1
	575	28.4	34.7	28.4	34.7	28.4	34.7

Table 11: Condenser Fan Quantity

RCS Model	Quantity Fans
015D, 020D, 025D	2
030D, 035D, 040D, 045D, 050D	4
062D, 080D	6
072D, 110D	8
092D, 100D, 120D	9
125D	10
140D	12

Table 12: Condenser Fan Amps (each)

Voltage	Standard Fan, RPM = 1140	
	FLA	LRA
208	4.2	21.0
230	4.0	19.8
460	2.0	9.9
575	1.7	9.6

NOTE: Minimum circuit ampacity (MCA) = 1.25 × largest motor RLA + sum of all other RLA and FLA.

Table 13: MCA and MOPD Values

Model	Cond Fan	208V		230V		380V/60Hz		380V/50Hz		460V		575V	
		MCA	MROPD	MCA	MROPD	MCA	MROPD	MCA	MROPD	MCA	MROPD	MCA	MROPD
RCS 015D	2	71.9	90	65.6	90	42.5	50	33.3	45	32.3	40	25.1	30
RCS 020D	2	96.5	125	87.6	110	—	—	—	—	46.0	60	34.3	45
RCS 025D	2	125.9	175	114.2	150	68.0	90	51.0	70	50.0	60	39.3	50
RCS 030D	4	140.5	175	127.8	175	77.0	100	62.1	80	62.1	80	48.6	60
RCS 035D	4	156.8	175	142.7	150	90.3	100	73.3	80	71.5	80	59.2	70
RCS 040D	4	161.4	175	146.9	175	103.5	125	81.8	90	80.0	90	59.2	70
RCS 045D	4	199.0	225	180.9	200	118.6	125	93.1	110	91.3	110	66.9	80
RCS 050D	4	245.7	250	222.9	250	129.7	150	93.1	110	91.3	110	75.8	90
RCS 062D	6	269.0	300	244.5	250	143.6	150	114.7	125	112.1	125	95.8	110
RCS 072D	8	300.2	300	273.3	300	179.0	200	141.5	150	138.1	150	101.5	110
RCS 080D	6	360.5	400	327.1	350	190.3	200	136.5	150	133.9	150	111.2	125
RCS 092D	9	395.0	450	359.1	400	210.9	225	168.4	175	164.6	175	140.7	150
RCS 100D	9	418.4	450	380.3	400	237.2	250	187.6	200	183.8	200	153.0	175
RCS 110D	8	435.8	450	395.8	450	259.0	250	202.8	225	199.4	225	162.7	175
RCS 120D	9	506.3	500	459.9	500	285.9	300	224.1	250	220.3	250	179.7	200
RCS 125D	10	571.7	600	519.4	500	310.9	350	244.0	250	239.8	250	195.5	200
RCS 140D	12	629.8	700	572.2	600	352.3	400	282.5	300	277.5	300	219.4	250

NOTE: Calculations for RCS042D and smaller include 500 VA control transformer.
 Calculations for RCS045D and larger include 1000 VA control transformer.
 Units with 380V/60Hz and 380V/50Hz power include 1.5 HP TEAO condenser fan motors.

Figure 31: Typical RCS Controls Wiring Diagram

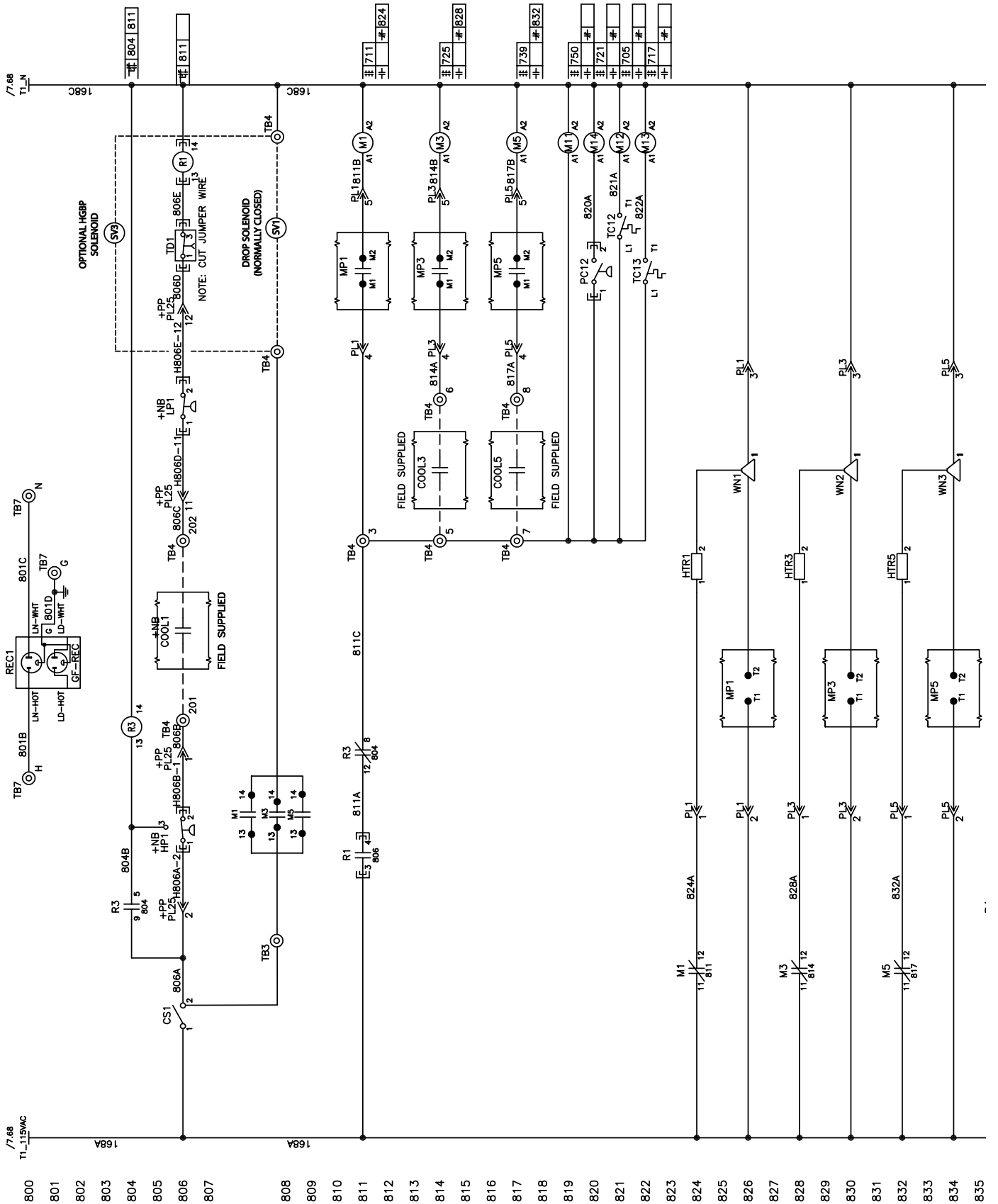


Figure 31: Typical RCS Controls Wiring Diagram (continued)

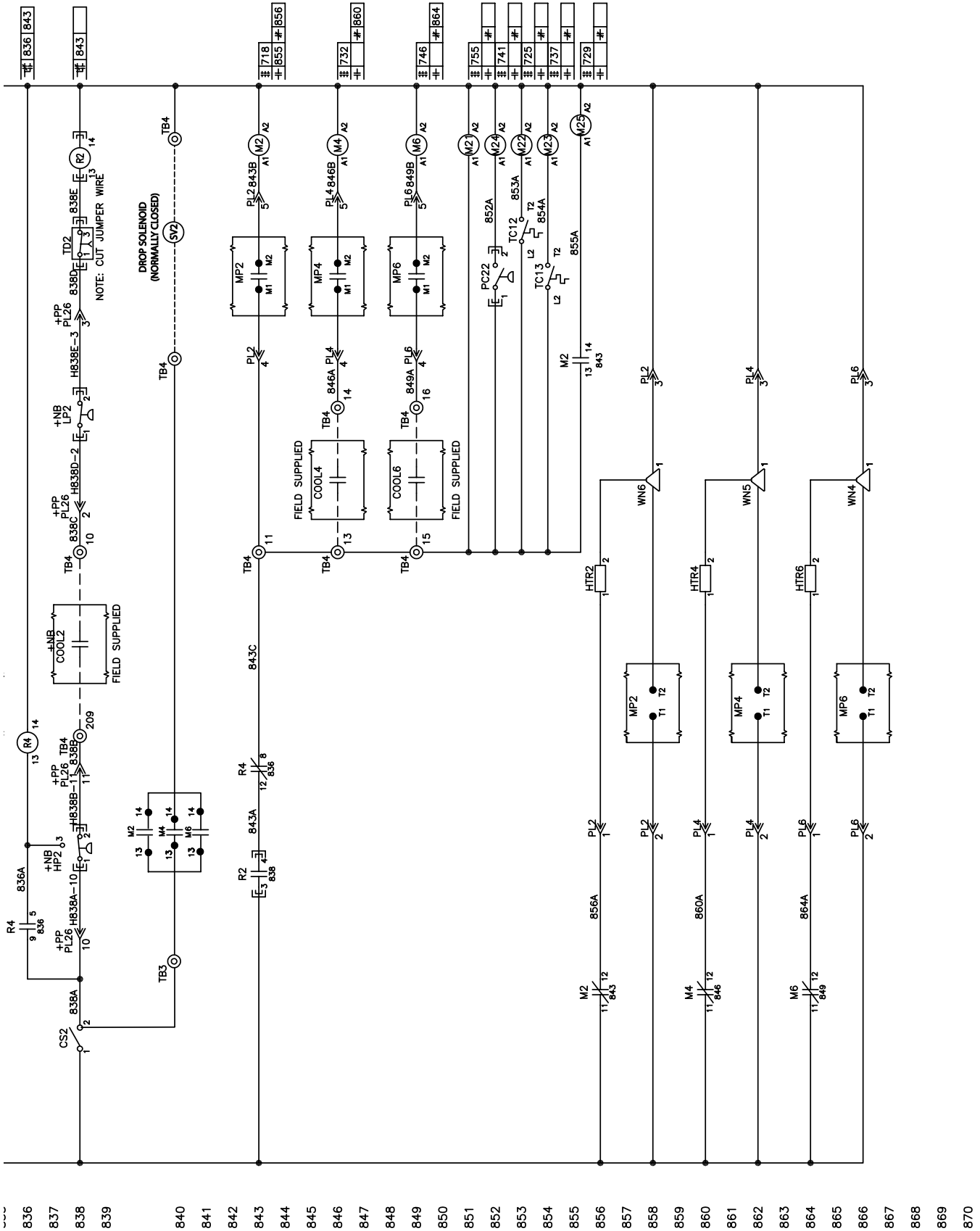


Figure 32: Typical RCS Condensing Unit Power Wiring Diagram

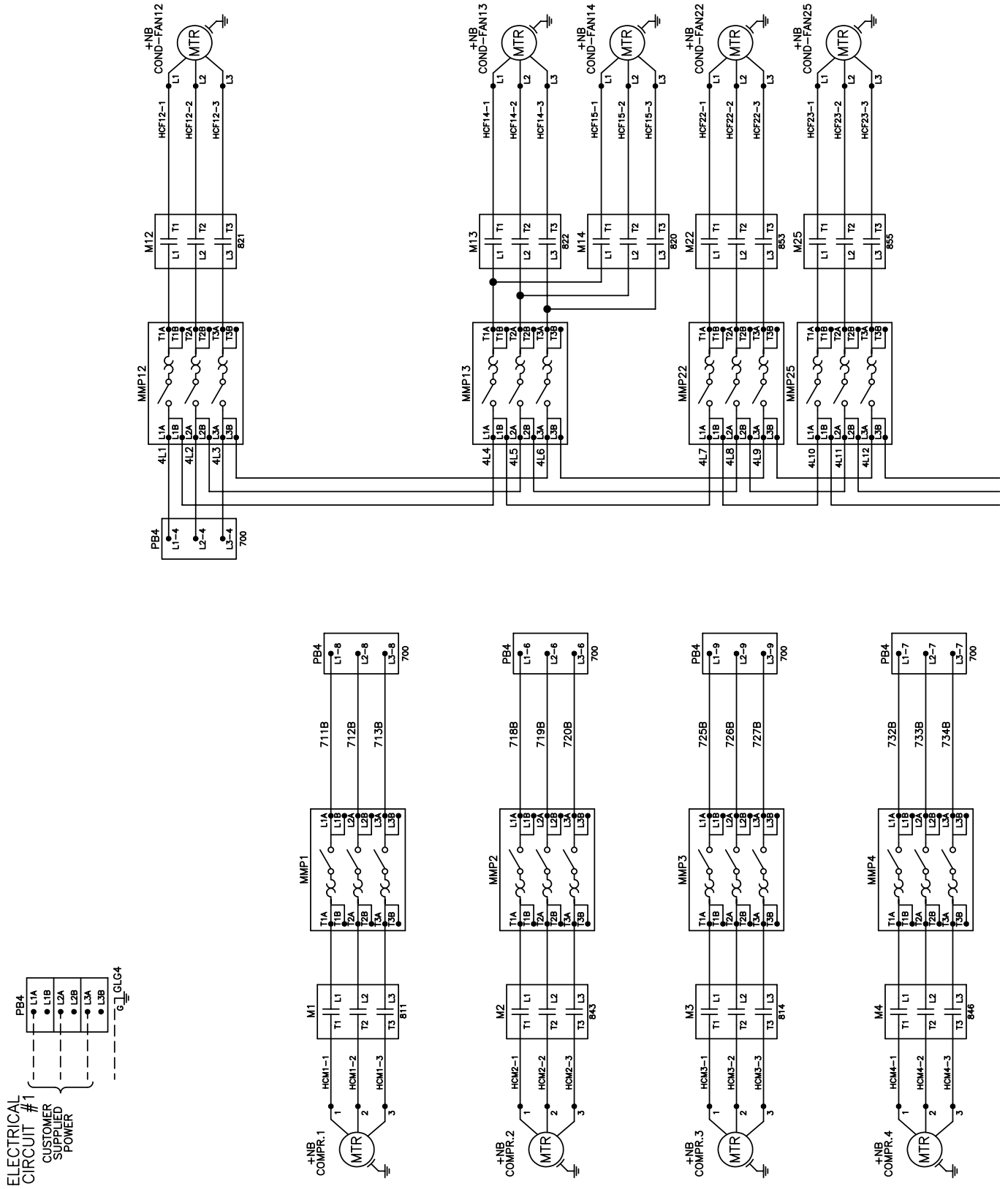
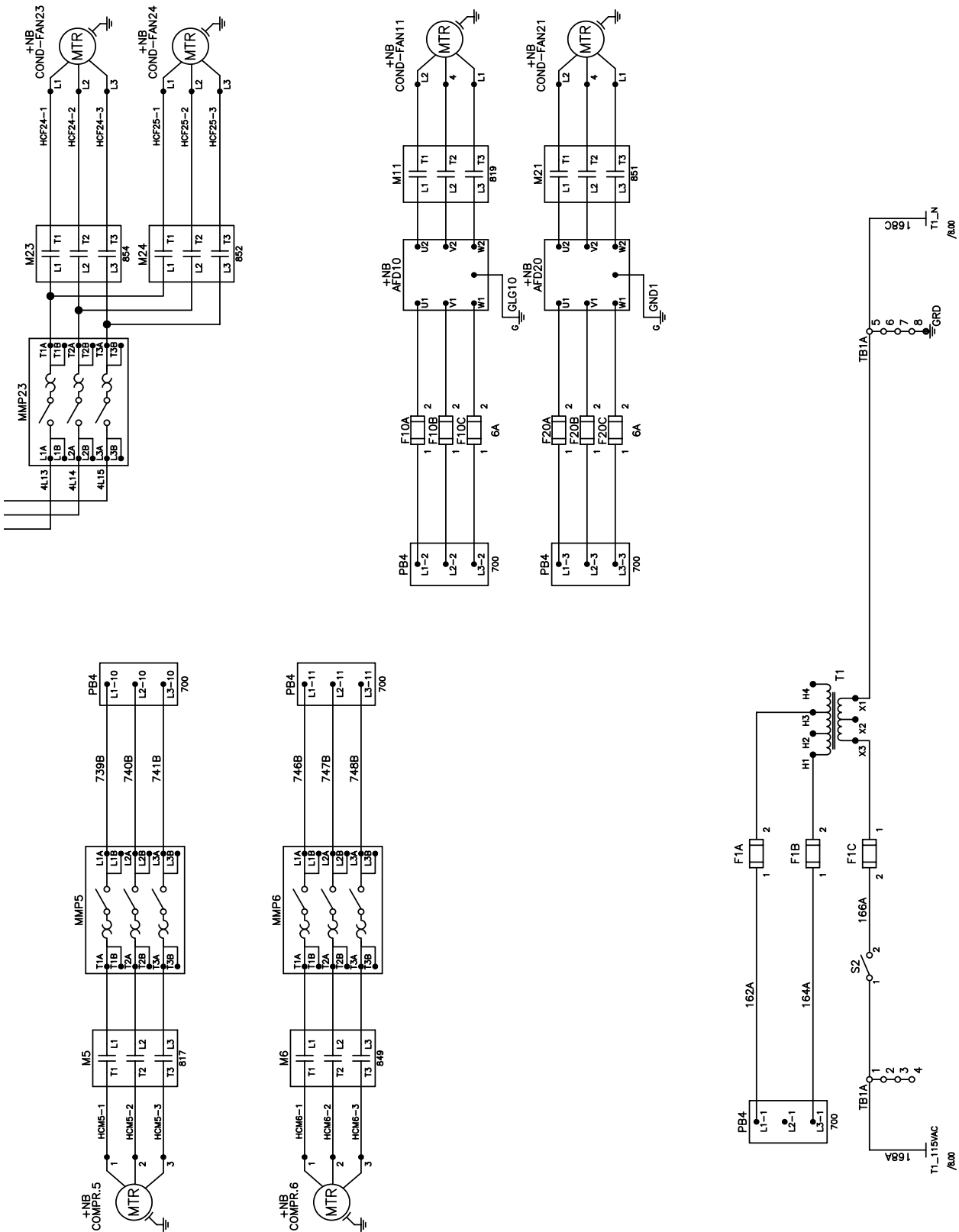


Figure 33: Typical RCS Condensing Unit Power Wiring Diagram (continued)



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Part 1: General

1.01 Summary

- A. Section includes design, performance criteria, refrigerants, and installation requirements for air cooled split condensing units.

1.02 References

- A. ARI-365 Commercial and Industrial Unitary Air Cooled Condensing Units.
- B. ANSI/ASHRAE 15 Safety Standard for Refrigerated Systems.

1.03 Submittals

- A. Submit Shop drawings and product data in accordance with the specifications.
- B. Submittals shall include the following:
 1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
 2. Summary of all auxiliary utility requirements, such as electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
 3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
 4. Schematic diagram of control system indicating points for field interface/connection.
 5. Diagram shall fully delineate field and factory wiring.
 6. Installation manuals.

1.04 Qualifications

- A. Regulatory Requirements: Comply with the codes and standards specified.
- B. Manufacturer's plant must be ISO Registered.

1.05 Delivery and Handling

- A. Condensing units shall be delivered to the job site assembled, leak tested, evacuated, and charged with a holding charge of dry nitrogen.
- B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06 Warranty

- A. The refrigeration equipment manufacturer's initial warranty shall be within 12 months from start-up or 18 months, whichever occurs first.
- B. The warranty shall provide for repair or replacement due to material and workmanship that proves defective within the above period, excluding refrigerant.

1.07 Maintenance

- A. Include instructions for installation, maintenance and service.
- B. Maintenance of the units shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

Part 2: Products

2.01 Acceptable Manufacturers

- A. Basis of design: McQuay International.
- B. (Approved Equal).

2.02 Unit Description

- A. Scroll Option: Provide and install, as shown on the plans, a factory-assembled, air-cooled scroll compressor condensing units in the size and quantity specified. Each unit shall consist of hermetic tandem or triple scroll compressor sets, air-cooled condenser section.

2.03 Design Requirements

- A. General: Provide a complete condensing unit as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.
- B. Performance: Refer to the schedule of performance on the drawings. Performance shall be in accordance with ARI Standard 365-94.
- C. Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

2.04 Condensing Section

- A. Air Cooled Condenser
 - 1. Each condenser coil shall be factory leak tested with high-pressure air under water. Each refrigerant circuit shall provide 15 degrees of liquid subcooling.
 - 2. Condenser coils shall be fabricated from cast aluminum micro-channel coils. Each condenser coil shall be factory leak tested with high-pressure air under water. Coils are to be recessed so that the cabinet provides built in hail protection.
 - 3. Condenser fans shall be 1140 rpm direct drive, propeller type designed for low tip speed, vertical air discharge, and include service guards. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.
 - 4. Units shall have at least one condenser fan controlled to maintain positive head pressure. An ambient thermostat shall prevent the refrigeration system from operating below 45°F ambient.
- B. Scroll Compressors
 - 1. Unit shall have multiple, heavy-duty Copeland scroll compressors.
 - 2. Each compressor shall be complete with gauge ports, oil sight glass, crank case heater, anti-slug protection, and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure.
 - 3. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.
 - 4. Refrigeration capacity control shall be accomplished by staging of the unit's multiple compressors. Liquid tight conduit shall be provided on exposed compressor wire.
 - 5. Each compressor shall have motor temperature sensing and current sensing overload protection.
- C. Refrigerant Circuit: Manual charging/evacuation valve and capped connections shall be provided for field connection of refrigerant piping.
 - 1. Refrigerant specialties shall be field supplied and installed.
 - 2. The unit shall have two independent refrigeration circuits.

2.05 Controls

- A. Unit shall be equipped with a low pressure and high pressure safety for each refrigerant circuit.
- B. Additional compressor safety controls are referenced in 2.04 Condensing Section - B2 and B5 9 (above).
- C. Unit manufacturer shall provide necessary relays for cooling stages as stated on equipment schedule.
- D. Field powered 115V outlet.

2.06 Options and Accessories

NOTE: The following options are to be included:

- A. Hot gas bypass kit for one (or both) circuits to allow unit operation to 10 percent of full load.
- B. VFD condenser fan speed control shall be added to the last fan off on each refrigeration circuit to provide cooling operation to ambient temperatures down to 0°F.
- C. Unit shall be equipped with a 24 V terminal strip for field supplied and installed controls.
- D. Non-fused disconnect switch with through-the-door handle.
- E. Baked epoxy coating providing 3000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frames.
- F. Spring vibration isolators for field installation.
- G. Vandal guards.
- H. Factory powered 115 V convenience outlet.
 - I. The manufacturer will provide extended 48 month, parts only, warranty on the compressor.
- J. The condensing unit shall be designed, manufactured, and independently tested, rated, and certified to meet the seismic standards of the 2009 International Building Code and ASCE 7-06.
 - 1. Certificates of Compliance shall be provided with the quotation and include the manufacturer's identification, designation of certified characteristics, and the Independent Certifying Agency's name and report identification.
 - 2. Clear installation instructions shall be provided including all accessory components.
- K. Suction and discharge isolation valves for each refrigeration circuit.

Part 3: Execution

3.01 Installation

- A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust and level unit in alignment on supports.
- C. Coordinate electrical installation with electrical contractor.
- D. Coordinate controls with control contractor.

3.02 Start-Up

- A. Install proper charge of refrigerant and oil.
- B. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.



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