

OAVC Direct Drive Air-Cooled Condenser

One to Twelve Fan Motors

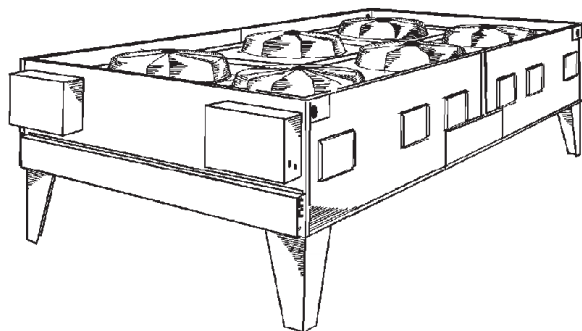


Air Cooled Condenser

PRODUCT DATA & INSTALLATION

OAVC Direct Drive Air-Cooled Condenser

One to Twelve Fan Motors



NOMENCLATURE

	OAVC	2	A	26	206	A	-T3	
Model								
OAVC = OMRAN Vertical air flow Condenser								
OAHC = OMRAN Horizontal air flow Condenser								
Tubing								
1 = 3/8 OD smooth								
2 = 1/2 OD smooth								
Motor & Fan Type								
A = 30" fan with 850 RPM Motor (700 RPM)								
B = 30" fan with 550 RPM Motor (450 RPM)								
C = 30" Fanwith 1140 RPM Motor (950 RPM)								
Fan Configuration								
First number = number of fans wide								
Second number = number of fans in length								
26 = 2 fans wide x 6 fans length (total 12 fans)								
11 = 1 fan wide x 1 fan length (total 1 fan)								
Electrical Code								
S2 = 208-230/1/60								S6 = 200-220/1/50
T3 = 208-230/3/60								T7 = 200-220/3/50
T4 = 460/3/60								T9 = 380-400/3/50
T5 = 575/3/60								
Fin Material & Spacing								
A = Aluminum 12 FPI (Standard), B = 10, C = 8								
D = Copper 12 FPI, E = 10, F = 8								
Nominal Capacity (Tons - THR)								
Rated at 25°F (14 °C) TD, 30" Fan / 850 RPM Motor,								
12" FPI, smooth tubing, 0 Subcooling, Sea Level								

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- **850 RPM** quiet low speed Dual voltage fan motors
- **Optional 550 ultra low and 1140 RPM high** speed motors available.
- **Rugged heavy-gauge** galvanized steel rail motor mounts/support.
- **All fan sections individually baffled** with full height partitions, and clean-out panels.
- **Complete selection** of electrical fan cycling and speed control options.
- **Heavy-gauge** galvanized steel cabinet construction assembled with zinc plated huck bolts supported on heavy-duty legs.

Continuing research results in steady improvements.
Therefore , these specifications are subject to change without notice.

CAPACITY DATA - 850 RPM MODELS - R22

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1 °F (0.56 °C)	10 °F (5.56 °C)	15 °F (8.3 °C)	20 °F (11.1 °C)	30 °F (16.7 °C)	1 °F (0.56 °C)	1 °F (0.56 °C)
Single Row Models								
007	1 x 1	3.165	31.7	47.5	63.3	95.0	2.912	2.595
009	1 x 1	4.135	41.4	62.0	82.7	124	3.846	3.515
010	1 x 1	4.655	46.6	69.8	93.1	140	4.329	3.957
011	1 x 1	5.365	53.7	80.5	107	161	5.097	4.721
012	1 x 1	5.875	58.8	88.1	118	176	5.581	5.170
013	1 x 1	6.465	64.7	97.0	129	194	6.336	5.948
017	1 x 2	8.265	82.7	124	165	248	7.686	7.025
019	1 x 2	9.265	92.7	139	185	278	8.616	7.875
022	1 x 2	10.74	107	161	215	322	10.20	9.447
024	1 x 2	11.77	118	176	235	353	11.18	10.35
027	1 x 2	12.94	129	194	259	388	12.68	11.90
029	1 x 3	13.97	140	209	279	419	12.90	11.87
034	1 x 3	16.07	161	241	321	482	15.26	14.14
037	1 x 3	17.64	176	265	353	529	16.75	15.52
041	1 x 3	19.40	194	291	388	582	19.01	17.85
043	1 x 3	20.64	206	310	413	619	19.61	18.17
048	1 x 3	23.01	230	345	460	690	22.55	21.17
056	1 x 4	26.34	263	395	527	790	24.50	22.39
063	1 x 4	30.29	303	454	606	909	28.77	26.65
068	1 x 4	32.55	326	488	651	977	31.90	29.95
079	1 x 5	37.95	379	569	759	1138	36.05	33.39
085	1 x 5	40.70	407	610	814	1221	39.88	37.44
095	1 x 6	45.54	455	683	911	1366	43.26	40.07
103	1 x 6	48.84	488	733	977	1465	47.85	44.93
039	2 x 2	18.60	186	279	372	558	17.30	15.81
045	2 x 2	21.47	215	322	429	644	20.39	18.89
049	2 x 2	23.50	235	353	470	705	22.33	20.68
054	2 x 2	25.84	258	388	517	775	25.32	23.77
058	2 x 3	27.90	279	419	558	837	25.95	23.72
067	2 x 3	32.17	322	482	643	965	30.56	28.31
073	2 x 3	35.24	352	529	705	1057	33.47	31.01
081	2 x 3	38.77	388	581	775	1163	37.99	35.66
086	2 x 3	41.29	413	619	826	1239	39.22	36.33
096	2 x 3	46.02	460	690	920	1381	45.10	42.34
112	2 x 4	53.89	539	808	1078	1617	50.11	45.80
126	2 x 4	60.57	606	909	1211	1817	57.54	53.30
137	2 x 4	65.99	660	990	1320	1980	64.67	60.71
158	2 x 5	75.90	759	1138	1518	2277	72.10	66.79
172	2 x 5	82.50	825	1237	1650	2475	80.85	75.90
190	2 x 6	91.08	911	1366	1822	2732	86.52	80.15
206	2 x 6	98.99	990	1485	1980	2970	97.01	91.07

Correction Factors for Other refrigerants - Use R22 Values Multiplied By

R134a	R12	R507	R404A	R407A	R407B	R502	R407C
0.94	0.95	0.97	0.97	0.97	0.97	0.98	1.00

NOTES:

- (1) Above capacity data based on 0 °F subcooling and at sea level.
- (2) TD = Condensing temperature - ambient temperature
- (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
- (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
- (5) For 50Hz capacity multiply by 0.92.

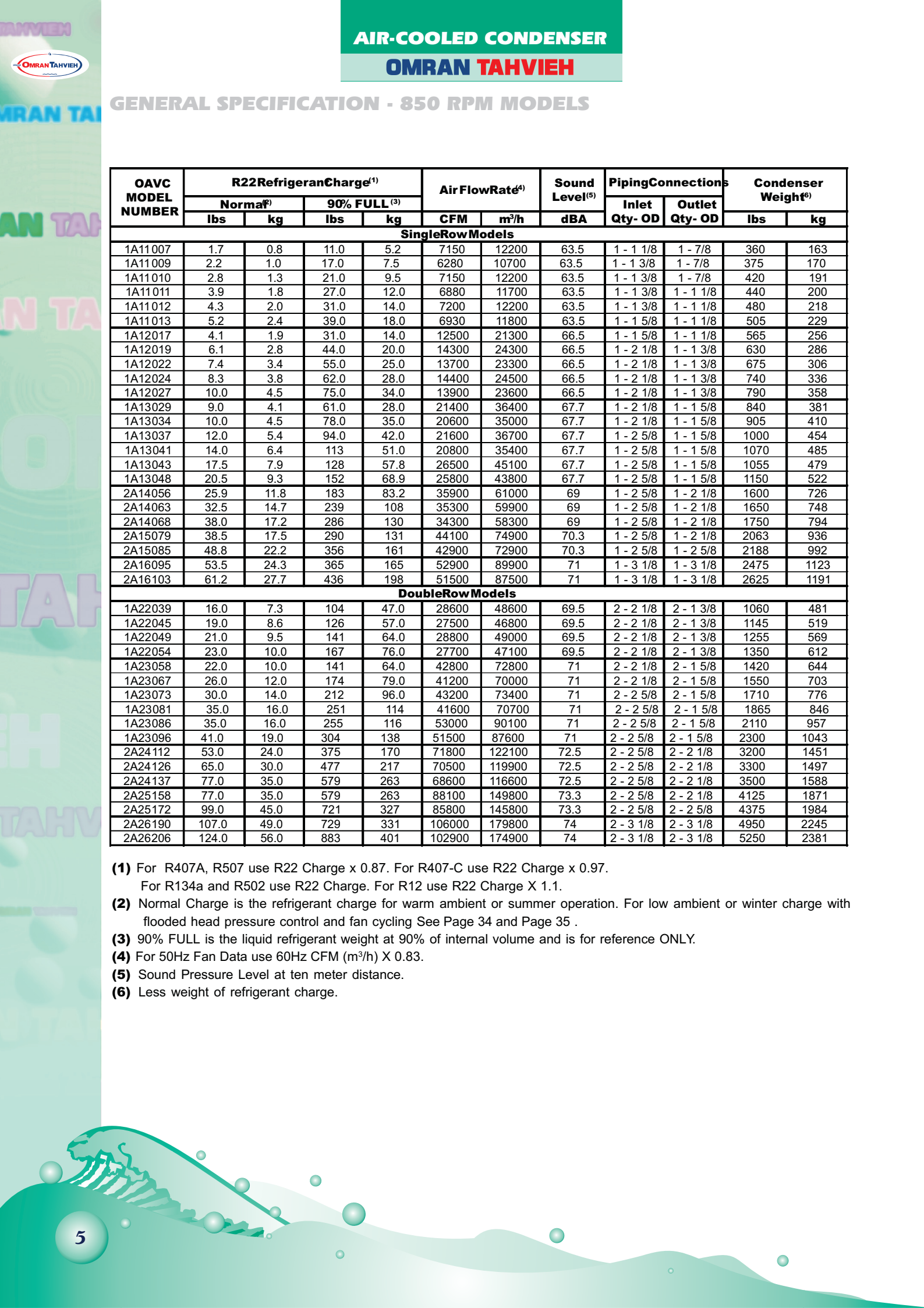
CAPACITY DATA 850 RPM MODELS - R404A

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1 °F (0.56 °C)	10 °F (5.56 °C)	15 °F (8.3 °C)	20 °F (11.1 °C)	30 °F (16.7 °C)	1 °F (0.56 °C)	1 °F (0.56 °C)
Single Row Models								
007	1 x 1	3.070	30.7	46.1	61.4	92.1	2.825	2.517
009	1 x 1	4.011	40.1	60.2	80.2	120	3.731	3.410
010	1 x 1	4.515	45.2	67.7	90.3	135	4.199	3.838
011	1 x 1	5.204	52.0	78.1	104	156	4.944	4.579
012	1 x 1	5.699	57.0	85.5	114	171	5.414	5.015
013	1 x 1	6.271	62.7	94.1	125	188	6.146	5.770
017	1 x 2	8.017	80.2	120	160	241	7.455	6.814
019	1 x 2	8.987	89.9	135	180	270	8.358	7.639
022	1 x 2	10.41	104	156	208	312	9.892	9.164
024	1 x 2	11.41	114	171	228	342	10.84	10.04
027	1 x 2	12.55	125	188	251	376	12.30	11.54
029	1 x 3	13.55	135	203	271	406	12.51	11.51
034	1 x 3	15.58	156	234	312	467	14.80	13.71
037	1 x 3	17.11	171	257	342	513	16.25	15.05
041	1 x 3	18.82	188	282	376	565	18.44	17.31
043	1 x 3	20.02	200	300	400	601	19.02	17.62
048	1 x 3	22.32	223	335	446	670	21.87	20.53
056	1 x 4	25.55	256	383	511	767	23.77	21.72
063	1 x 4	29.38	294	441	588	881	27.91	25.85
068	1 x 4	31.58	316	474	632	947	30.94	29.05
079	1 x 5	36.81	368	552	736	1104	34.97	32.39
085	1 x 5	39.48	395	592	790	1184	38.69	36.32
095	1 x 6	44.17	442	663	883	1325	41.96	38.87
103	1 x 6	47.37	474	711	947	1421	46.41	43.58
Double Row Models								
039	2 x 2	18.04	180	271	361	541	16.78	15.34
045	2 x 2	20.82	208	312	416	625	19.78	18.32
049	2 x 2	22.80	228	342	456	684	21.66	20.06
054	2 x 2	25.06	251	376	501	752	24.56	23.05
058	2 x 3	27.06	271	406	541	812	25.17	23.00
067	2 x 3	31.20	312	468	624	936	29.64	27.46
073	2 x 3	34.18	342	513	684	1025	32.47	30.08
081	2 x 3	37.60	376	564	752	1128	36.85	34.59
086	2 x 3	40.05	400	601	801	1201	38.04	35.24
096	2 x 3	44.64	446	670	893	1339	43.75	41.07
112	2 x 4	52.27	523	784	1045	1568	48.61	44.43
126	2 x 4	58.75	588	881	1175	1763	55.82	51.70
137	2 x 4	64.01	640	960	1280	1920	62.73	58.88
158	2 x 5	73.62	736	1104	1472	2209	69.94	64.78
172	2 x 5	80.02	800	1200	1600	2401	78.42	73.62
190	2 x 6	88.34	883	1325	1767	2650	83.93	77.74
206	2 x 6	96.02	960	1440	1920	2881	94.10	88.34

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

NOTES:

- (1) Above capacity data based on 0 °F subcooling and at sea level.
- (2) TD = Condensing temperature - ambient temperature
- (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
- (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
- (5) For 50Hz capacity multiply by 0.92.



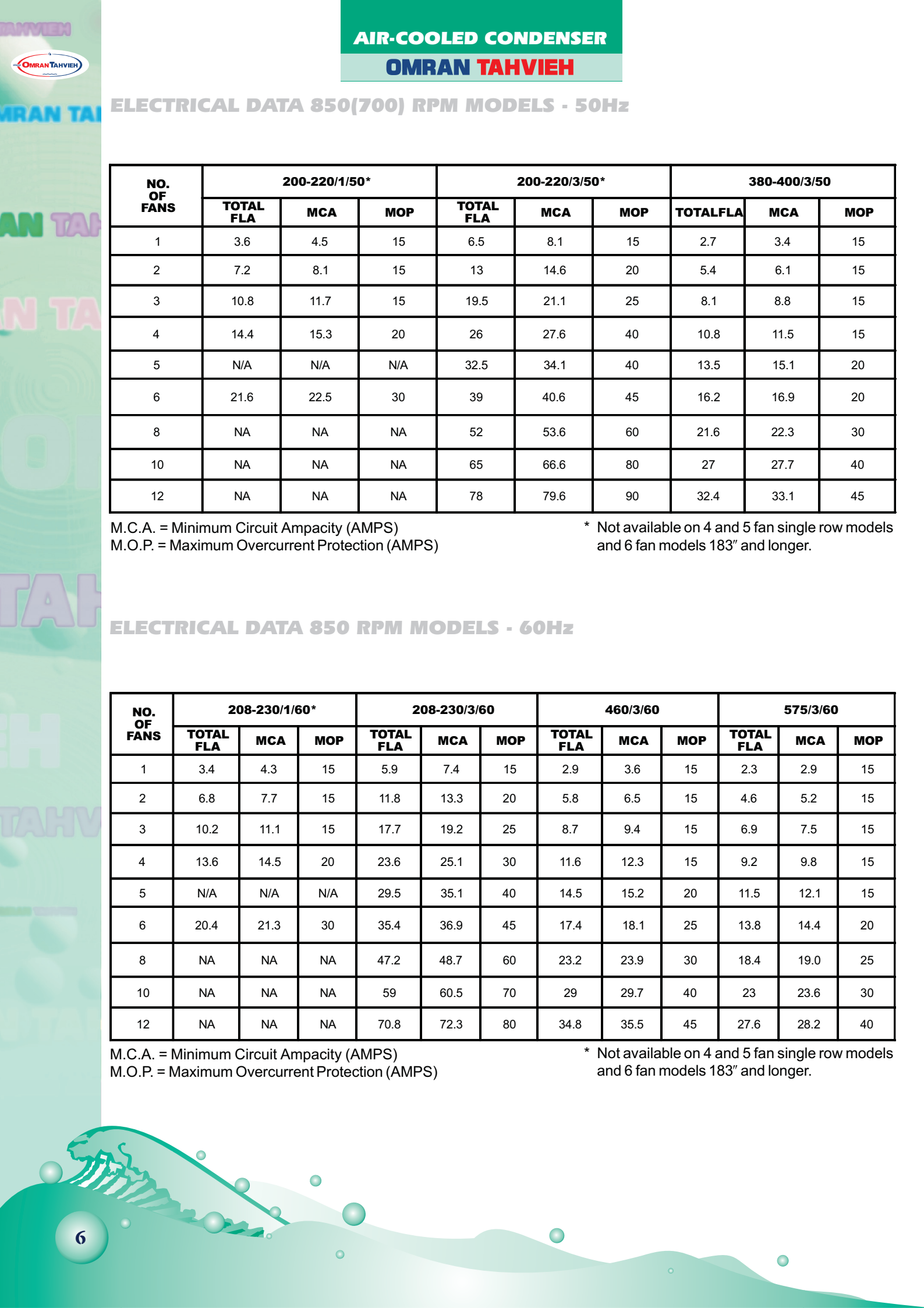
AIR-COOLED CONDENSER

OMRAN TAHVIEH

GENERAL SPECIFICATION - 850 RPM MODELS

OAVC MODEL NUMBER	R22RefrigeranCharge ⁽¹⁾				Air FlowRate ⁽⁴⁾		Sound Level ⁽⁵⁾	PipingConnections		Condenser Weight ⁽⁶⁾	
	Norma ⁽²⁾		90% FULL ⁽³⁾					Inlet	Outlet		
	lbs	kg	lbs	kg	CFM	m³/h	dBA	Qty- OD	Qty- OD	lbs	kg
SingleRowModels											
1A11007	1.7	0.8	11.0	5.2	7150	12200	63.5	1 - 1 1/8	1 - 7/8	360	163
1A11009	2.2	1.0	17.0	7.5	6280	10700	63.5	1 - 1 3/8	1 - 7/8	375	170
1A11010	2.8	1.3	21.0	9.5	7150	12200	63.5	1 - 1 3/8	1 - 7/8	420	191
1A11011	3.9	1.8	27.0	12.0	6880	11700	63.5	1 - 1 3/8	1 - 1 1/8	440	200
1A11012	4.3	2.0	31.0	14.0	7200	12200	63.5	1 - 1 3/8	1 - 1 1/8	480	218
1A11013	5.2	2.4	39.0	18.0	6930	11800	63.5	1 - 1 5/8	1 - 1 1/8	505	229
1A12017	4.1	1.9	31.0	14.0	12500	21300	66.5	1 - 1 5/8	1 - 1 1/8	565	256
1A12019	6.1	2.8	44.0	20.0	14300	24300	66.5	1 - 2 1/8	1 - 1 3/8	630	286
1A12022	7.4	3.4	55.0	25.0	13700	23300	66.5	1 - 2 1/8	1 - 1 3/8	675	306
1A12024	8.3	3.8	62.0	28.0	14400	24500	66.5	1 - 2 1/8	1 - 1 3/8	740	336
1A12027	10.0	4.5	75.0	34.0	13900	23600	66.5	1 - 2 1/8	1 - 1 3/8	790	358
1A13029	9.0	4.1	61.0	28.0	21400	36400	67.7	1 - 2 1/8	1 - 1 5/8	840	381
1A13034	10.0	4.5	78.0	35.0	20600	35000	67.7	1 - 2 1/8	1 - 1 5/8	905	410
1A13037	12.0	5.4	94.0	42.0	21600	36700	67.7	1 - 2 5/8	1 - 1 5/8	1000	454
1A13041	14.0	6.4	113	51.0	20800	35400	67.7	1 - 2 5/8	1 - 1 5/8	1070	485
1A13043	17.5	7.9	128	57.8	26500	45100	67.7	1 - 2 5/8	1 - 1 5/8	1055	479
1A13048	20.5	9.3	152	68.9	25800	43800	67.7	1 - 2 5/8	1 - 1 5/8	1150	522
2A14056	25.9	11.8	183	83.2	35900	61000	69	1 - 2 5/8	1 - 2 1/8	1600	726
2A14063	32.5	14.7	239	108	35300	59900	69	1 - 2 5/8	1 - 2 1/8	1650	748
2A14068	38.0	17.2	286	130	34300	58300	69	1 - 2 5/8	1 - 2 1/8	1750	794
2A15079	38.5	17.5	290	131	44100	74900	70.3	1 - 2 5/8	1 - 2 1/8	2063	936
2A15085	48.8	22.2	356	161	42900	72900	70.3	1 - 2 5/8	1 - 2 5/8	2188	992
2A16095	53.5	24.3	365	165	52900	89900	71	1 - 3 1/8	1 - 3 1/8	2475	1123
2A16103	61.2	27.7	436	198	51500	87500	71	1 - 3 1/8	1 - 3 1/8	2625	1191
DoubleRowModels											
1A22039	16.0	7.3	104	47.0	28600	48600	69.5	2 - 2 1/8	2 - 1 3/8	1060	481
1A22045	19.0	8.6	126	57.0	27500	46800	69.5	2 - 2 1/8	2 - 1 3/8	1145	519
1A22049	21.0	9.5	141	64.0	28800	49000	69.5	2 - 2 1/8	2 - 1 3/8	1255	569
1A22054	23.0	10.0	167	76.0	27700	47100	69.5	2 - 2 1/8	2 - 1 3/8	1350	612
1A23058	22.0	10.0	141	64.0	42800	72800	71	2 - 2 1/8	2 - 1 5/8	1420	644
1A23067	26.0	12.0	174	79.0	41200	70000	71	2 - 2 1/8	2 - 1 5/8	1550	703
1A23073	30.0	14.0	212	96.0	43200	73400	71	2 - 2 5/8	2 - 1 5/8	1710	776
1A23081	35.0	16.0	251	114	41600	70700	71	2 - 2 5/8	2 - 1 5/8	1865	846
1A23086	35.0	16.0	255	116	53000	90100	71	2 - 2 5/8	2 - 1 5/8	2110	957
1A23096	41.0	19.0	304	138	51500	87600	71	2 - 2 5/8	2 - 1 5/8	2300	1043
2A24112	53.0	24.0	375	170	71800	122100	72.5	2 - 2 5/8	2 - 2 1/8	3200	1451
2A24126	65.0	30.0	477	217	70500	119900	72.5	2 - 2 5/8	2 - 2 1/8	3300	1497
2A24137	77.0	35.0	579	263	68600	116600	72.5	2 - 2 5/8	2 - 2 1/8	3500	1588
2A25158	77.0	35.0	579	263	88100	149800	73.3	2 - 2 5/8	2 - 2 1/8	4125	1871
2A25172	99.0	45.0	721	327	85800	145800	73.3	2 - 2 5/8	2 - 2 5/8	4375	1984
2A26190	107.0	49.0	729	331	106000	179800	74	2 - 3 1/8	2 - 3 1/8	4950	2245
2A26206	124.0	56.0	883	401	102900	174900	74	2 - 3 1/8	2 - 3 1/8	5250	2381

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97.
For R134a and R502 use R22 Charge. For R12 use R22 Charge X 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling See Page 34 and Page 35 .
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal volume and is for reference ONLY.
- (4) For 50Hz Fan Data use 60Hz CFM (m³/h) X 0.83.
- (5) Sound Pressure Level at ten meter distance.
- (6) Less weight of refrigerant charge.



AIR-COOLED CONDENSER

OMRAN TAHVIEH

ELECTRICAL DATA 850(700) RPM MODELS - 50Hz

NO. OF FANS	200-220/1/50*			200-220/3/50*			380-400/3/50		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP	TOTALFLA	MCA	MOP
1	3.6	4.5	15	6.5	8.1	15	2.7	3.4	15
2	7.2	8.1	15	13	14.6	20	5.4	6.1	15
3	10.8	11.7	15	19.5	21.1	25	8.1	8.8	15
4	14.4	15.3	20	26	27.6	40	10.8	11.5	15
5	N/A	N/A	N/A	32.5	34.1	40	13.5	15.1	20
6	21.6	22.5	30	39	40.6	45	16.2	16.9	20
8	NA	NA	NA	52	53.6	60	21.6	22.3	30
10	NA	NA	NA	65	66.6	80	27	27.7	40
12	NA	NA	NA	78	79.6	90	32.4	33.1	45

M.C.A. = Minimum Circuit Ampacity (AMPS) * Not available on 4 and 5 fan single row models and 6 fan models 183" and longer.
M.O.P. = Maximum Overcurrent Protection (AMPS)

ELECTRICAL DATA 850 RPM MODELS - 60Hz

NO. OF FANS	208-230/1/60*			208-230/3/60			460/3/60			575/3/60		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP
1	3.4	4.3	15	5.9	7.4	15	2.9	3.6	15	2.3	2.9	15
2	6.8	7.7	15	11.8	13.3	20	5.8	6.5	15	4.6	5.2	15
3	10.2	11.1	15	17.7	19.2	25	8.7	9.4	15	6.9	7.5	15
4	13.6	14.5	20	23.6	25.1	30	11.6	12.3	15	9.2	9.8	15
5	N/A	N/A	N/A	29.5	35.1	40	14.5	15.2	20	11.5	12.1	15
6	20.4	21.3	30	35.4	36.9	45	17.4	18.1	25	13.8	14.4	20
8	NA	NA	NA	47.2	48.7	60	23.2	23.9	30	18.4	19.0	25
10	NA	NA	NA	59	60.5	70	29	29.7	40	23	23.6	30
12	NA	NA	NA	70.8	72.3	80	34.8	35.5	45	27.6	28.2	40

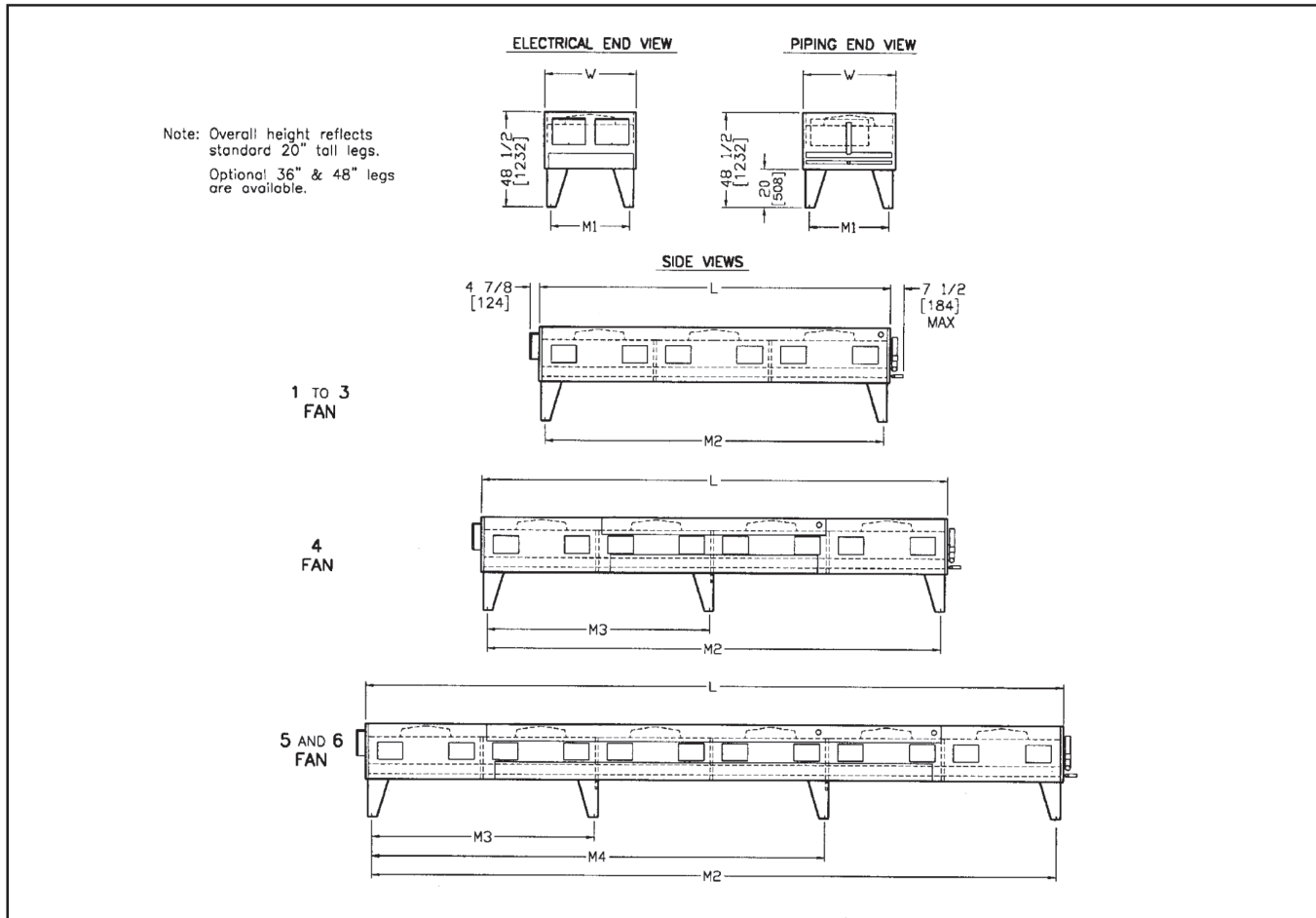
M.C.A. = Minimum Circuit Ampacity (AMPS) * Not available on 4 and 5 fan single row models and 6 fan models 183" and longer.
M.O.P. = Maximum Overcurrent Protection (AMPS)



AIR-COOLED CONDENSER

OMRAN TAHVIEH

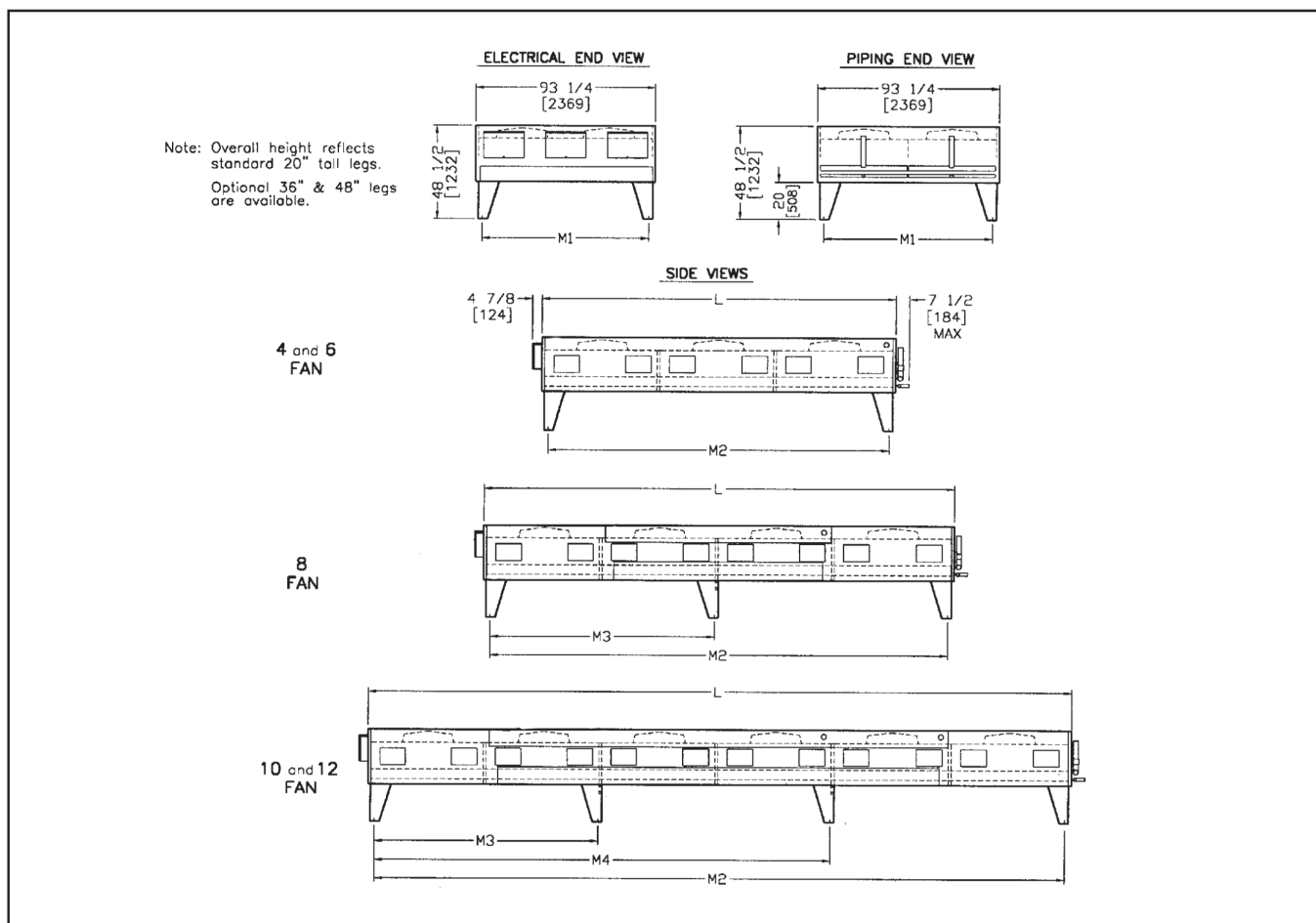
DIMENSIONAL DATA - SINGLE ROW OAVC MODELS



DIMENSIONS - Inches (mm)

SINGLEROW MODEL	WIDTH W	LENGTH L	MOUNTING LEG CENTRES			
			M1	M2	M3	M4
11 007	38 1/8 (968)	43 (1092)	31 1/8 (791)	36 (914)	-	-
11 009	38 1/8 (968)	43 (1092)	31 1/8 (791)	36 (914)	-	-
11 010	48 1/8 (1222)	43 (1092)	41 1/8 (1045)	36 (914)	-	-
11 011	48 1/8 (1222)	43 (1092)	41 1/8 (1045)	36 (914)	-	-
11 012	48 1/8 (1222)	50 (127)	41 1/8 (1045)	43 (1092)	-	-
11 013	48 1/8 (1222)	50 (127)	41 1/8 (1045)	43 (1092)	-	-
12 017	38 1/8 (968)	83 1/8 (2111)	31 1/8 (791)	76 1/8 (1934)	-	-
12 019	48 1/8 (1222)	83 1/8 (2111)	41 1/8 (1045)	76 1/8 (1934)	-	-
12 022	48 1/8 (1222)	83 1/8 (2111)	41 1/8 (1045)	76 1/8 (1934)	-	-
12 024	48 1/8 (1222)	97 1/8 (2467)	41 1/8 (1045)	90 1/8 (2289)	-	-
12 027	48 1/8 (1222)	97 1/8 (2467)	41 1/8 (1045)	90 1/8 (2289)	-	-
13 029	48 1/8 (1222)	123 1/4 (3131)	41 1/8 (1045)	116 1/4 (2953)	-	-
13 034	48 1/8 (1222)	123 1/4 (3131)	41 1/8 (1045)	116 1/4 (2953)	-	-
13 037	48 1/8 (1222)	144 1/4 (3664)	41 1/8 (1045)	137 1/4 (3486)	-	-
13 041	48 1/8 (1222)	144 1/4 (3664)	41 1/8 (1045)	137 1/4 (3486)	-	-
13 043	48 1/8 (1222)	183 (4648)	41 1/8 (1045)	176 1/4 (4477)	-	-
13 048	48 1/8 (1222)	183 (4648)	41 1/8 (1045)	176 1/4 (4477)	-	-
14 056	48 1/8 (1222)	243 (6172)	41 1/8 (1045)	236 5/16 (6002)	116 3/16 (2951)	-
14 063	48 1/8 (1222)	243 (6172)	41 1/8 (1045)	236 5/16 (6002)	116 3/16 (2951)	-
14 068	48 1/8 (1222)	243 (6172)	41 1/8 (1045)	236 5/16 (6002)	116 3/16 (2951)	-
15 079	48 1/8 (1222)	303 (7696)	41 1/8 (1045)	296 5/16 (7526)	116 3/16 (2951)	176 3/16 (4475)
15 085	48 1/8 (1222)	303 (7696)	41 1/8 (1045)	296 5/16 (7526)	116 3/16 (2951)	176 3/16 (4475)
16 095	48 1/8 (1222)	363 (9220)	41 1/8 (1045)	356 5/16 (9050)	116 3/16 (2951)	236 3/16 (5999)
16 103	48 1/8 (1222)	363 (9220)	41 1/8 (1045)	356 5/16 (9050)	116 3/16 (2951)	236 3/16 (5999)

DIMENSIONAL DATA - DOUBLE ROW OAVC MODELS



DIMENSIONS - Inches (mm)

DOUBLEROW MODEL	LENGTH L	MOUNTING LEG CENTRES			
		M1	M2	M3	M4
22 039	83 1/8 (2111)	86 1/8 (2188)	76 1/8 (1934)	-	-
22 045	83 1/8 (2111)	86 1/8 (2188)	76 1/8 (1934)	-	-
22 049	97 1/8 (2467)	86 1/8 (2188)	90 1/8 (2289)	-	-
22 054	97 1/8 (2467)	86 1/8 (2188)	90 1/8 (2289)	-	-
23 058	123 1/4 (3131)	86 1/8 (2188)	116 1/4 (2953)	-	-
23 067	123 1/4 (3131)	86 1/8 (2188)	116 1/4 (2953)	-	-
23 073	144 1/4 (3664)	86 1/8 (2188)	137 1/4 (3486)	-	-
23 081	144 1/4 (3664)	86 1/8 (2188)	137 1/4 (3486)	-	-
23 086	183 (4648)	86 7/16 (2196)	176 1/4 (4477)	-	-
23 096	183 (4648)	86 7/16 (2196)	176 1/4 (4477)	-	-
24 112	243 (6172)	86 7/16 (2196)	236 5/16 (6002)	116 3/16 (2951)	-
24 126	243 (6172)	86 7/16 (2196)	236 5/16 (6002)	116 3/16 (2951)	-
24 137	243 (6172)	86 7/16 (2196)	236 5/16 (6002)	116 3/16 (2951)	-
25 158	303 (7696)	86 7/16 (2196)	296 5/16 (7526)	116 3/16 (2951)	176 3/16 (4475)
25 172	303 (7696)	86 7/16 (2196)	296 5/16 (7526)	116 3/16 (2951)	176 3/16 (4475)
26 190	363 (9220)	86 7/16 (2196)	356 5/16 (9050)	116 3/16 (2951)	236 3/16 (5999)
26 206	363 (9220)	86 7/16 (2196)	356 5/16 (9050)	116 3/16 (2951)	236 3/16 (5999)

WIRING DIAGRAMS (SINGLE ROW MODEL)

TYPICAL SINGLE ROW 1, 2 & 3 FAN. 1 Ø & 3 Ø WIRING DIAGRAM (TYPICAL)

OPTIONAL INDIVIDUAL FAN MOTOR FUSING AND STANDARD 120 VOLT CONTROL CIRCUIT SHOWN

3 FAN MODEL

THREE PHASE
REFER TO UNIT DATA PLATE FOR ENTERING ELECTRICAL SERVICE REQUIREMENTS

MAIN POWER TERMINAL BLOCK

FUSE

OPTIONAL FAN MOTOR FUSES

Note: Motors not available on 183" long models.

2 FAN MODEL

THREE PHASE
REFER TO UNIT DATA PLATE FOR ENTERING ELECTRICAL SERVICE REQUIREMENTS

MAIN POWER TERMINAL BLOCK

FUSE

OPTIONAL FAN MOTOR FUSES

1 FAN MODEL

SINGLE PHASE
REFER TO UNIT DATA PLATE FOR ENTERING ELECTRICAL SERVICE REQUIREMENTS

MAIN POWER TERMINAL BLOCK

FUSE

OPTIONAL FAN MOTOR FUSES

C - COMMON
S - START
R - RUN

FAN MOTOR IDENTIFICATION

1 FAN HEADER END
CONTROL PANEL END (TOP VIEW)
AIR FLOW

2 FAN HEADER END
CONTROL PANEL END (TOP VIEW)

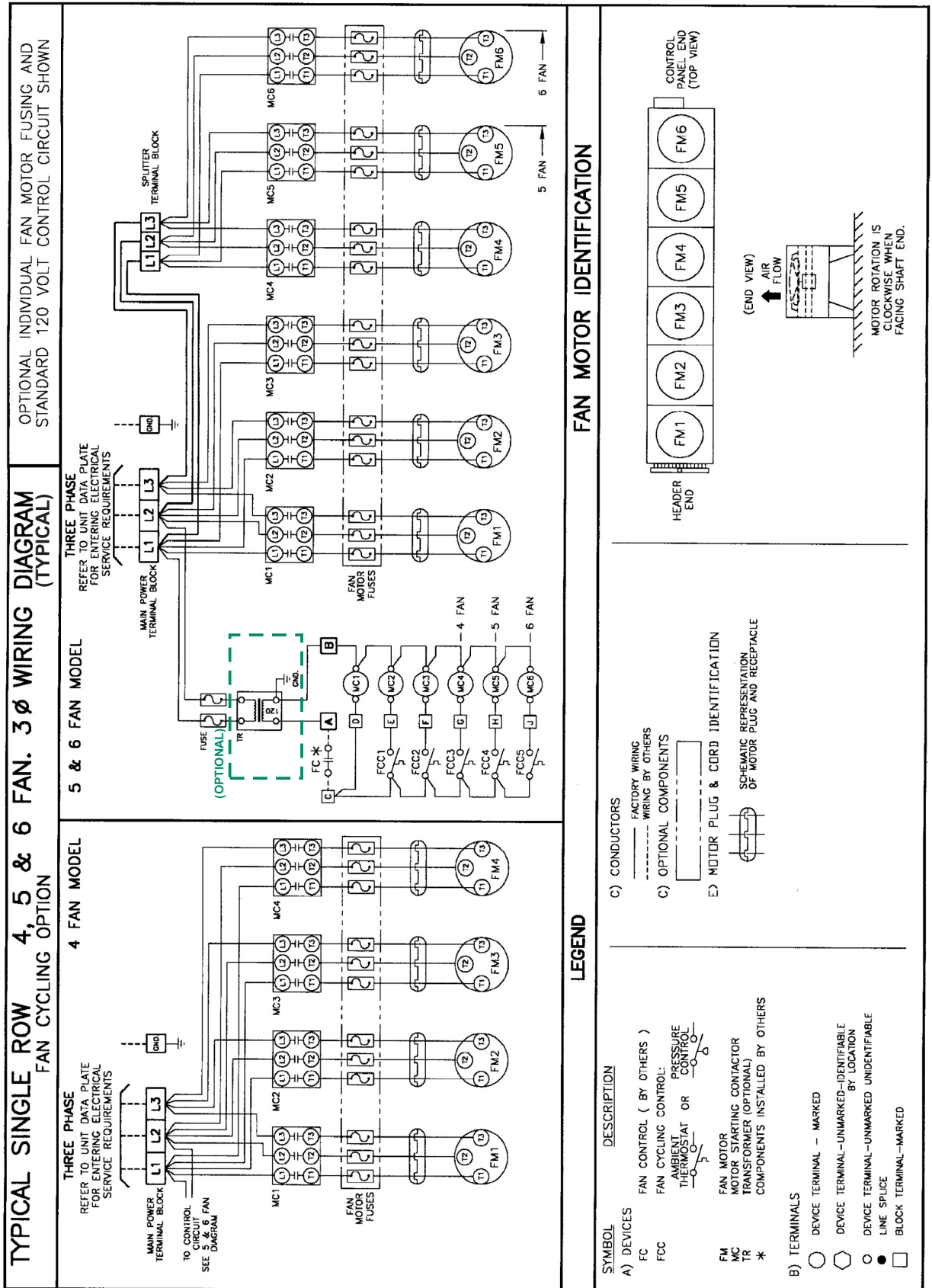
3 FAN HEADER END
CONTROL PANEL END (TOP VIEW)

MOTOR ROTATION IS CLOCKWISE WHEN FACING SHAFT END.

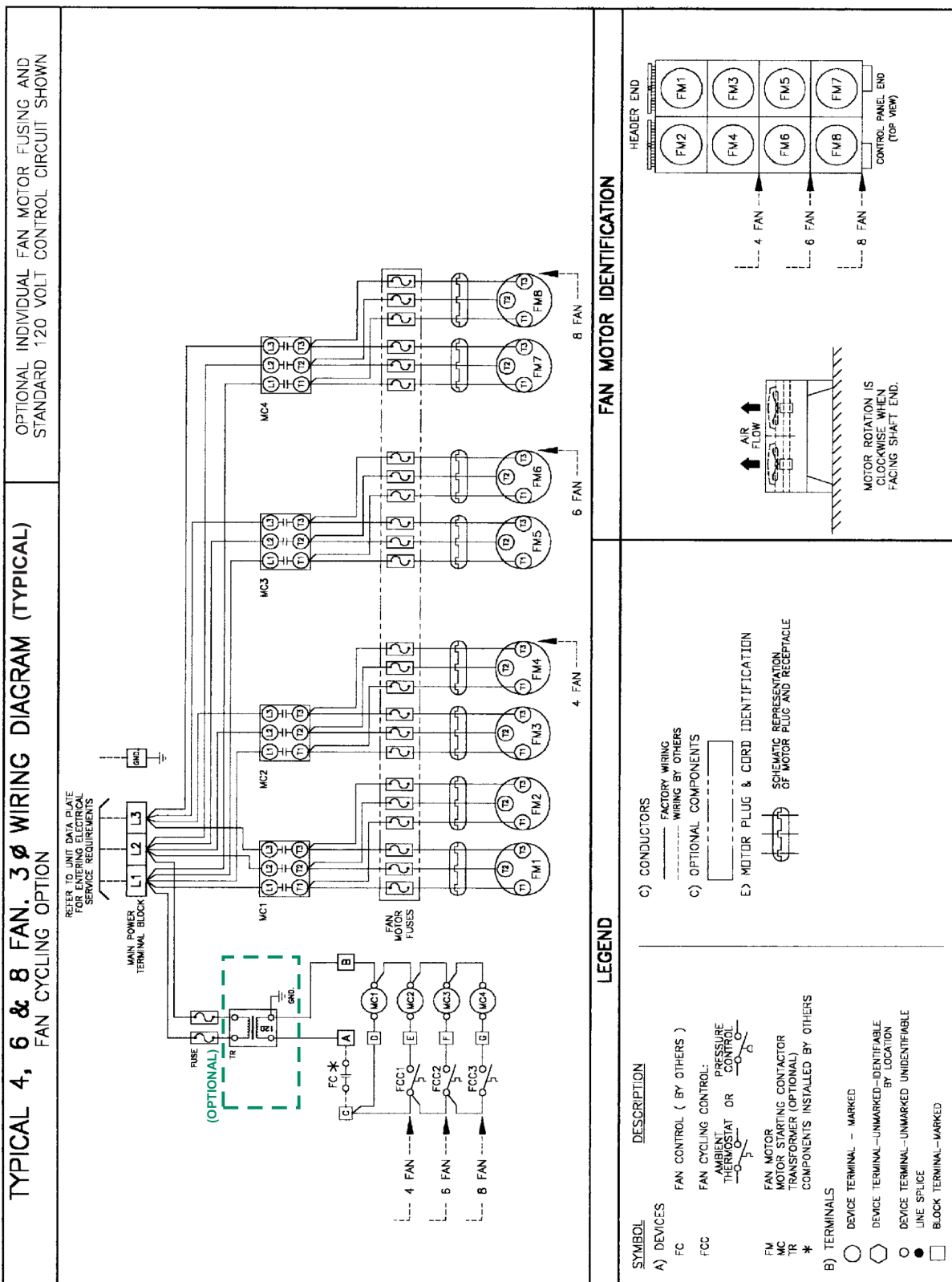
LEGEND

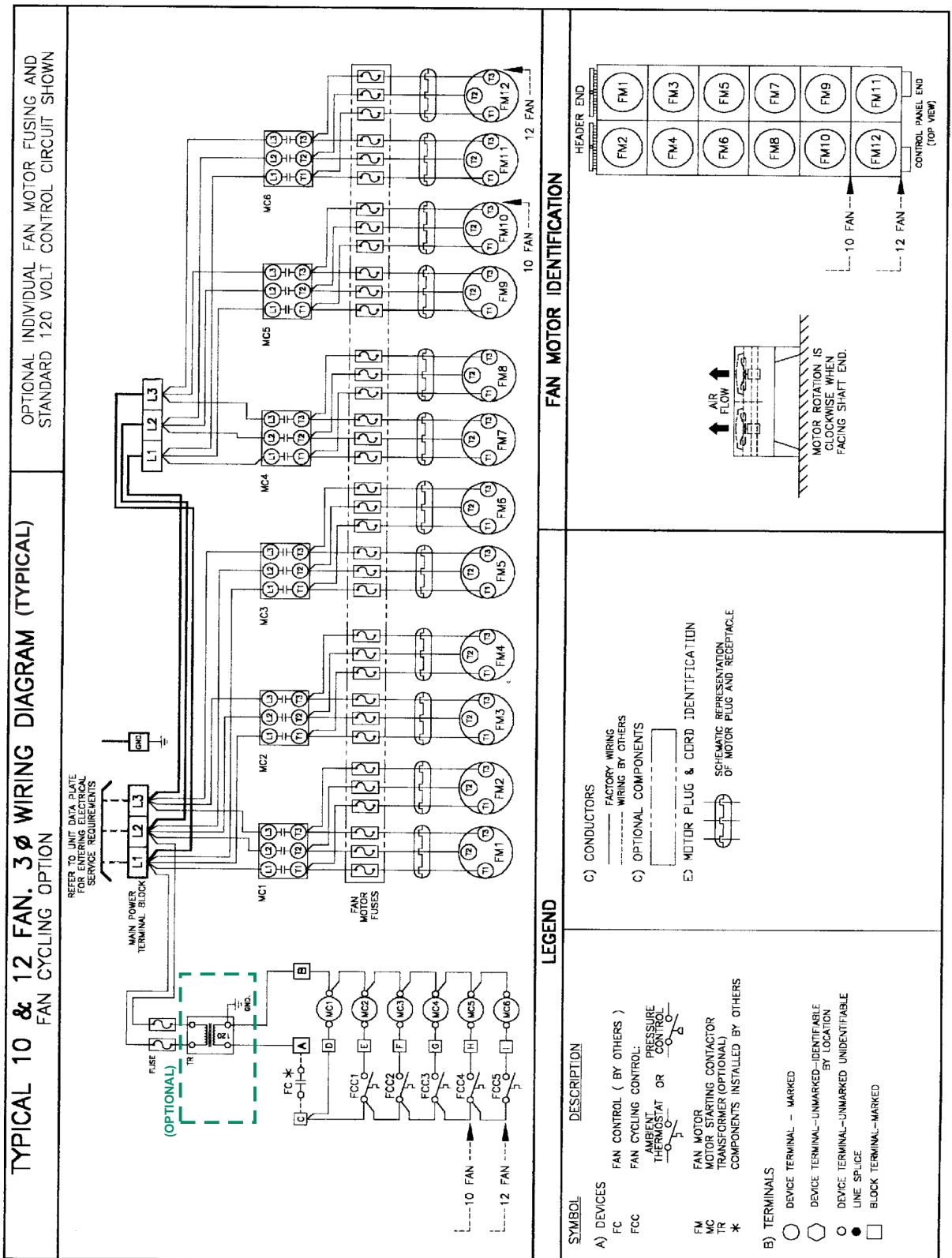
SYMBOL	DESCRIPTION
A) DEVICES	
FC	FAN CONTROL (BY OTHERS)
FCC	FAN CYCLING CONTROL: AMBIENT THERMOSTAT OR PRESSURE CONTROL
FM	FAN MOTOR
MC	MOTOR STARTING CONTACTOR TRANSFORMER (OPTIONAL)
*	* COMPONENTS INSTALLED BY OTHERS
B) TERMINALS	
○	DEVICE TERMINAL - MARKED
◊	DEVICE TERMINAL - UNMARKED-IDENTIFIABLE BY LOCATION
○	DEVICE TERMINAL - UNMARKED UNIDENTIFIABLE
●	LINE SPLICE
□	BLOCK TERMINAL-MARKED
C) CONDUCTORS	
---	FACTORY WIRING
- - -	WIRING BY OTHERS
C) OPTIONAL COMPONENTS	
E) MOTOR PLUG & CORD IDENTIFICATION	
	SCHEMATIC REPRESENTATION OF MOTOR PLUG AND RECEPTACLE

WIRING DIAGRAMS (SINGLE ROW MODEL)



WIRING DIAGRAMS (DOUBLE ROW MODEL)





CAPACITY DATA - 550 RPM MODELS - R22

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1°F (0.56°C)	10°F (5.56°C)	15°F (8.3°C)	20°F (11.1°C)	30°F (16.7°C)	1°F (0.56°C)	1°F (0.56°C)
Single Row Models								
007	1 x 1	2.540	25.4	38.1	50.8	76.2	2.324	2.059
009	1 x 1	3.162	31.6	47.4	63.2	94.8	3.011	2.760
010	1 x 1	3.523	35.2	52.8	70.5	106	3.312	3.014
011	1 x 1	3.949	39.5	59.2	79.0	118	3.822	3.568
012	1 x 1	4.298	43.0	64.5	86.0	129	4.104	3.835
013	1 x 1	4.580	45.8	68.7	91.6	137	4.503	4.288
017	1 x 2	6.316	63.2	94.7	126	189	6.015	5.514
019	1 x 2	7.008	70.1	105	140	210	6.589	5.997
022	1 x 2	7.898	79.0	118	158	237	7.644	7.136
024	1 x 2	8.603	86.0	129	172	258	8.215	7.677
027	1 x 2	9.159	91.6	137	183	275	9.006	8.575
029	1 x 3	10.56	106	158	211	317	9.930	9.037
034	1 x 3	11.82	118	177	236	355	11.44	10.68
037	1 x 3	12.89	129	193	258	387	12.31	11.51
041	1 x 3	13.73	137	206	275	412	13.50	12.86
043	1 x 3	15.24	152	229	305	457	14.17	13.32
048	1 x 3	16.20	162	243	324	486	15.59	14.92
056	1 x 4	20.23	202	303	405	607	19.02	17.32
063	1 x 4	22.53	225	338	451	676	21.52	20.10
068	1 x 4	23.66	237	355	473	710	23.26	22.15
079	1 x 5	28.24	282	424	565	847	26.97	25.19
085	1 x 5	29.18	292	438	592	887	28.69	27.32
095	1 x 6	33.88	339	508	678	1017	32.36	30.23
103	1 x 6	35.02	350	525	710	1065	34.42	32.78
Double Row Models								
039	2 x 2	14.06	141	211	281	422	13.22	12.03
045	2 x 2	15.79	158	237	316	474	15.28	14.27
049	2 x 2	17.18	172	258	344	515	16.40	15.33
054	2 x 2	18.29	183	274	366	549	17.98	17.12
058	2 x 3	21.09	211	316	422	633	19.83	18.05
067	2 x 3	23.66	237	355	473	710	22.90	21.37
073	2 x 3	25.76	258	386	515	773	24.60	22.99
081	2 x 3	27.44	274	412	549	823	26.98	25.69
086	2 x 3	30.48	305	457	610	914	28.34	26.63
096	2 x 3	32.39	324	486	648	972	31.18	29.85
112	2 x 4	40.46	405	607	809	1214	38.03	34.63
126	2 x 4	45.07	451	676	901	1352	43.04	40.20
137	2 x 4	47.32	473	710	946	1420	46.52	44.29
158	2 x 5	56.47	565	847	1129	1694	53.93	50.38
172	2 x 5	59.16	592	887	1183	1775	58.15	55.37
190	2 x 6	67.77	678	1017	1355	2033	64.72	60.45
206	2 x 6	70.98	710	1065	1420	2129	69.78	66.44

Correction Factors for Other refrigerants - Use R22 Values Multiplied By

R134a	R12	R507	R404A	R407A	R407B	R502	R407C
0.94	0.95	0.97	0.97	0.97	0.97	0.98	1.00

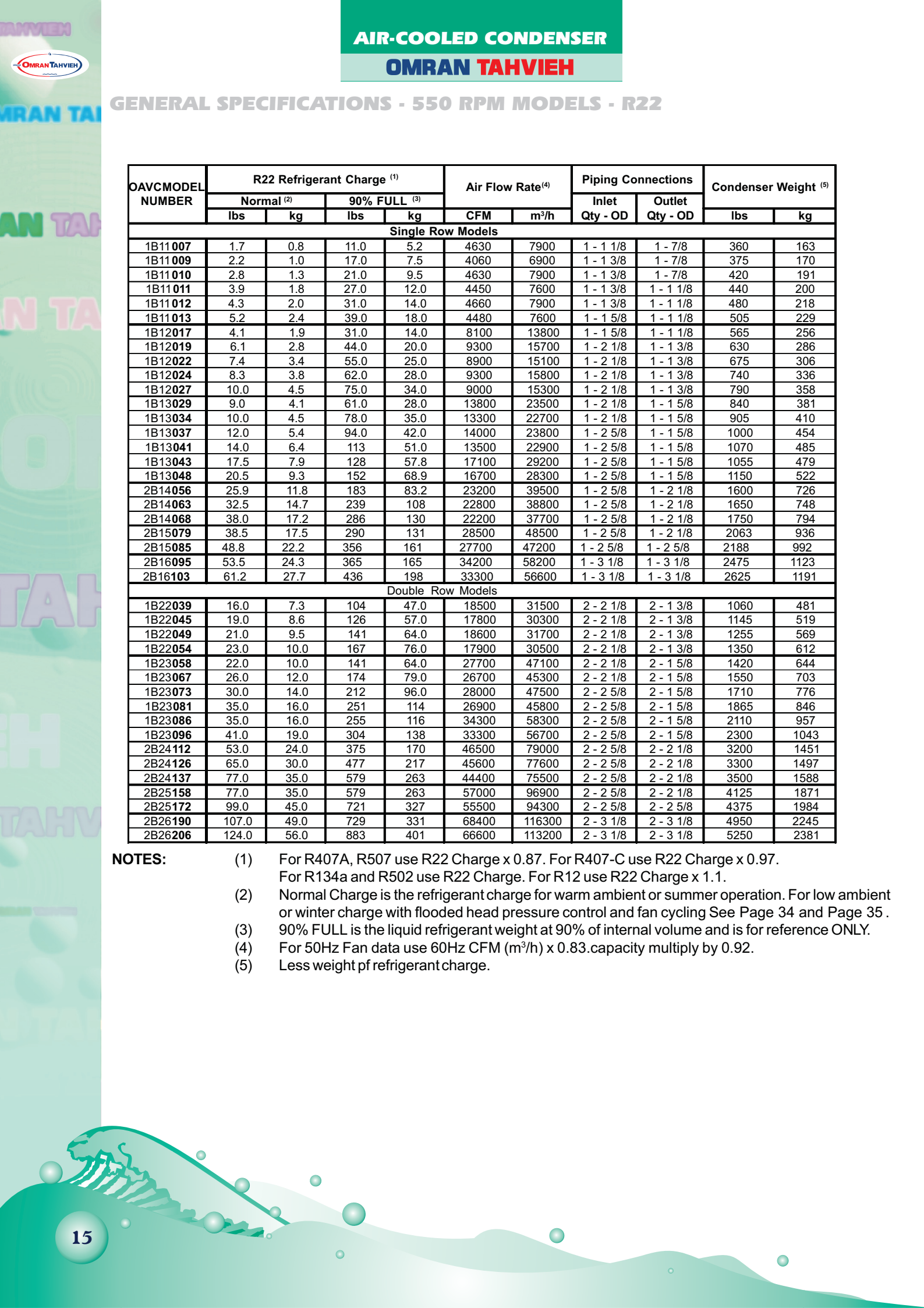
- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
 - (2) TD = Condensing temperature - ambient temperature
 - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
 - (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
 - (5) For 50Hz capacity multiply by 0.92.

CAPACITY DATA - 550 RPM MODELS - R404A

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1 °F (0.56 °C)	10 °F (5.56 °C)	15 °F (8.3 °C)	20 °F (11.1 °C)	30 °F (16.7 °C)	1 °F (0.56 °C)	1 °F (0.56 °C)
Single Row Models								
007	1 x 1	2.464	24.6	37.0	49.3	73.9	2.254	1.998
009	1 x 1	3.067	30.7	46.0	61.3	92.0	2.921	2.677
010	1 x 1	3.417	34.2	51.3	68.3	103	3.213	2.924
011	1 x 1	3.830	38.3	57.5	76.6	115	3.707	3.461
012	1 x 1	4.169	41.7	62.5	83.4	125	3.981	3.720
013	1 x 1	4.442	44.4	66.6	88.8	133	4.368	4.159
017	1 x 2	6.126	61.3	91.9	123	184	5.834	5.348
019	1 x 2	6.798	68.0	102	136	204	6.391	5.817
022	1 x 2	7.661	76.6	115	153	230	7.415	6.922
024	1 x 2	8.345	83.5	125	167	250	7.969	7.447
027	1 x 2	8.885	88.8	133	178	267	8.736	8.318
029	1 x 3	10.24	102	154	205	307	9.632	8.766
034	1 x 3	11.46	115	172	229	344	11.09	10.36
037	1 x 3	12.51	125	188	250	375	11.94	11.16
041	1 x 3	13.32	133	200	266	400	13.10	12.47
043	1 x 3	14.78	148	222	296	443	13.75	12.92
048	1 x 3	15.71	157	236	314	471	15.12	14.48
056	1 x 4	19.19	192	288	392	589	18.44	16.80
063	1 x 4	21.86	219	328	437	656	20.87	19.50
068	1 x 4	22.64	226	340	459	689	22.56	21.48
079	1 x 5	27.39	274	411	548	822	26.16	24.43
085	1 x 5	28.31	283	425	574	861	27.82	26.50
095	1 x 6	32.87	329	493	657	986	31.39	29.32
103	1 x 6	33.97	340	510	689	1033	33.39	31.80
Double Row Models								
039	2 x 2	13.64	136	205	273	409	12.82	11.67
045	2 x 2	15.31	153	230	306	459	14.82	13.84
049	2 x 2	16.66	167	250	333	500	15.91	14.87
054	2 x 2	17.74	177	266	355	532	17.44	16.61
058	2 x 3	20.46	205	307	409	614	19.24	17.51
067	2 x 3	22.95	229	344	459	688	22.21	20.73
073	2 x 3	24.99	250	375	500	750	23.86	22.30
081	2 x 3	26.62	266	399	532	799	26.17	24.92
086	2 x 3	29.57	296	443	591	887	27.49	25.83
096	2 x 3	31.42	314	471	628	943	30.24	28.95
112	2 x 4	39.24	392	589	785	1177	36.89	33.59
126	2 x 4	43.72	437	656	874	1311	41.75	38.99
137	2 x 4	45.90	459	689	918	1377	45.12	42.96
158	2 x 5	54.78	548	822	1096	1643	52.32	48.86
172	2 x 5	57.38	574	861	1148	1722	56.41	53.71
190	2 x 6	65.74	657	986	1315	1972	62.78	58.64
206	2 x 6	68.85	689	1033	1377	2066	67.68	64.45

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
 - (2) TD = Condensing temperature - ambient temperature
 - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
 - (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
 - (5) For 50Hz capacity multiply by 0.92.



AIR-COOLED CONDENSER

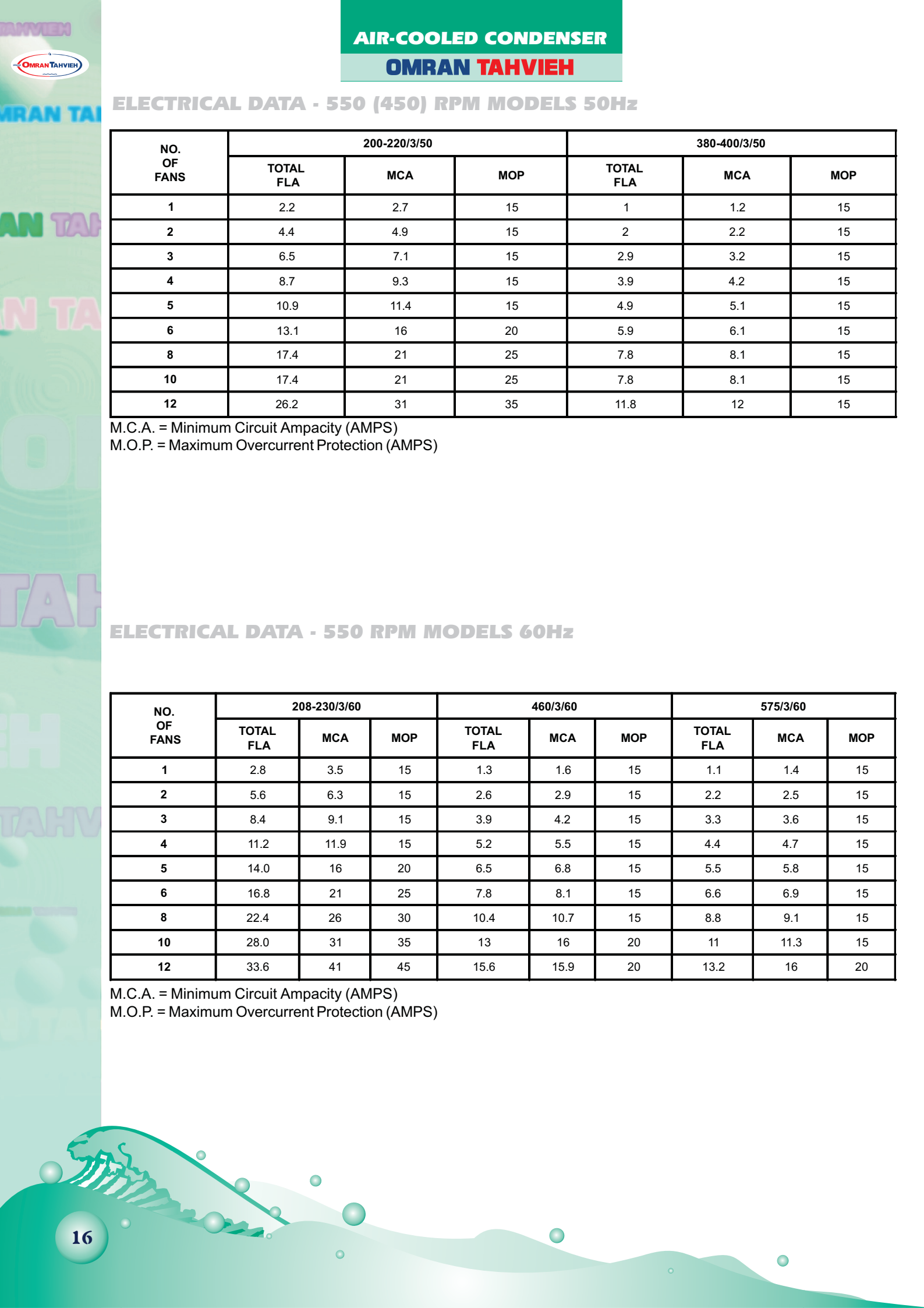
OMRAN TAHVIEH

GENERAL SPECIFICATIONS - 550 RPM MODELS - R22

OAVCMODEL NUMBER	R22 Refrigerant Charge ⁽¹⁾				Air Flow Rate ⁽⁴⁾		Piping Connections		Condenser Weight ⁽⁵⁾	
	Normal ⁽²⁾		90% FULL ⁽³⁾				Inlet	Outlet		
	lbs	kg	lbs	kg	CFM	m³/h	Qty - OD	Qty - OD	lbs	kg
Single Row Models										
1B11007	1.7	0.8	11.0	5.2	4630	7900	1 - 1 1/8	1 - 7/8	360	163
1B11009	2.2	1.0	17.0	7.5	4060	6900	1 - 1 3/8	1 - 7/8	375	170
1B11010	2.8	1.3	21.0	9.5	4630	7900	1 - 1 3/8	1 - 7/8	420	191
1B11011	3.9	1.8	27.0	12.0	4450	7600	1 - 1 3/8	1 - 1 1/8	440	200
1B11012	4.3	2.0	31.0	14.0	4660	7900	1 - 1 3/8	1 - 1 1/8	480	218
1B11013	5.2	2.4	39.0	18.0	4480	7600	1 - 1 5/8	1 - 1 1/8	505	229
1B12017	4.1	1.9	31.0	14.0	8100	13800	1 - 1 5/8	1 - 1 1/8	565	256
1B12019	6.1	2.8	44.0	20.0	9300	15700	1 - 2 1/8	1 - 1 3/8	630	286
1B12022	7.4	3.4	55.0	25.0	8900	15100	1 - 2 1/8	1 - 1 3/8	675	306
1B12024	8.3	3.8	62.0	28.0	9300	15800	1 - 2 1/8	1 - 1 3/8	740	336
1B12027	10.0	4.5	75.0	34.0	9000	15300	1 - 2 1/8	1 - 1 3/8	790	358
1B13029	9.0	4.1	61.0	28.0	13800	23500	1 - 2 1/8	1 - 1 5/8	840	381
1B13034	10.0	4.5	78.0	35.0	13300	22700	1 - 2 1/8	1 - 1 5/8	905	410
1B13037	12.0	5.4	94.0	42.0	14000	23800	1 - 2 5/8	1 - 1 5/8	1000	454
1B13041	14.0	6.4	113	51.0	13500	22900	1 - 2 5/8	1 - 1 5/8	1070	485
1B13043	17.5	7.9	128	57.8	17100	29200	1 - 2 5/8	1 - 1 5/8	1055	479
1B13048	20.5	9.3	152	68.9	16700	28300	1 - 2 5/8	1 - 1 5/8	1150	522
2B14056	25.9	11.8	183	83.2	23200	39500	1 - 2 5/8	1 - 2 1/8	1600	726
2B14063	32.5	14.7	239	108	22800	38800	1 - 2 5/8	1 - 2 1/8	1650	748
2B14068	38.0	17.2	286	130	22200	37700	1 - 2 5/8	1 - 2 1/8	1750	794
2B15079	38.5	17.5	290	131	28500	48500	1 - 2 5/8	1 - 2 1/8	2063	936
2B15085	48.8	22.2	356	161	27700	47200	1 - 2 5/8	1 - 2 5/8	2188	992
2B16095	53.5	24.3	365	165	34200	58200	1 - 3 1/8	1 - 3 1/8	2475	1123
2B16103	61.2	27.7	436	198	33300	56600	1 - 3 1/8	1 - 3 1/8	2625	1191
Double Row Models										
1B22039	16.0	7.3	104	47.0	18500	31500	2 - 2 1/8	2 - 1 3/8	1060	481
1B22045	19.0	8.6	126	57.0	17800	30300	2 - 2 1/8	2 - 1 3/8	1145	519
1B22049	21.0	9.5	141	64.0	18600	31700	2 - 2 1/8	2 - 1 3/8	1255	569
1B22054	23.0	10.0	167	76.0	17900	30500	2 - 2 1/8	2 - 1 3/8	1350	612
1B23058	22.0	10.0	141	64.0	27700	47100	2 - 2 1/8	2 - 1 5/8	1420	644
1B23067	26.0	12.0	174	79.0	26700	45300	2 - 2 1/8	2 - 1 5/8	1550	703
1B23073	30.0	14.0	212	96.0	28000	47500	2 - 2 5/8	2 - 1 5/8	1710	776
1B23081	35.0	16.0	251	114	26900	45800	2 - 2 5/8	2 - 1 5/8	1865	846
1B23086	35.0	16.0	255	116	34300	58300	2 - 2 5/8	2 - 1 5/8	2110	957
1B23096	41.0	19.0	304	138	33300	56700	2 - 2 5/8	2 - 1 5/8	2300	1043
2B24112	53.0	24.0	375	170	46500	79000	2 - 2 5/8	2 - 2 1/8	3200	1451
2B24126	65.0	30.0	477	217	45600	77600	2 - 2 5/8	2 - 2 1/8	3300	1497
2B24137	77.0	35.0	579	263	44400	75500	2 - 2 5/8	2 - 2 1/8	3500	1588
2B25158	77.0	35.0	579	263	57000	96900	2 - 2 5/8	2 - 2 1/8	4125	1871
2B25172	99.0	45.0	721	327	55500	94300	2 - 2 5/8	2 - 2 5/8	4375	1984
2B26190	107.0	49.0	729	331	68400	116300	2 - 3 1/8	2 - 3 1/8	4950	2245
2B26206	124.0	56.0	883	401	66600	113200	2 - 3 1/8	2 - 3 1/8	5250	2381

NOTES:

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97. For R134a and R502 use R22 Charge. For R12 use R22 Charge x 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling See Page 34 and Page 35.
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal volume and is for reference ONLY.
- (4) For 50Hz Fan data use 60Hz CFM (m³/h) x 0.83.capacity multiply by 0.92.
- (5) Less weight pf refrigerant charge.



AIR-COOLED CONDENSER

OMRAN TAHVIEH

ELECTRICAL DATA - 550 (450) RPM MODELS 50Hz

NO. OF FANS	200-220/3/50			380-400/3/50		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP
1	2.2	2.7	15	1	1.2	15
2	4.4	4.9	15	2	2.2	15
3	6.5	7.1	15	2.9	3.2	15
4	8.7	9.3	15	3.9	4.2	15
5	10.9	11.4	15	4.9	5.1	15
6	13.1	16	20	5.9	6.1	15
8	17.4	21	25	7.8	8.1	15
10	17.4	21	25	7.8	8.1	15
12	26.2	31	35	11.8	12	15

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

ELECTRICAL DATA - 550 RPM MODELS 60Hz

NO. OF FANS	208-230/3/60			460/3/60			575/3/60		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP
1	2.8	3.5	15	1.3	1.6	15	1.1	1.4	15
2	5.6	6.3	15	2.6	2.9	15	2.2	2.5	15
3	8.4	9.1	15	3.9	4.2	15	3.3	3.6	15
4	11.2	11.9	15	5.2	5.5	15	4.4	4.7	15
5	14.0	16	20	6.5	6.8	15	5.5	5.8	15
6	16.8	21	25	7.8	8.1	15	6.6	6.9	15
8	22.4	26	30	10.4	10.7	15	8.8	9.1	15
10	28.0	31	35	13	16	20	11	11.3	15
12	33.6	41	45	15.6	15.9	20	13.2	16	20

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

CAPACITY DATA - 1140 RPM MODELS - R22

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1°F (0.56°C)	10°F (5.56°C)	15°F (8.3°C)	20°F (11.1°C)	30°F (16.7°C)	1°F (0.56°C)	1°F (0.56°C)
Single Row Models								
007	1 x 1	3.627	36.3	54.4	72.5	109	3.303	2.911
009	1 x 1	4.989	49.9	74.8	100	150	4.677	4.220
010	1 x 1	5.516	55.2	82.7	110	165	5.094	4.572
011	1 x 1	6.446	64.5	96.7	129	193	6.118	5.589
012	1 x 1	7.157	71.6	107	143	215	6.710	6.114
013	1 x 1	7.985	79.9	120	160	240	7.678	7.095
017	1 x 2	9.971	100	150	199	299	9.348	8.434
019	1 x 2	10.98	110	165	220	329	10.14	9.100
022	1 x 2	12.90	129	194	258	387	12.25	11.19
024	1 x 2	14.34	143	215	287	430	13.44	12.25
027	1 x 2	15.98	160	240	320	479	15.37	14.20
029	1 x 3	16.55	166	248	331	497	15.29	13.72
034	1 x 3	19.31	193	290	386	579	18.33	16.74
037	1 x 3	21.49	215	322	430	645	20.15	18.36
041	1 x 3	23.96	240	359	479	719	23.04	21.29
043	1 x 3	25.40	254	381	508	762	24.03	21.94
048	1 x 3	28.48	285	427	570	854	27.14	25.19
056	1 x 4	31.01	310	465	620	930	28.64	25.71
063	1 x 4	36.76	368	551	735	1103	34.77	31.76
068	1 x 4	40.34	403	605	807	1210	38.44	35.67
079	1 x 5	46.06	461	691	921	1382	43.57	39.79
085	1 x 5	50.43	504	756	1009	1513	48.06	44.59
095	1 x 6	55.27	553	829	1105	1658	52.29	47.75
103	1 x 6	60.51	605	908	1210	1815	57.66	53.51
Double Row Models								
039	2 x 2	22.04	220	331	441	661	20.35	18.27
045	2 x 2	25.79	258	387	516	774	24.48	22.37
049	2 x 2	28.63	286	429	573	859	26.84	24.45
054	2 x 2	31.92	319	479	638	957	30.69	28.36
058	2 x 3	33.06	331	496	661	992	30.53	27.40
067	2 x 3	38.65	386	580	773	1159	36.69	33.52
073	2 x 3	42.93	429	644	859	1288	40.25	36.67
081	2 x 3	47.89	479	718	958	1437	46.05	42.55
086	2 x 3	50.80	508	762	1016	1524	48.06	43.89
096	2 x 3	56.97	570	854	1139	1709	54.29	50.38
112	2 x 4	63.44	634	952	1269	1903	58.58	52.58
126	2 x 4	73.52	735	1103	1470	2205	69.55	63.51
137	2 x 4	81.76	818	1226	1635	2453	77.92	72.30
158	2 x 5	92.12	921	1382	1842	2764	87.15	79.59
172	2 x 5	102.2	1022	1533	2044	3067	97.41	90.39
190	2 x 6	110.5	1105	1658	2211	3316	104.6	95.50
206	2 x 6	122.7	1227	1840	2453	3680	116.9	108.5

Correction Factors for Other refrigerants - Use R22 Values Multiplied By

R134a	R12	R507	R404A	R407A	R407B	R502	R407C
0.94	0.95	0.97	0.97	0.97	0.97	0.98	1.00

- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
 - (2) TD = Condensing temperature - ambient temperature
 - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
 - (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
 - (5) For 50Hz capacity multiply by 0.92.

CAPACITY DATA - 1140 RPM MODELS - R404A

OAVC MODEL NUMBER	Fan Rows	TOTAL HEAT OF REJECTION CAPACITY (MBH)						
		TEMPERATURE DIFFERENCE (TD)						
		12 FPI					10 FPI	8 FPI
		1°F (0.56°C)	10°F (5.56°C)	15°F (8.3°C)	20°F (11.1°C)	30°F (16.7°C)	1°F (0.56°C)	1°F (0.56°C)
Single Row Models								
007	1 x 1	3.518	35.2	52.8	70.4	106	3.204	2.824
009	1 x 1	4.839	48.4	72.6	96.8	145	4.537	4.093
010	1 x 1	5.351	53.5	80.3	107	161	4.941	4.435
011	1 x 1	6.252	62.5	93.8	125	188	5.935	5.422
012	1 x 1	6.943	69.4	104	139	208	6.509	5.930
013	1 x 1	7.746	77.5	116	155	232	7.448	6.882
017	1 x 2	9.672	96.7	145	193	290	9.068	8.181
019	1 x 2	10.65	106	160	213	319	9.834	8.827
022	1 x 2	12.52	125	188	250	375	11.88	10.85
024	1 x 2	13.91	139	209	278	417	13.04	11.88
027	1 x 2	15.50	155	233	310	465	14.91	13.77
029	1 x 3	16.06	161	241	321	482	14.83	13.31
034	1 x 3	18.73	187	281	375	562	17.78	16.24
037	1 x 3	20.85	208	313	417	625	19.54	17.81
041	1 x 3	23.24	232	349	465	697	22.35	20.65
043	1 x 3	24.64	246	370	493	739	23.31	21.29
048	1 x 3	27.63	276	414	553	829	26.33	24.43
056	1 x 4	30.08	301	451	602	903	27.78	24.93
063	1 x 4	35.65	357	535	713	1070	33.73	30.80
068	1 x 4	39.13	391	587	783	1174	37.29	34.60
079	1 x 5	44.68	447	670	894	1340	42.27	38.60
085	1 x 5	48.92	489	734	978	1467	46.61	43.26
095	1 x 6	53.61	536	804	1072	1608	50.72	46.32
103	1 x 6	58.69	587	880	1174	1761	55.93	51.90
Double Row Models								
039	2 x 2	21.38	214	321	428	641	19.74	17.72
045	2 x 2	25.02	250	375	500	751	23.75	21.70
049	2 x 2	27.77	278	417	555	833	26.03	23.72
054	2 x 2	30.96	310	464	619	929	29.77	27.51
058	2 x 3	32.07	321	481	641	962	29.61	26.58
067	2 x 3	37.49	375	562	750	1125	35.59	32.51
073	2 x 3	41.64	416	625	833	1249	39.04	35.57
081	2 x 3	46.45	465	697	929	1394	44.66	41.27
086	2 x 3	49.28	493	739	986	1478	46.62	42.57
096	2 x 3	55.26	553	829	1105	1658	52.66	48.86
112	2 x 4	61.53	615	923	1231	1846	56.82	51.00
126	2 x 4	71.31	713	1070	1426	2139	67.46	61.61
137	2 x 4	79.31	793	1190	1586	2379	75.58	70.14
158	2 x 5	89.36	894	1340	1787	2681	84.53	77.20
172	2 x 5	99.15	992	1487	1983	2975	94.49	87.68
190	2 x 6	107.2	1072	1608	2145	3217	101.4	92.64
206	2 x 6	119.0	1190	1785	N/A	N/A	113.4	105.2

To calculate capacities with other refrigerants, multiply the R22 capacity by the appropriate correction factor. Refer to the table accompanying each of the R22 tables.

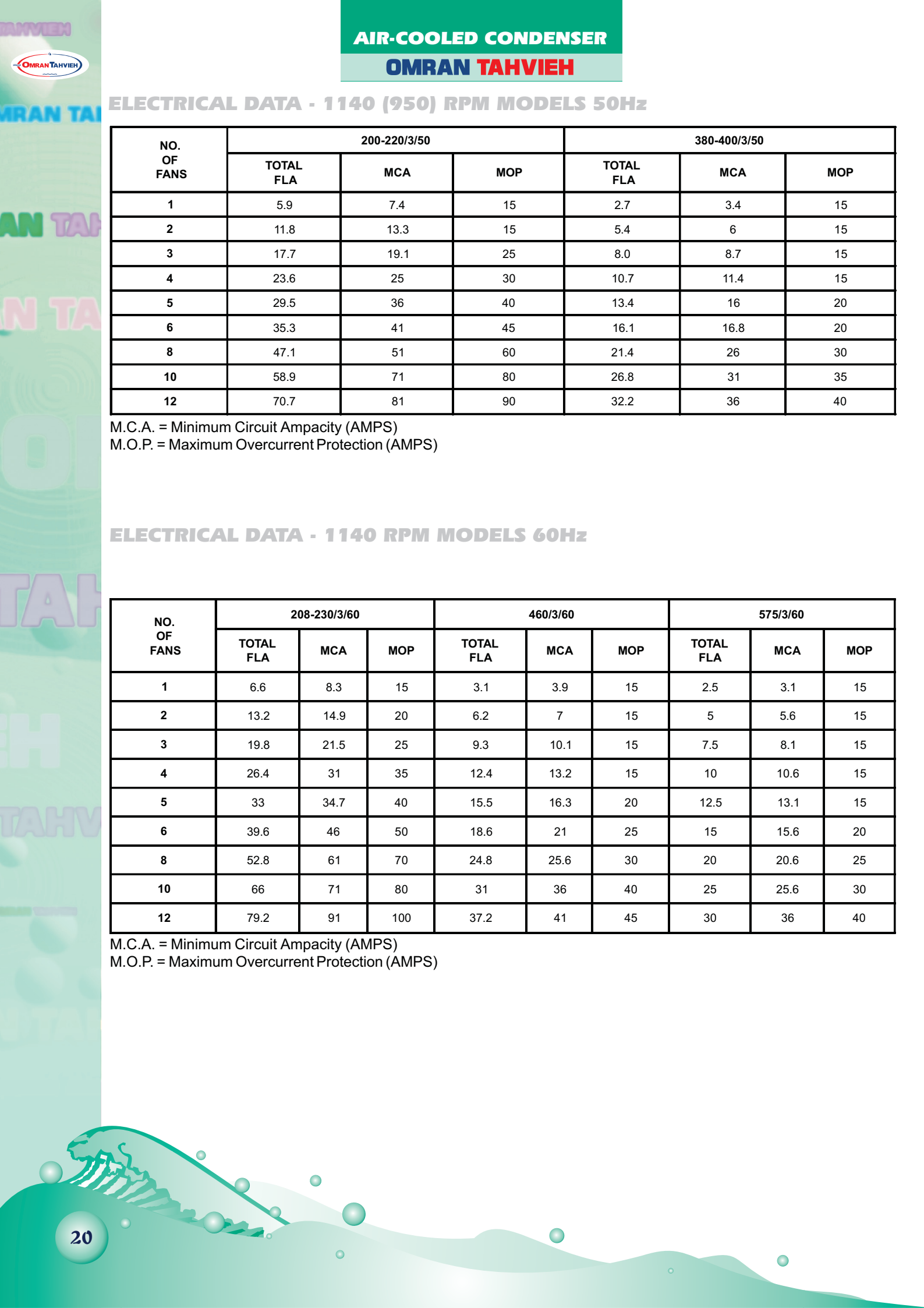
- NOTES:**
- (1) Above capacity data based on 0°F subcooling and at sea level.
 - (2) TD = Condensing temperature - ambient temperature
 - (3) Standard fin spacing is 12 FPI except models 056 and 112 (13 FPI).
 - (4) For High Altitude applications apply the following correction factors:
0.94 for 2000 feet, 0.88 for 4000 feet and 0.81 for 6000 feet.
 - (5) For 50Hz capacity multiply by 0.92.

GENERAL SPECIFICATIONS - 1140 RPM MODELS

OAVC MODEL NUMBER	R22 Refrigerant Charge ⁽¹⁾				Air Flow Rate ⁽⁴⁾		Piping Connections		Condenser Weight ⁽⁵⁾	
	Normal ⁽²⁾		90% FULL ⁽³⁾				Inlet Qty - OD	Outlet Qty - OD		
	lbs	kg	lbs	kg	CFM	m³/h			lbs	kg
Single Row Models										
1C11007	1.7	0.8	11.0	5.2	9590	16300	1 - 1 1/8	1 - 7/8	360	163
1C11009	2.2	1.0	17.0	7.5	8420	14300	1 - 1 3/8	1 - 7/8	375	170
1C11010	2.8	1.3	21.0	9.5	9590	16300	1 - 1 3/8	1 - 7/8	420	191
1C11011	3.9	1.8	27.0	12.0	9230	15700	1 - 1 3/8	1 - 1 1/8	440	200
1C11012	4.3	2.0	31.0	14.0	9660	16400	1 - 1 3/8	1 - 1 1/8	480	218
1C11013	5.2	2.4	39.0	18.0	9290	15800	1 - 1 5/8	1 - 1 1/8	505	229
1C12017	4.1	1.9	31.0	14.0	16800	28500	1 - 1 5/8	1 - 1 1/8	565	256
1C12019	6.1	2.8	44.0	20.0	19200	32600	1 - 2 1/8	1 - 1 3/8	630	286
1C12022	7.4	3.4	55.0	25.0	18400	31200	1 - 2 1/8	1 - 1 3/8	675	306
1C12024	8.3	3.8	62.0	28.0	19300	32800	1 - 2 1/8	1 - 1 3/8	740	336
1C12027	10.0	4.5	75.0	34.0	18600	31700	1 - 2 1/8	1 - 1 3/8	790	358
1C13029	9.0	4.1	61.0	28.0	28700	48800	1 - 2 1/8	1 - 1 5/8	840	381
1C13034	10.0	4.5	78.0	35.0	27600	47000	1 - 2 1/8	1 - 1 5/8	905	410
1C13037	12.0	5.4	94.0	42.0	29000	49200	1 - 2 5/8	1 - 1 5/8	1000	454
1C13041	14.0	6.4	113	51.0	27900	47400	1 - 2 5/8	1 - 1 5/8	1070	485
1C13043	17.5	7.9	128	57.8	35500	60400	1 - 2 5/8	1 - 1 5/8	1055	479
1C13048	20.5	9.3	152	68.9	34500	58700	1 - 2 5/8	1 - 1 5/8	1150	522
2C14056	25.9	11.8	183	83.2	48100	81900	1 - 2 5/8	1 - 2 1/8	1600	726
2C14063	32.5	14.7	239	108	47300	80400	1 - 2 5/8	1 - 2 1/8	1650	748
2C14068	38.0	17.2	286	130	46000	78200	1 - 2 5/8	1 - 2 1/8	1750	794
2C15079	38.5	17.5	290	131	59100	100500	1 - 2 5/8	1 - 2 1/8	2063	936
2C15085	48.8	22.2	356	161	57500	97800	1 - 2 5/8	1 - 2 5/8	2188	992
2C16095	53.5	24.3	365	165	70900	120600	1 - 3 1/8	1 - 3 1/8	2475	1123
2C16103	61.2	27.7	436	198	69000	117300	1 - 3 1/8	1 - 3 1/8	2625	1191
Double Row Models										
1C22039	16.0	7.3	104	47.0	38400	65200	2 - 2 1/8	2 - 1 3/8	1060	481
1C22045	19.0	8.6	126	57.0	36900	62700	2 - 2 1/8	2 - 1 3/8	1145	519
1C22049	21.0	9.5	141	64.0	38600	65700	2 - 2 1/8	2 - 1 3/8	1255	569
1C22054	23.0	10.0	167	76.0	37200	63200	2 - 2 1/8	2 - 1 3/8	1350	612
1C23058	22.0	10.0	141	64.0	57400	97600	2 - 2 1/8	2 - 1 5/8	1420	644
1C23067	26.0	12.0	174	79.0	55300	93900	2 - 2 1/8	2 - 1 5/8	1550	703
1C23073	30.0	14.0	212	96.0	57900	98500	2 - 2 5/8	2 - 1 5/8	1710	776
1C23081	35.0	16.0	251	114	55800	94800	2 - 2 5/8	2 - 1 5/8	1865	846
1C23086	35.0	16.0	255	116	71100	120800	2 - 2 5/8	2 - 1 5/8	2110	957
1C23096	41.0	19.0	304	138	69100	117400	2 - 2 5/8	2 - 1 5/8	2300	1043
2C24112	53.0	24.0	375	170	96300	163700	2 - 2 5/8	2 - 2 1/8	3200	1451
2C24126	65.0	30.0	477	217	94600	160700	2 - 2 5/8	2 - 2 1/8	3300	1497
2C24137	77.0	35.0	579	263	92000	156400	2 - 2 5/8	2 - 2 1/8	3500	1588
2C25158	77.0	35.0	579	263	118200	200900	2 - 2 5/8	2 - 2 1/8	4125	1871
2C25172	99.0	45.0	721	327	115000	195500	2 - 2 5/8	2 - 2 5/8	4375	1984
2C26190	107.0	49.0	729	331	141800	241100	2 - 3 1/8	2 - 3 1/8	4950	2245
2C26206	124.0	56.0	883	401	138000	234600	2 - 3 1/8	2 - 3 1/8	5250	2381

NOTES:

- (1) For R407A, R507 use R22 Charge x 0.87. For R407-C use R22 Charge x 0.97. For R134a and R502 use R22 Charge. For R12 use R22 Charge x 1.1.
- (2) Normal Charge is the refrigerant charge for warm ambient or summer operation. For low ambient or winter charge with flooded head pressure control and fan cycling See Page 34 and Page 35.
- (3) 90% FULL is the liquid refrigerant weight at 90% of internal weight and is for reference ONLY.
- (4) For 50Hz Fan data use 60Hz CFM (m³/h) x 0.83.capacity multiply by 0.92.
- (5) Less weight pf refrigerant charge.



AIR-COOLED CONDENSER

OMRAN TAHVIEH

ELECTRICAL DATA - 1140 (950) RPM MODELS 50Hz

NO. OF FANS	200-220/3/50			380-400/3/50		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP
1	5.9	7.4	15	2.7	3.4	15
2	11.8	13.3	15	5.4	6	15
3	17.7	19.1	25	8.0	8.7	15
4	23.6	25	30	10.7	11.4	15
5	29.5	36	40	13.4	16	20
6	35.3	41	45	16.1	16.8	20
8	47.1	51	60	21.4	26	30
10	58.9	71	80	26.8	31	35
12	70.7	81	90	32.2	36	40

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

ELECTRICAL DATA - 1140 RPM MODELS 60Hz

NO. OF FANS	208-230/3/60			460/3/60			575/3/60		
	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP	TOTAL FLA	MCA	MOP
1	6.6	8.3	15	3.1	3.9	15	2.5	3.1	15
2	13.2	14.9	20	6.2	7	15	5	5.6	15
3	19.8	21.5	25	9.3	10.1	15	7.5	8.1	15
4	26.4	31	35	12.4	13.2	15	10	10.6	15
5	33	34.7	40	15.5	16.3	20	12.5	13.1	15
6	39.6	46	50	18.6	21	25	15	15.6	20
8	52.8	61	70	24.8	25.6	30	20	20.6	25
10	66	71	80	31	36	40	25	25.6	30
12	79.2	91	100	37.2	41	45	30	36	40

M.C.A. = Minimum Circuit Ampacity (AMPS)

M.O.P. = Maximum Overcurrent Protection (AMPS)

CONDENSER THEORY

The purpose of a refrigeration system is to absorb heat from an area where it is not wanted and reject this heat to an area where it is unobjectionable. By referring to the diagram below, it can be seen that only a few components are required to perform this task.

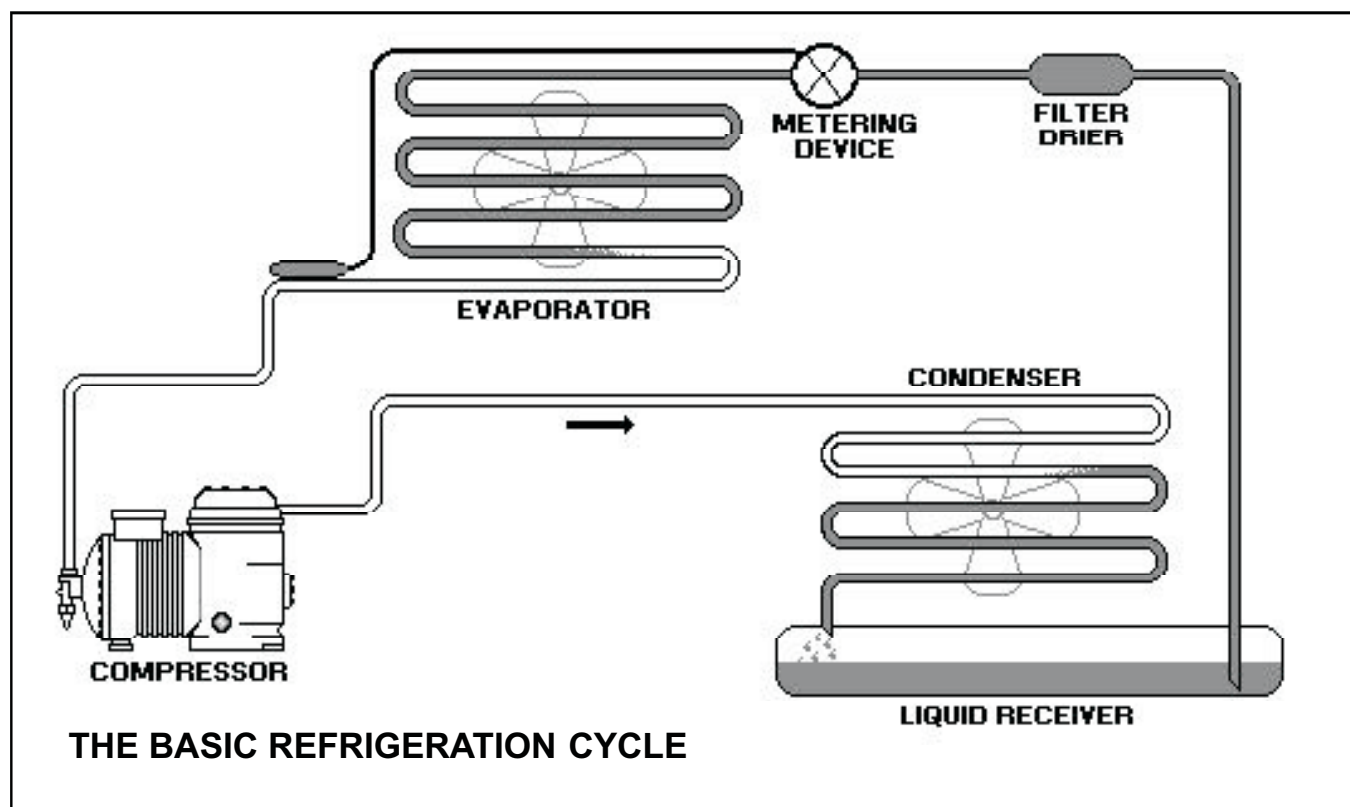
High pressure/high temperature vapor leaves the compressor and is forced into the condenser via the discharge line. The condenser first desuperheats the vapor down to its saturation point. This saturation point can be expressed as the condensing temperature of the refrigerant and varies with condenser size, load and ambient temperature.

Now the condenser must remove the latent heat of condensation from the refrigerant so that it may fully condense. After the refrigerant has fully condensed, it will be subcooled to some extent.

The liquid leaving the condenser is still at a high pressure but at a much lower temperature and drains into the receiver. As the liquid level in the receiver increases, the vapor is allowed to vent back up to the condenser via the condensate line.

Because the dip tube almost reaches the bottom of the receiver, only liquid will enter the liquid line. This liquid now passes through the metering device where its pressure is reduced to the evaporating pressure. The temperature will drop with pressure since the refrigerant will always attempt to meet its saturation point during a change of state.

The condensing temperature decreases as the ambient temperature drops and/or as the condenser surface increases.



GLOSSARY OF TERMS

Balance point - after a system stabilizes, the heat added to the refrigerant during the refrigeration cycle will equal the heat rejected at the condenser. The balance point usually refers to the actual TD that the system is operating at. The balance point could refer to a low side balance or a high side balance. For example, a system operating with a 120 °F condensing temperature in a 90 °F ambient will have a condenser balance point of 30 °F TD.

Circuit - a circuit can be considered a group of feeds. A condenser may be sized to handle several refrigeration systems at one time. Each system is considered one circuit and the number of feeds required for each circuit depends on the THR for that particular system. Each circuit has its own inlet and outlet header. The number of circuits on a condenser can not exceed the total number of feeds available.

Compression Ratio - Compression ratio equals the discharge pressure in pounds per square inch absolute (psia) divided by the suction pressure in psia. The compression ratio in a compressor increases as suction pressure decreases and as discharge pressure increases. (at sea-level, psia is equal to psig plus 14.7).

Compressor Capacity - can be defined as the actual refrigerating capacity available at the evaporator and suction line after considering the overall system balance point. Compressor capacity is mainly affected by the evaporating and condensing temperatures of the system.

Condensate Line - (also called "Drain Leg") is a term that describes the refrigerant line between the condenser and the receiver. The condensate line should drop vertically and is typically larger than the liquid line. This is to promote free draining of the refrigerant from the condenser to the receiver.

Condenser Temperature Difference (TD) - is the difference between the condensing temperature of the refrigerant and the temperature of the air entering the condenser.

Condensing Temperature (CT) - is the temperature where the refrigerant vapor condenses back to a liquid. This temperature varies with condenser size. Condensing temperature should be kept as low as possible to maintain higher refrigerating capacity and system efficiency

Desuperheat - refers to the lowering of refrigerant superheat. Hot vapor entering a condenser must first be desuperheated before any condensing of the refrigerant can take place.

Evaporating Temperature - the temperature at which heat is absorbed in the evaporator, at this temperature, the refrigerant changes from a liquid to a vapor. This evaporating temperature is dependent on pressure and must be lower than the surrounding temperature for heat transfer to take place.

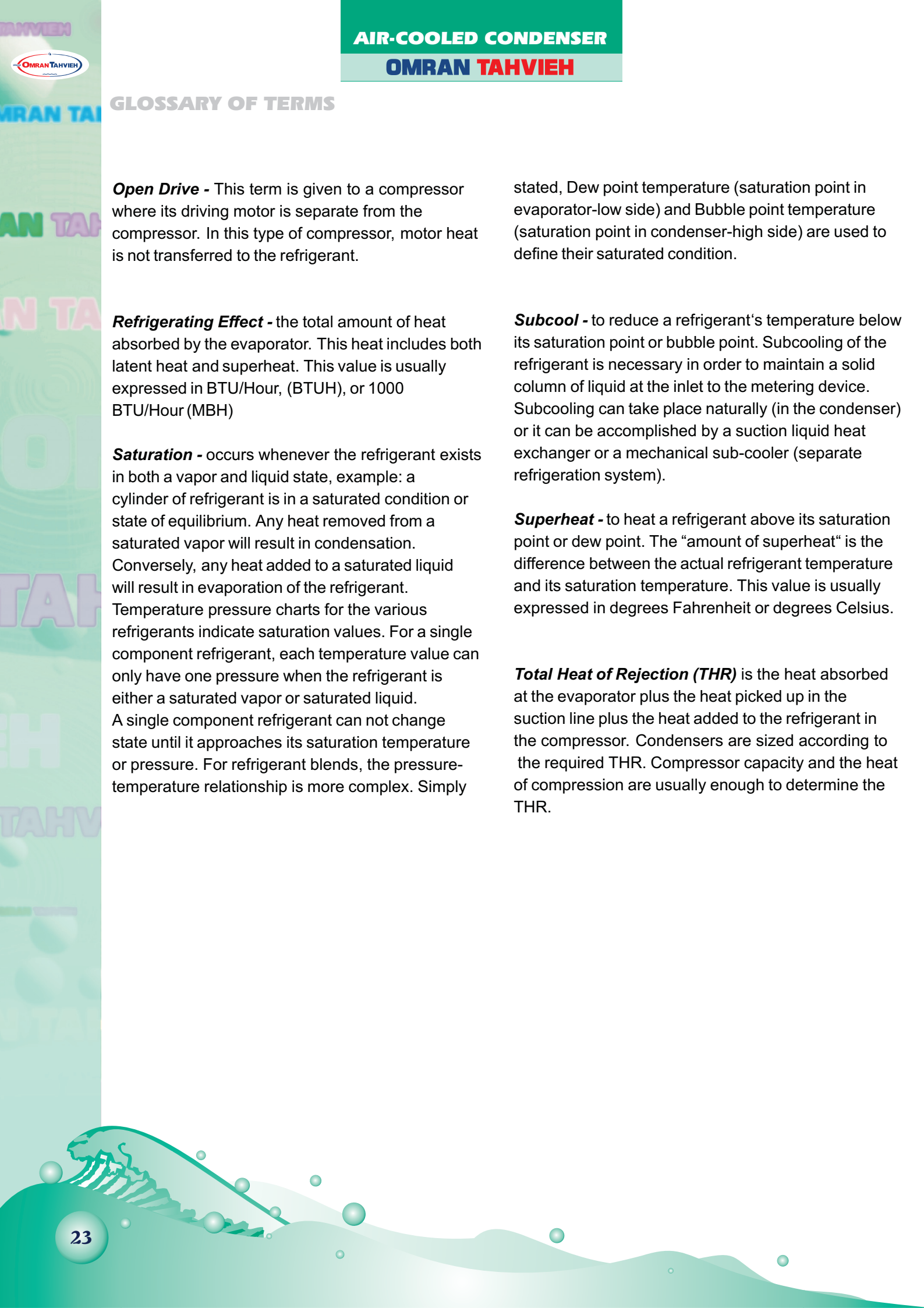
Feed - a single path for refrigerant flow inside a condenser. This path begins at the inlet header and terminates at the condenser's outlet header. These feeds can be grouped together to accommodate one or more circuits.

Heat of Compression - heat is added to the refrigerant as it is compressed. Evidence of this can be observed on the pressure-enthalpy diagram for the refrigerant being used. The amount of this heat is dependent on the refrigerant type and compression ratio.

Additional heat from friction also increases the heat of compression. All of this heat along with the heat absorbed in the evaporator, suction line and any motor heat must be rejected by the condenser.

Latent Heat of Vaporization (also Latent Heat of Condensation) - refers to the heat required to fully vaporize or condense a refrigerant. This latent heat varies with temperature and pressure. Latent heat is often referred to as hidden heat since adding heat to a saturated liquid or removing heat from a saturated vapor will result in a change of state and heat content but not a change in temperature.

Liquid Line - is the piping between the receiver and the metering device. On systems without a receiver, the liquid line runs between the condenser and the metering device.



GLOSSARY OF TERMS

Open Drive - This term is given to a compressor where its driving motor is separate from the compressor. In this type of compressor, motor heat is not transferred to the refrigerant.

Refrigerating Effect - the total amount of heat absorbed by the evaporator. This heat includes both latent heat and superheat. This value is usually expressed in BTU/Hour, (BTUH), or 1000 BTU/Hour (MBH)

Saturation - occurs whenever the refrigerant exists in both a vapor and liquid state, example: a cylinder of refrigerant is in a saturated condition or state of equilibrium. Any heat removed from a saturated vapor will result in condensation. Conversely, any heat added to a saturated liquid will result in evaporation of the refrigerant. Temperature pressure charts for the various refrigerants indicate saturation values. For a single component refrigerant, each temperature value can only have one pressure when the refrigerant is either a saturated vapor or saturated liquid. A single component refrigerant can not change state until it approaches its saturation temperature or pressure. For refrigerant blends, the pressure-temperature relationship is more complex. Simply

stated, Dew point temperature (saturation point in evaporator-low side) and Bubble point temperature (saturation point in condenser-high side) are used to define their saturated condition.

Subcool - to reduce a refrigerant's temperature below its saturation point or bubble point. Subcooling of the refrigerant is necessary in order to maintain a solid column of liquid at the inlet to the metering device. Subcooling can take place naturally (in the condenser) or it can be accomplished by a suction liquid heat exchanger or a mechanical sub-cooler (separate refrigeration system).

Superheat - to heat a refrigerant above its saturation point or dew point. The "amount of superheat" is the difference between the actual refrigerant temperature and its saturation temperature. This value is usually expressed in degrees Fahrenheit or degrees Celsius.

Total Heat of Rejection (THR) is the heat absorbed at the evaporator plus the heat picked up in the suction line plus the heat added to the refrigerant in the compressor. Condensers are sized according to the required THR. Compressor capacity and the heat of compression are usually enough to determine the THR.

CONDENSER SELECTION

During a condenser selection process, the application engineer should choose a condenser which is large enough to reject all of the heat added to the refrigerant during the refrigerating cycle. When the condenser is sized to equal the total heat of rejection (THR) at design conditions, enough heat will be rejected to maintain the required condensing temperature. This will ensure that sufficient refrigeration capacity will be maintained at the evaporator during the warm summer period when it is needed the most.

If a condenser is undersized, the condensing temperature (CT) will be driven upwards. This naturally occurs as the system seeks its new balance point. As the CT increases, the operating temperature difference (TD) °F the condenser also increases. Even though the capacity of the condenser increases with the higher TD, the refrigerating capacity of the compressor will decrease due to the higher condensing temperature. An undersized condenser may perform satisfactorily when ambient temperatures are below design, but the overall system capacity will not be high enough during the warmer periods.

Oversizing a condenser increases project costs and can also lead to undesirable operating conditions.

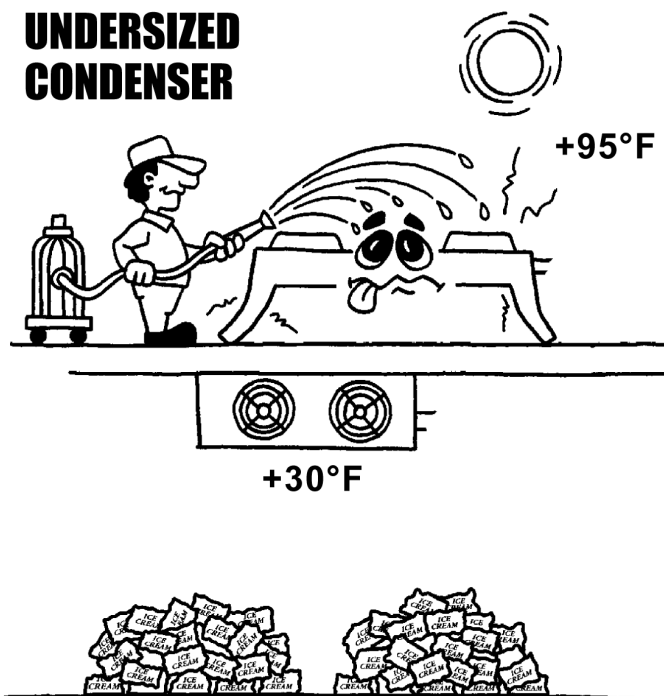
Low ambient control devices such as pressure regulators and fan cycling switches operate to maintain a sufficient pressure in the condenser during low ambient periods.

On systems utilizing a receiver and flooding type of head pressure control, more refrigerant will be required to flood the condenser in order to achieve the desired condensing pressure.

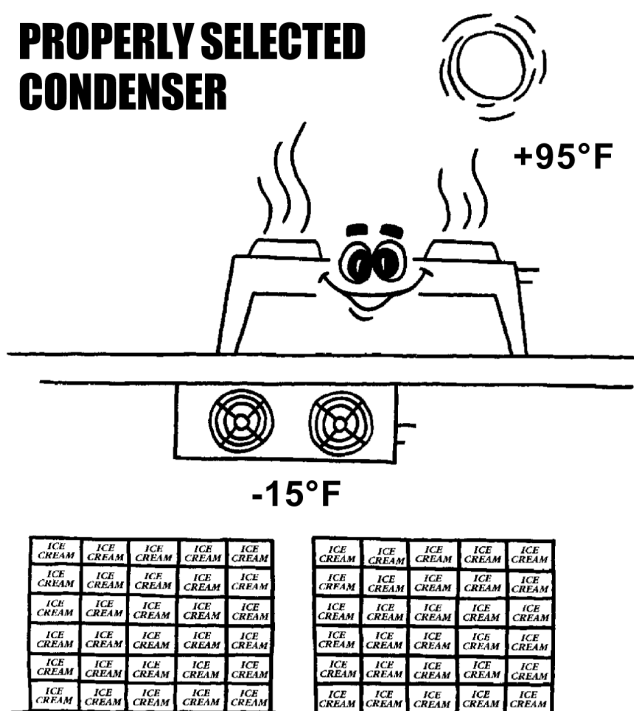
Consider an air conditioning system with an oversized condenser which is only used during the summer time and does not have any type of head pressure control. This particular system may experience problems due to a lack of subcooling. Since the condenser was oversized the amount of natural subcooling available is less. *The maximum amount of natural subcooling possible is the difference between the condensing temperature and the ambient temperature.* If this amount of subcooling is not enough to offset the pressure losses in the liquid line, then flashing is certain to occur.

Flashing produces vapor at the metering device which was designed to meter 100% liquid. One cure for this is to apply head pressure control devices to the system that will increase the head pressure and ensure adequate liquid subcooling.

UNDERSIZED CONDENSER



PROPERLY SELECTED CONDENSER



CONDENSER SELECTION

PRELIMINARY DATA REQUIREMENTS

There are several factors that influence the size of an air cooled condenser. Before a condenser can be properly selected, this information must be obtained. It may be convenient for you to refer to the calculation worksheets (P.27 and P.28) as you read through the following information.

1. What are the Desired Evaporating and Condensing Temperatures?

The evaporating temperature is needed to determine the THR (total heat of rejection) of the condenser. As the evaporating temperature is lowered, the heat of compression increases due to the higher compression ratio. This affects THR.

The required condensing temperature (CT) must be known before the temperature difference can be determined. This is necessary since condenser capacity varies with temperature difference. The required compressor capacity will determine the maximum CT since the compressor can only provide this capacity at certain operating conditions. You could also refer to Table 1 for CT recommendations. The heat of compression varies with compression ratio. Both evaporating and condensing temperatures affect the compression ratio.

Often customers may request a specified TD value (i.e 10, 15 etc.). The condensing temperature is then established as being the sum of this TD value and the design ambient temperature. (i.e $10 + 95 = 105^{\circ}\text{F}$)

2. Compressor Capacity

Determine the capacity of the compressor at the desired evaporating and condensing conditions. Remember, tons refrigeration does not necessarily equal horsepower. As the evaporating temperature decreases and/or the condensing temperature increases, tons refrigeration per horsepower decreases. One ton refrigeration equals 12000 Btu/h.

3. Condenser Ambient Design Temperature

This will be the maximum design temperature of the air entering the condenser. It is typical to add about 5°F to the maximum outdoor design temperature in some instances to compensate for radiation from a dark surface such as a black roof.

4. Type of Compressor

It is necessary to identify the type of compressor to be utilized in the application so that accurate heat of rejection information may be obtained. For example, open-drive compressors can be belt driven or direct coupled to the motor. Electrical energy from the motor is converted to heat energy which is not transferred to the refrigerant as in a refrigerant cooled compressor.

In a hermetic refrigerant cooled compressor, the cool

suction vapor picks up heat as it travels through the warm motor windings. The condenser must be sized to reject this heat along with any other heat absorbed by the refrigerant. It can be observed in Table 2 that hermetic refrigerant cooled compressors have higher heat of rejection factors.

5. Heat of Compression

As the refrigerant is compressed in the compressor, its heat content increases due to the physical and thermodynamic properties of the refrigerant. Additional heat from friction between moving parts in the compressor also increases the heat content of the refrigerant. The amount of heat added to the refrigerant is dependent on the refrigerant type, the compression ratio and the type of compressor.

Accurate THR or heat of compression factors may be available from the compressor manufacturer. Always attempt to access this information prior to using other methods. If this information is not available, refer to the heat of rejection factors in Table 2.

However, in situations where your application exceeds the limits of this table, such as in compound compression and cascade systems, one of the following calculations may be performed.

For OPEN DRIVE COMPRESSORS:

Total heat of Rejection = Compressor Capacity (Btu/h) + (2545 x BHP)
(BHP - Brake Horsepower of the motor)

For SUCTION COOLED COMPRESSORS:

Total heat Rejection = Compressor Capacity (Btu/h) + (3413 x KW)
(KW may be obtained from the power input curve for that compressor)

6. What is the Refrigerant Type?

A condenser's capacity can vary by 8 to 10% due to differences in physical and thermodynamic properties. Refer to the correct refrigerant capacity table or use factor as indicated. (see P. 2)

7. Altitude

The volume of a given mass of air increases as it rises above sea level. As its volume increases, its density decreases. As the air becomes less dense, its heat capacity decreases. Therefore, more air volume would have to be forced through the condenser at 6,000 feet *above* sea level than at sea level.

Since condenser capacities are based on operation at sea level, an altitude correction factor must be applied to the total heat of rejection. Basically, the load on the condenser will be increased to a point which will compensate for the higher altitude.

CONDENSER SELECTION

8. Are you Replacing a Water Cooled Condenser with a Remote Air Cooled Condenser?

If this is the case, it should be remembered that the compressor will operate at a higher discharge pressure after converting to air cooled. To help minimize the resulting loss in capacity, the condenser should be sized generously. In other words, you may consider keeping the balance point of the condenser as low as possible.

9. Is this an application for multiple circuits?

If you wish to utilize the condenser for multiple circuits, then all of the above data must be obtained for EACH circuit. After obtaining this information, proceed to the MULTIPLE CIRCUIT WORKSHEET (P. 28) (for single circuit applications refer to the SINGLE CIRCUIT WORKSHEET (P. 27)).

TABLE 1 - CONDENSING TEMPERATURE GUIDELINES

Evaporating Temperature	Condensing Temperature Guidelines (at 85° to 105° Ambient Temperature)					TD*
	85 °F	90 °F	95 °F	100 °F	105 °F	
Low Temp Systems (-40 °F to +9 °F Evap Temps)	95-100 °F	100-105 °F	105-110 °F	110-115 °F	115-120 °F	10-15
Medium Temp Systems (+10 °F to +34 °F Evap Temps)	100-105 °F	105-110 °F	110-115 °F	115-120 °F	120-125 °F	15-20
High Temp Systems (+35 °F to +50 °F Evap Temps)	105-110 °F	110-115 °F	115-120 °F	120-125 °F	125-130 °F	20-25
Air Conditioning Systems (+40 °F to +50 °F Evap Temps)	110-115 °F	115-120 °F	120-125 °F	125-130 °F	130-135 °F	25-30

* TD - Condenser TD guideline

TABLE 2 - HEAT OF REJECTION FACTORS

EVAPORATOR TEMPERATURE		CONDENSING TEMPERATURE															
		90°F (32°C)		100°F (38°C)		105°F (41°C)		110°F (43°C)		115°F (46°C)		120°F (49°C)		130°F (55°C)		140°F (60°C)	
°F	°C	OPEN	HERM	OPEN	HERM	OPEN	HERM	OPEN	HERM	OPEN	HERM	OPEN	HERM	OPEN	HERM	OPEN	HERM
-40	-40	*	1.66	*	1.73	*	1.76	*	1.80	*	1.90	*	2.00	*	*	*	*
-30	-34	1.37	1.57	1.42	1.62	1.44	1.65	1.47	1.68	*	1.74	*	1.80	*	*	*	*
-20	-29	1.33	1.49	1.37	1.53	1.39	1.55	1.42	1.58	1.44	1.61	1.47	1.65	*	*	*	*
-10	-23	1.28	1.42	1.32	1.46	1.34	1.48	1.37	1.50	1.39	1.53	1.42	1.57	1.47	1.64	*	*
0	-18	1.24	1.36	1.28	1.40	1.30	1.42	1.32	1.44	1.34	1.47	1.37	1.50	1.41	1.56	1.47	1.62
10	-12	1.21	1.31	1.24	1.34	1.26	1.36	1.28	1.38	1.30	1.40	1.32	1.43	1.36	1.49	1.42	1.55
20	-7	1.17	1.26	1.20	1.29	1.22	1.31	1.24	1.33	1.26	1.35	1.28	1.37	1.32	1.43	1.37	1.49
30	-1	1.14	1.22	1.17	1.25	1.18	1.26	1.20	1.28	1.22	1.30	1.24	1.32	1.27	1.37	1.32	1.42
40	4	1.12	1.18	1.15	1.21	1.16	1.23	1.17	1.24	1.18	1.25	1.20	1.27	1.23	1.31	1.28	1.35
50	10	1.09	1.14	1.12	1.17	1.13	1.19	1.14	1.20	1.16	1.22	1.17	1.23	1.20	1.26	1.24	1.29

OPEN - Direct Drive or Belt Drive open compressors

HERM - Hermetic or semi-Hermetic, Refrigerant (suction) cooled motor compressors.

WORKSHEETS - SINGLE CIRCUIT

SINGLE CIRCUIT WORKSHEET

(REFER TO P. 25 FOR GUIDELINES, SEE SAMPLE SELECTION ON P. 29)

JOB REF: _____

1. SYSTEM DATA REQUIREMENTS

EVAP TEMP = _____ °F

COND TEMP = _____ °F

COMPR. CAPACITY = _____ Btuh / 1000 = _____ MBH

COND. DESIGN AMBIENT TEMP = _____ (AT) °F

TD = _____ (Cond. Temp. - Ambient Temp)

COMPRESSOR TYPE = ☐ OPEN ☐ HERMETIC (Refrigerant cooled)

REFRIGERANT = R _____ REF. FACTOR = _____ (see P. 3)

ALTITUDE = ☐ AT SEA LEVEL

or _____ FEET

ALT. FACTOR = _____
(See P.3)

2. THR (Total Heat of Rejection) CALCULATION

COMPR. CAPACITY (MBH) X HR f X ALT f X REF f = THR (MBH)

_____ X _____ X _____ X _____ = _____

Where HR f = Heat of rejection factor (see Table 2, P. 26)

ALT f = Altitude/elevation factor (Sea level=1, or above factor)

REF f = Refrigerant Correction factor (R22 = 1)

Alternate refrigerant based on factors from P. 3

R12 = 1/.95 = 1.05, R134a = 1/.94 = 1.06,

R502 = 1/.98 = 1.02, R404A/R507/R407A/B = 1/.97 = 1.03

THR = Total Heat of Rejection (MBH, factored in R22) to be rejected by condenser

3. CONDENSER MODEL SELECTION

Refer to the R22 CAPACITY section (P. 3) and select a condenser at the TD (required above) that will closely match the above calculated THR value. (NOTE: use the R22 capacity Table. The above calculation has already been adjusted for alternate types).

COND. MODEL # _____ For the model selected
record the THR PER 1°F TD value = _____ (B) (see P. 3)

4. ACTUAL CONDENSING TEMP CALCULATION

THR (from sec. 2) / value (B) = ATD (actual Temperature Difference)

_____ / _____ = _____

To find the Actual Condensing Temp. (ACT) just add the Actual Temperature Difference (ATD) to the design Ambient Temperature (AT).

ATD + AT = ACT

_____ + _____ = _____ °F

NOTE: The Actual Condensing Temp. MUST EQUAL or BE LESS THAN the condensing temp recorded in section 1 above. This ensures the compressor capacity is maintained when operating the condenser at the designed ambient temperature.

For further assistance please contact your local Omran sales representative.

WORKSHEETS - MULTIPLE CIRCUITS

MULTIPLE CIRCUIT WORKSHEET

(REFER TO P. 25 FOR GUIDELINES & SEE SAMPLE SELECTION ON P. 30)

1. SYSTEM DATA REQUIREMENTS

CONDENSER DESIGN AMBIENT TEMP = _____ (AT) °F
 ALTITUDE = ☐ SEA LEVEL or _____ FEET FACTOR = _____ (See P. 3)

JOB REF: _____

CIRCUIT INFORMATION

	CIRC #1	CIRC #2	CIRC #3	CIRC #4
OPEN	☐	☐	☐	☐
HERMETIC	☐	☐	☐	☐

EVAP. TEMP °F =	_____	_____	_____	_____
CONDENSING TEMP =	_____	_____	_____	_____
COMPR CAP. (MBH) =	_____	_____	_____	_____
REFRIGERANT =	_____	_____	_____	_____
TD =	_____	_____	_____	_____
(Cond Temp - Amb.)				

2. THR (Total Heat of Rejection) CALCULATION

COMPR CAPACITY (MBH) X HRf X ALTf X REFf = THR (MBH) / TD = CL

CIRC #1	_____	X	_____	X	_____	X	_____	=	_____	/	_____	=	_____
CIRC #2	_____	X	_____	X	_____	X	_____	=	_____	/	_____	=	_____
CIRC #3	_____	X	_____	X	_____	X	_____	=	_____	/	_____	=	_____
CIRC #4	_____	X	_____	X	_____	X	_____	=	_____	/	_____	=	_____

TOTAL THR Capacity (MBH / 1 °F TD) = _____

Where HR f = Heat of rejection factor (see Table 2, P.26)

ALT f = Altitude/elevation factor (Sea level=1, see P.3 for Higher)

REF f = Refrigerant Correction factor (R22 = 1)

R12 = 1/.95 = 1.05, R134a = 1/.94 = 1.06,

R502 = 1/.98 = 1.02, R404A / R507 / R407A/B = 1/.97 = 1.03

Alternate refrigerant based on factors from P.3

THR = Total Heat of Rejection (MBH) to be rejected by condenser (R22 capacity)

TD = Condensing Temp - Ambient Temperature

CL = Circuit loading per 1°F TD

3. CONDENSER SELECTION

Refer to the R22 CAPACITY selection (P.3) and select a condenser at the 1°F TD that will closely match the above Total THR Capacity (MBH/ 1°F TD).

COND. MODEL# _____ For the model selected, refer to P.3 and enter...

Max no. of Feeds = _____ (A)

MBH @ 1°F TD per feed = _____ (B)

calculate the number of feeds required for each circuit.

CL (MBH / 1°F TD) / (B) value = NF number of feeds required (round off to nearest whole #)

CIRC #1	_____	/	_____	=	_____
CIRC #2	_____	/	_____	=	_____
CIRC #3	_____	/	_____	=	_____
CIRC #4	_____	/	_____	=	_____

Total number of feeds required NF = _____

(must not exceed value (A))

If number of feeds required exceeds number of feeds available then select the next larger size condenser model that can handle the number and repeat above process.

4. ACTUAL CONDENSING TEMP (per circuit) CALCULATION

First calculate the ATD (Actual TD) as follows: { THR (from sec. 2) / NF value } / value (B) = (Actual Temperature Difference)

CIRC #1	{ _____ / _____ }	/	_____	=	_____
CIRC #2	{ _____ / _____ }	/	_____	=	_____
CIRC #3	{ _____ / _____ }	/	_____	=	_____
CIRC #4	{ _____ / _____ }	/	_____	=	_____

To find the Actual Condensing Temperature (ACT) just add the Actual Temperature Difference (ATD) to the design ambient (AT)

	ATD	+	AT	=	ACT
CIRC #1	_____	+	_____	=	_____ °F
CIRC #2	_____	+	_____	=	_____ °F
CIRC #3	_____	+	_____	=	_____ °F
CIRC #4	_____	+	_____	=	_____ °F

NOTE: The Actual Condensing Temp. MUST EQUAL or BE LESS THAN the condensing temp recorded in section 1 above.

This ensures the compressor capacity is maintained when operating the condenser at the design ambient temperature.

For further assistance please contact your local Omran sales representative.

WORKSHEETS - SAMPLE SELECTION#1

Preliminary Data Given:

1. Evaporating temp = -20 °F
2. Condensing temp = 105 °F
3. Compressor capacity = 300,000 Btuh
4. Design ambient = 90 °F

Use WORKSHEET - SINGLE CIRCUIT (P.27) to complete selection of condenser

JOBREF: TC 1500

1. SYSTEM DATA REQUIREMENTS

EVAP TEMP = -20 °F COND TEMP = 105 °F

COMPR. CAPACITY = 300,000 Btuh / 1000 = 300 MBH

COND. DESIGN AMBIENT TEMP = 90 (AT) °F TD = 15 (Cond. Temp. - Ambient Temp)

COMPRESSOR TYPE = ☐ OPEN ☒ HERMETIC (Refrigerant cooled)

REFRIGERANT = R 22 REF. FACTOR = 1 (see P. 3)

ALTITUDE = ☒ AT SEA LEVEL or _____ FEET ALT. FACTOR = 1
(See P.3)

2. THR (Total Heat of Rejection) CALCULATION

COMPR. CAPACITY (MBH) X	HR f	X	ALT f	X	REF f	=	THR (MBH)
<u>300</u>	X	<u>1.55</u>	X	<u>1</u>	X	<u>1</u>	= <u>465</u>

3. CONDENSER MODEL SELECTION

COND. MODEL # OAVC1A23067 For the model selected
record the THR PER 1°F TD value = 32.165 (B) (see P. 3)

4. ACTUAL CONDENSING TEMP CALCULATION

THR (from sec. 2)	/	value (B)	=	ATD (actual Temperature Difference)
<u>465</u>	/	<u>32.165</u>	=	<u>14.5</u> °F

To find the Actual Condensing Temp. (ACT) just add the Actual Temperature Difference (ATD) to the design Ambient Temperature (AT).

ATD	+	AT	=	ACT
<u>14.5</u>	+	<u>90</u>	=	<u>104.5</u> °F

Above selection using condenser model OAVC1A23067 ensures condensing temperature will be at 105 °F or below during design ambient conditions. See SAMPLE SELECTION # 2 for multiple circuit selections.

WORKSHEETS - SAMPLE SELECTION#2

Preliminary Data Given:

1. Location at Reno, Nevada, 95 °F design ambient and 4,000 feet elevation.
2. Multiple circuits required with evaporating temperatures, condensing temperatures, compressor capacities and refrigerant types as listed below.

Use WORKSHEET-MULTIPLE CIRCUITS (P. 28) to complete selection of condenser.

1. SYSTEM DATA REQUIREMENTS

CONDENSER DESIGN AMBIENT TEMP = 95 (AT) °F
 ALTITUDE = ☐ SEA LEVEL or 4,000 FEET
 (See P.3)
 JOB REF: TC2000
 FACTOR = 1.14

	CIRC#1	CIRC#2	CIRC#3	CIRC#4
OPEN	☐	☐	☐	☐
HERMETIC	☒	☒	☒	☒
EVAP. TEMP °F =	<u>+20</u>	<u>+10</u>	<u>-10</u>	<u>-20</u>
CONDENSING TEMP =	<u>110</u>	<u>110</u>	<u>105</u>	<u>105</u>
COMPR CAP. (MBH) =	<u>13</u>	<u>25</u>	<u>4.6</u>	<u>31.5</u>
REFRIGERANT =	<u>22</u>	<u>22</u>	<u>404A</u>	<u>404A</u>
TD =	<u>15</u>	<u>15</u>	<u>10</u>	<u>10</u>
(Cond Temp - Amb.)				

2. THR (Total Heat of Rejection) CALCULATION

COMPR CAPACITY (MBH)	X	HRf	X	ALTf	X	REFf	= THR (MBH)	/ TD	= CL
CIRC#1 <u>13</u>	X	<u>1.33</u>	X	<u>1.14</u>	X	<u>1</u>	= <u>19.71</u>	/ <u>15</u>	= <u>1.314</u>
CIRC#2 <u>25</u>	X	<u>1.38</u>	X	<u>1.14</u>	X	<u>1</u>	= <u>39.33</u>	/ <u>15</u>	= <u>2.622</u>
CIRC#3 <u>4.6</u>	X	<u>1.48</u>	X	<u>1.14</u>	X	<u>1.03</u>	= <u>7.99</u>	/ <u>10</u>	= <u>.799</u>
CIRC#4 <u>31.5</u>	X	<u>1.55</u>	X	<u>1.14</u>	X	<u>1.03</u>	= <u>57.33</u>	/ <u>10</u>	= <u>5.733</u>
TOTAL THR Capacity (MBH / 1 °F TD) =							<u>10.468</u>		

3. CONDENSER SELECTION

Refer to the R22 CAPACITY selection (P.3) and select a condenser at the 1°F TD that will closely match the above Total THR Capacity (MBH/ 1°F TD).

COND. MODEL # OAVC1A12022

For the model selected, refer to P.3 and enter...

Max no. of Feeds = 24 (A)

MBH @ 1°F TD per feed = .447 (B)

calculate the number of feeds required for each circuit.

CL (MBH / 1°F TD)	/	(B) value	= NF number of feeds required (round off to nearest whole #)
CIRC#1 <u>1.314</u>	/	<u>.447</u>	= <u>(2.93) 3</u>
CIRC#2 <u>2.622</u>	/	<u>.447</u>	= <u>(5.86) 6</u>
CIRC#3 <u>.799</u>	/	<u>.447</u>	= <u>(1.78) 2</u>
CIRC#4 <u>5.733</u>	/	<u>.447</u>	= <u>(12.82) 13</u>

Total number of feeds required NF = 24
 (must not exceed value (A))

If number of feeds required exceeds number of feeds available then select the next larger size condenser model that can handle the number and repeat above process.

4. ACTUAL CONDENSING TEMP (per circuit) CALCULATION

First calculate the ATD (Actual TD) as follows: {THR (from sec. 2) / NF value} / value (B) = ATD (Actual Temperature Difference)

CIRC#1	{ <u>19.71</u> / <u>3</u> }	/	<u>.447</u>	=	<u>14.7</u>
CIRC#2	{ <u>39.33</u> / <u>6</u> }	/	<u>.447</u>	=	<u>14.7</u>
CIRC#3	{ <u>7.99</u> / <u>2</u> }	/	<u>.447</u>	=	<u>8.9</u>
CIRC#4	{ <u>57.33</u> / <u>13</u> }	/	<u>.447</u>	=	<u>9.9</u>

To find the Actual Condensing Temperature (ACT) just add the Actual Temperature Difference (ATD) to the design ambient (AT)

	ATD	+	AT	=	ACT
CIRC#1	<u>14.7</u>	+	<u>95</u>	=	<u>109.7</u> °F
CIRC#2	<u>14.7</u>	+	<u>95</u>	=	<u>109.7</u> °F
CIRC#3	<u>8.9</u>	+	<u>95</u>	=	<u>103.9</u> °F
CIRC#4	<u>9.9</u>	+	<u>95</u>	=	<u>104.9</u> °F

LOW AMBIENT OPERATION

GENERAL

When a remote air cooled condenser is installed outdoors, it will be subjected to varying temperatures. Within many areas, winter to summer annual temperatures swings can be as high as 120 °F or so, this will have a major impact on the performance of the condenser. As the ambient temperature drops, the condenser capacity increases due to the wider temperature difference between ambient and condensing. As this happens, the condensing temperature also drops as the system finds a new balance point. Although the overall system capacity will be higher at lower condensing temperatures, other problems can occur. The capacity of an expansion valve is affected by both the liquid temperature entering the valve and the pressure drop across it. As the condensing temperature decreases, the pressure drop across the metering device also decreases. A lower pressure drop decreases the capacity of the valve. Although lower liquid temperatures increase the capacity of the metering device, the increase is not large enough to offset the loss due to the lower pressure drop. The following three sections cover the various options used to control condensing temperatures.

(i) Fan Cycling

Cycling of the condenser fans helps control the condensing temperature. With this approach to solving low ambient problems, fans are taken off-line either one at a time, or in pairs. It is not recommended that multiple fan condensers cycle more than two fans per step. The reason for this is that the pressure in the condenser will increase drastically as several fans are taken off-line at the same time. This will result in erratic operation of the refrigeration system and applies additional stress to the condenser tubes. It is preferable to control the condensing temperature as smoothly as possible. Fans should be cycled independently on a condenser where the fans are all in a single row. On two row condensers, the fans should be cycled in pairs.

Ambient temperature sensing controls can be set to bring on certain fans when the outdoor temperature reaches a predetermined setpoint. Pressure sensing controls are set to bring on certain fans when the condensing pressure reaches the setpoint on the control. Temperature or pressure setpoints and differentials should be set in such a way as to prevent short cycling of the fans. Constant short cycling will produce a volatile condensing pressure while decreasing the life of the fan motors.

For recommended fan cycling switch settings, refer to Table 4. Differential settings on fan cycling temperature controls should be about 5 °F (2.8 °C). On fan cycling pressure controls, a differential of approximately 35 psig is recommended. On supermarket applications (using 6-12 Fan models) condenser fans may be cycled individually (not in pairs) and therefore lower differential settings may apply and will depend on the specific application.

Fans closest to the inlet header should be permitted to run whenever the compressor is running. If these initial fans are wired through a cycling control, the life of the condenser may be shortened due to the additional stress placed on the tubes and headers. Table 3 shows the fan cycling options available for all condenser models.

(ii) Variable Motor Speed Control

If additional head pressure control is required beyond the last step of fan cycling variable fan motor speed may be used. Variable motor speed is optional on all condenser models. A varying motor speed may be accomplished using a modulating temperature or modulating pressure control. A variable speed controller can be an electronic or solid state device which varies the voltage going to the motor depending on the temperature or pressure of the medium being sensed.

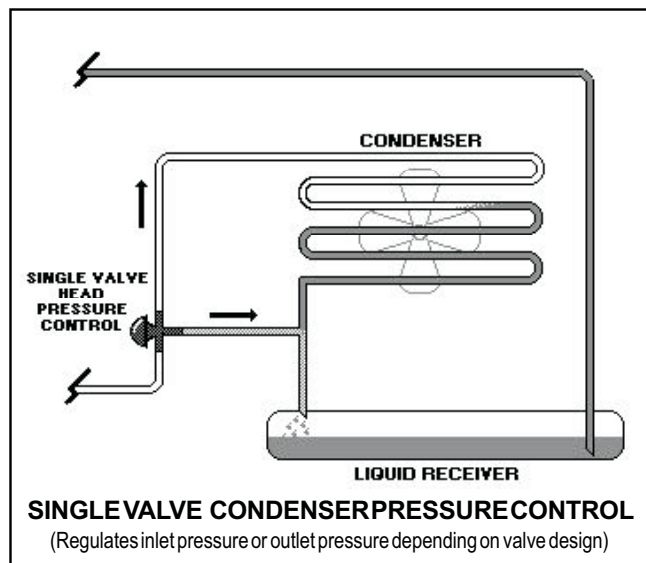
(iii) Refrigerant Regulating Controls

Pressure regulating controls are available from a number of valve manufacturers. The purpose of such a control is to regulate the refrigerant flow in such a way as to maintain a pre-selected condensing pressure. In lower ambient temperatures, these valves throttle to maintain the desired pressure and in doing so, flood the condenser with liquid refrigerant.

The larger the condenser surface is, the higher its capacity will be. When a condenser is flooded, its useful condensing surface is reduced. This is because the refrigerant occupies the space which would otherwise be used for condensing.

Some control/check valve combinations will regulate refrigerant flow depending on the pressure at the inlet of the condenser. These are often referred to as inlet regulators. As the valve closes, hot gas bypasses the condenser through a differential check valve to increase the pressure at the receiver.

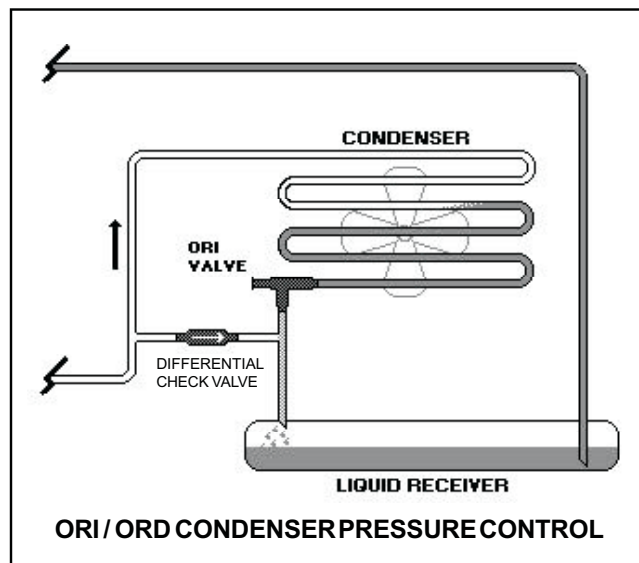
LOW AMBIENT OPERATION



This will flood the condenser until the condensing pressure increases to a point which will again open the valve. Other valves regulate the refrigerant at the outlet of the condenser to provide a similar effect. These are commonly referred to as outlet regulators. There are also combination inlet/outlet regulators with a differential check valve or other type of condenser bypass arrangement incorporated within the valve.

Controls which regulate the flow of refrigerant based on condenser inlet pressure are typically used in conjunction with a check valve having a minimum opening differential across the condenser. Outlet regulators typically require a check valve with a fixed pressure differential setting of between 20 and 35 psi. The differential is needed to compensate for pressure drop through the condenser during flooding and associated discharge piping.

Systems equipped with a condenser flooding arrangement should always use a receiver having sufficient liquid holding capacity. Additional liquid required for flooding is only required during the winter low ambients and must be stored somewhere in the system at the higher ambients. Failure to use an adequately sized receiver will result in liquid back-up in the condenser during the warmer summer months. This will cause the system to develop very high pressures in the high side resulting in a high pressure safety control trip.



Determining Additional Flooded Refrigerant Charge

Additional charge will vary with the condenser design TD and the coldest expected ambient temperature. Condensers designed for low TD applications (low temperature evaporators) and operating in colder ambients will require more additional charge than those designed for higher TD applications (high temperature evaporators) and warmer ambients.

Refer to Table 5 to determine the required added refrigerant charge at the selected TD and ambient temperatures.

These charges are based on condensers using Fan Cycling options with their last fan (Single Row Fan Models) running or last pair of fans running (Double Row Fan models).

WARNING: Do not over charge when charging by a sightglass. Liquid lines feeding the TXV at the evaporator must have a solid column of liquid (no bubbles) however bubbles at the sightglass (located adjacent to the receiver) may be normal due to the result of a higher pressure drop at that point. Bubbles could also appear in the glass whenever the regulating valves start to flood the condenser. Always record the number of drums or the weight of refrigerant that has been added or removed in the system. Overcharged systems may result in compressor failure as well as other serious mechanical damage to the system components.

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TABLE 3 - FAN CYCLING CONTROL SCHEDULE

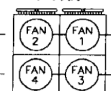
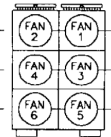
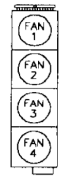
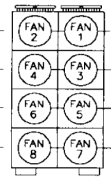
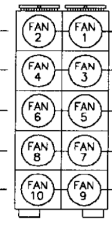
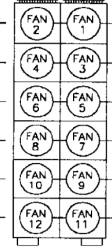
FAN ARRANGEMENT		FANS CYCLED	FANS IN CONSTANT OPERATION	FANS AVAILABLE FOR VARIABLE SPEED CONTROL
SINGLE ROW	DOUBLE ROW			
1 FAN HEADER END 			•	•
CONTROL PANEL END				
2 FAN 	4 FAN 		•	•
	1 STAGE			
3 FAN 	6 FAN 		•	•
	2'ND STAGE			
	1'ST STAGE			
4 FAN 	8 FAN 		•	•
	3'RD STAGE			
	2'ND STAGE			
	1'ST STAGE			
FAN ARRANGEMENT		FANS CYCLED	FANS IN CONSTANT OPERATION	FANS AVAILABLE FOR VARIABLE SPEED CONTROL
SINGLE ROW	DOUBLE ROW			
5 FAN 	10 FAN 		•	•
	4'TH STAGE			
	3'RD STAGE			
	2'ND STAGE			
	1'ST STAGE			
6 FAN 	12 FAN 		•	•
	5'TH STAGE			
	4'TH STAGE			
	3'RD STAGE			
	2'ND STAGE			
	1'ST STAGE			

TABLE 4 - AMBIENT FAN CYCLING THERMOSTAT SETTINGS

Number of Fans on Condenser		Design T.D. °F (°C)	Thermostat Setting * °F (°C)				
Single Row Models	Double Row Models		1st Stage	2nd Stage	3rd Stage	4th Stage	5th Stage
2	4	30 (16.7)	60 (15.6)				
		25 (13.9)	65 (18.3)				
		20 (11.1)	70 (21.1)				
		15 (8.3)	75 (23.9)				
		10 (5.6)	80 (26.7)				
3	6	30 (16.7)	60 (15.6)	40 (4.4)			
		25 (13.9)	65 (18.3)	55 (12.8)			
		20 (11.1)	70 (21.1)	60 (15.6)			
		15 (8.3)	75 (23.9)	65 (18.3)			
		10 (5.6)	80 (26.7)	75 (23.9)			
4	8	30 (16.7)	60 (15.6)	50 (10.0)	30 (-1.1)		
		25 (13.9)	65 (18.3)	55 (12.8)	40 (4.4)		
		20 (11.1)	70 (21.1)	65 (18.3)	50 (10.0)		
		15 (8.3)	75 (23.9)	70 (21.1)	60 (15.6)		
		10 (5.6)	80 (26.7)	75 (23.9)	70 (21.1)		
5	10	30 (16.7)	60 (15.6)	55 (12.8)	45 (7.2)	30 (-1.1)	
		25 (13.9)	65 (18.3)	60 (15.6)	50 (10.0)	35 (1.7)	
		20 (11.1)	70 (21.1)	65 (18.3)	60 (15.6)	40 (4.4)	
		15 (8.3)	75 (23.9)	70 (21.1)	65 (18.3)	55 (12.8)	
		10 (5.6)	80 (26.7)	75 (23.9)	70 (21.1)	65 (18.3)	
6	12	30 (16.7)	55 (12.8)	50 (10.0)	40 (4.4)	30 (-1.1)	25 (-3.9)
		25 (13.9)	65 (18.3)	60 (15.6)	55 (12.8)	45 (7.2)	35 (1.7)
		20 (11.1)	70 (21.1)	65 (18.3)	60 (15.6)	50 (10.0)	40 (4.4)
		15 (8.3)	75 (23.9)	70 (21.1)	65 (18.3)	60 (15.6)	50 (10.0)
		10 (5.6)	80 (26.7)	75 (23.9)	70 (21.1)	65 (18.3)	60 (15.6)

* NOTE: These are typical settings. Further adjustments may be necessary to suit actual field conditions.

LOW AMBIENT OPERATION

**TO DETERMINE WINTER CHARGE, ADD THE SUM OF THE NORMAL CHARGE
AND ADDITIONAL WINTER CHARGE**

TABLE 5
R22 WINTER OPERATION CHARGE - Lbs • Deg °F
Flooded Condensers with Fan Cycling

MODEL	NORMAL CHARGE Lbs	ADDITIONAL CHARGE FOR WINTER OPERATION (LBS)																			
		Design TD = 10 (Deg F)					Design TD = 15 (Deg F)					Design TD = 20 (Deg F)					Design TD = 25 (Deg F)				
		Ambient (Deg F)					Ambient (Deg F)					Ambient (Deg F)					Ambient (Deg F)				
		40	20	0	-20	-40	40	20	0	-20	-40	40	20	0	-20	-40	40	20	0	-20	-40
1A 11 007	1.7	3.5	3.8	4.0	4.1	4.2	3.0	3.5	3.7	3.9	4.0	2.5	3.1	3.5	3.7	3.8	2.0	2.8	3.2	3.4	3.6
1A 11 009	2.2	5.2	5.7	5.9	6.1	6.2	4.5	5.2	5.5	5.7	5.9	3.7	4.6	5.1	5.4	5.6	3.0	4.1	4.7	5.1	5.4
1A 11 010	2.8	6.7	7.3	7.6	7.8	7.9	5.8	6.6	7.1	7.4	7.6	4.8	6.0	6.6	7.0	7.2	3.8	5.3	6.1	6.6	6.9
1A 11 011	3.9	8.9	9.7	10	10	11	7.6	8.8	9.4	9.8	10	6.4	7.9	8.8	9.3	9.6	5.1	7.0	8.1	8.7	9.2
1A 11 012	4.3	10	11	12	12	12	8.9	10	11	11	12	7.4	9.3	10	11	11	6.0	8.3	9.5	10	11
1A 11 013	5.2	13	14	15	15	15	11	13	14	14	15	9.3	12	13	14	14	7.4	10	12	13	13
1A 12 017	4.1	10	12	13	14	15	6.4	9.3	11	12	13	4.0	7.5	9.4	11	12	0	5.1	7.6	9.2	10
1A 12 019	6.1	15	18	20	21	23	9.4	14	16	18	20	6.0	11	14	16	17	0	7.6	11	14	15
1A 12 022	7.4	17	21	24	26	27	11	17	20	22	23	7.0	13	17	19	21	0	9.2	14	14	18
1A 12 024	8.3	20	24	27	29	30	13	19	22	24	26	9.0	15	19	21	23	0	10	15	18	21
1A 12 027	10	23	28	31	34	36	15	22	26	29	31	12	18	22	25	28	0	12	18	22	24
1A 13 029	8.6	19	24	27	30	31	11	18	22	25	27	0	11	17	20	23	0	2.6	12	17	20
1A 13 034	10	23	29	33	36	38	13	22	27	30	33	0	13	20	25	28	0	3.2	15	20	24
1A 13 037	12	27	34	39	42	45	15	26	32	35	38	0	15	24	29	33	0	3.8	18	24	28
1A 13 041	14	32	40	46	50	53	18	31	37	42	45	0	18	28	34	38	0	4.4	21	28	33
1A 13 043	18	39	49	56	61	64	22	37	46	51	55	0	22	35	42	47	0	6	25	35	41
1A 13 048	21	45	57	65	70	75	26	43	53	59	64	0	26	40	49	55	0	6	29	40	47
2A 14 056	26	51	69	80	88	94	3	46	62	71	79	0	14	43	57	66	0	0	19	42	53
2A 14 063	33	64	87	100	110	117	4	58	77	89	98	0	18	54	71	82	0	0	24	52	67
2A 14 068	38	74	101	116	127	136	5	67	89	104	114	0	20	63	82	95	0	0	27	60	77
2A 15 079	39	64	97	114	127	136	0	48	81	99	111	0	0	48	75	91	0	0	12	55	75
2A 15 085	49	80	122	145	160	172	0	60	102	125	140	0	0	60	95	115	0	0	15	70	95
2A 16 095	54	66	126	154	172	186	0	66	113	137	154	0	0	29	88	116	0	0	0	54	92
2A 16 103	61	76	145	177	197	213	0	76	129	157	177	0	0	33	101	133	0	0	0	62	105
1A 22 039	16	38	47	53	57	60	25	37	43	48	52	15	30	37	42	46	0	20	30	36	41
1A 22 045	19	44	54	61	65	69	29	42	50	55	60	18	34	43	49	53	0	23	35	42	47
1A 22 049	21	48	59	66	72	76	32	46	55	61	65	19	37	47	53	58	0	25	38	45	51
1A 22 054	23	55	68	76	82	87	36	53	62	69	75	22	43	53	61	66	0	29	43	52	58
1A 23 058	22	49	62	70	76	81	28	47	57	64	70	0	28	43	53	59	0	6.8	32	43	51
1A 23 067	26	57	72	82	89	95	32	55	67	75	81	0	32	51	62	69	0	8.0	37	51	60
1A 23 073	30	66	84	96	104	111	38	64	78	88	95	0	38	59	72	81	0	9.3	43	59	70
1A 23 081	35	76	97	110	119	127	43	73	89	100	109	0	43	68	82	92	0	11	50	68	80
1A 23 086	35	77	98	111	121	128	44	74	91	102	110	0	44	69	83	94	0	11	50	69	81
1A 23 096	41	89	114	129	140	149	51	86	105	118	128	0	51	80	97	109	0	12	58	80	94
2A 24 112	53	104	142	164	180	192	6.4	94	126	146	161	0	29	88	116	135	0	0	38	85	109
2A 24 126	65	127	173	200	219	234	7.8	115	154	178	196	0	35	108	142	164	0	0	47	103	133
2A 24 137	77	149	204	235	258	275	9.2	135	181	210	231	0	41	127	167	193	0	0	55	121	157
2A 25 158	77	127	193	228	253	271	0	95	161	197	221	0	0	95	149	181	0	0	23	109	149
2A 25 172	99	163	248	294	325	348	0	122	207	253	284	0	0	122	192	233	0	0	30	141	192
2A 26 190	107	132	252	308	344	371	0	132	225	274	308	0	0	57	176	232	0	0	0	108	183
2A 26 206	124	154	293	358	400	432	0	154	261	318	358	0	0	66	205	270	0	0	0	126	213

Note: For R134a and R502 use R22 charge
 For R404A and R507 use R22 charge x 0.87
 For R407C use R22 charge x 0.97
 For R12 use R22 charge x 1.10
 For 90% full volume Charge see p. 5

LOW AMBIENT OPERATION

**TO DETERMINE WINTER CHARGE, ADD THE SUM OF THE NORMAL CHARGE
AND ADDITIONAL WINTER CHARGE**

TABLE 5A
R22 WINTER OPERATION CHARGE - Kg • Deg °C
Flooded Condensers with Fan Cycling

MODEL	NORMAL CHARGE Kg	ADDITIONAL CHARGE FOR WINTER OPERATION (Kg)																			
		Design TD = 5.6 (Deg C)					Design TD = 8.3 (Deg C)					Design TD = 11.1 (Deg C)					Design TD = 13.9 (Deg C)				
		Ambient (Deg C)					Ambient (Deg C)					Ambient (Deg C)					Ambient (Deg C)				
		4.4	-6.7	-17.8	-28.9	-40.0	4.4	-6.7	-17.8	-28.9	-40.0	4.4	-6.7	-17.8	-28.9	-40.0	4.4	-6.7	-17.8	-28.9	-40.0
1A 11 007	0.8	1.6	1.7	1.8	1.9	1.9	1.4	1.6	1.7	1.8	1.8	1.1	1.4	1.6	1.7	1.7	0.9	1.3	1.4	1.6	1.6
1A 11 009	1.0	2.4	2.6	2.7	2.8	2.8	2.0	2.3	2.5	2.6	2.7	1.7	2.1	2.3	2.5	2.6	1.4	1.9	2.1	2.3	2.4
1A 11 010	1.3	3.0	3.3	3.5	3.5	3.6	2.6	3.0	3.2	3.4	3.4	2.2	2.7	3.0	3.2	3.3	1.7	2.4	2.8	3.0	3.1
1A 11 011	1.8	4.0	4.4	4.6	4.7	4.8	3.5	4.0	4.3	4.5	4.6	2.9	3.6	4.0	4.2	4.4	2.3	3.2	3.7	4.0	4.2
1A 11 012	1.9	4.7	5.1	5.4	5.5	5.6	4.1	4.7	5.0	5.2	5.4	3.4	4.2	4.7	4.9	5.1	2.7	3.7	4.3	4.6	4.9
1A 11 013	2.4	5.9	6.4	6.7	6.9	7.0	5.1	5.8	6.3	6.5	6.7	4.2	5.3	5.8	6.2	6.4	3.4	4.7	5.4	5.8	6.1
1A 12 017	1.9	4.4	5.4	6.1	6.6	6.9	2.9	4.2	5.0	5.5	6.0	1.8	3.4	4.3	4.9	5.3	0	2.3	3.5	4.2	4.7
1A 12 019	2.8	6.6	8.0	9.0	9.7	10	4.3	6.3	7.4	8.2	8.9	2.7	5.1	6.3	7.2	7.9	0	3.5	5.1	6.2	6.9
1A 12 022	3.4	7.9	9.7	11	12	12	5.1	7.5	8.9	9.9	11	3.2	6.1	7.6	8.7	9.5	0	4.2	6.2	7.4	8.4
1A 12 024	3.8	8.9	11	12	13	14	5.8	8.4	10	11	12	4.1	6.8	8.5	9.7	11	0	4.7	6.9	8.3	9.3
1A 12 027	4.4	10	13	14	15	16	6.8	9.9	12	13	14	5.3	8.0	10	11	13	0	5.5	8.1	9.8	11
1A 13 029	3.9	8.5	11	12	13	14	4.9	8.2	10	11	12	0	4.9	7.6	9.2	10	0	1.2	5.6	7.6	9.0
1A 13 034	4.8	10	13	15	16	17	5.9	10	12	14	15	0	5.9	9.3	11	13	0	1.5	6.8	9.3	11
1A 13 037	5.6	12	15	18	19	20	6.9	12	14	16	17	0	6.9	11	13	15	0	1.7	8.0	11	13
1A 13 041	6.6	14	18	21	23	24	8.2	14	17	19	21	0	8.2	13	16	17	0	2.0	9.4	13	15
1A 13 043	8.0	18	22	25	28	29	10	17	21	23	25	0	10	16	19	21	0	2.5	11	16	18
1A 13 048	9.0	20	26	29	32	34	12	20	24	27	29	0	12	18	22	25	0	2.7	13	18	21
2A 14 056	11.8	23	32	36	40	43	1.4	21	28	32	36	0	6.4	20	26	30	0	0	8.4	19	24
2A 14 063	14.8	29	39	46	50	53	1.8	26	35	41	45	0	8.0	25	32	37	0	0	11	23	30
2A 14 068	17.3	33	46	53	58	62	2.1	30	41	47	52	0	9.2	29	37	43	0	0	12	27	35
2A 15 079	17.5	29	44	52	58	62	0	22	37	45	50	0	0	22	34	41	0	0	5.2	25	34
2A 15 085	22.2	37	56	66	73	78	0	27	46	57	64	0	0	27	43	52	0	0	6.7	32	43
2A 16 095	24.3	30	57	70	78	84	0	30	51	62	70	0	0	13	40	53	0	0	0	25	42
2A 16 103	27.8	35	66	80	90	97	0	35	59	71	80	0	0	15	46	61	0	0	0	28	48
1A 22 039	7.4	17	21	24	26	27	11	17	20	22	24	6.8	13	17	19	21	0	9.2	14	16	18
1A 22 045	8.5	20	25	28	30	31	13	19	23	25	27	8.2	15	19	22	24	0	11	16	19	21
1A 22 049	9.3	22	27	30	32	34	14	21	25	27	30	8.6	17	21	24	26	0	12	17	21	23
1A 22 054	11	25	31	34	37	39	16	24	28	31	34	10	19	24	28	30	0	13	20	24	27
1A 23 058	10	22	28	32	35	37	13	21	26	29	32	0	13	20	24	27	0	3.1	14	20	23
1A 23 067	12	26	33	37	41	43	15	25	30	34	37	0	15	23	28	31	0	3.6	17	23	27
1A 23 073	14	30	38	44	47	50	17	29	35	40	43	0	17	27	33	37	0	4.2	20	27	32
1A 23 081	16	34	44	50	54	58	20	33	41	46	49	0	20	31	37	42	0	4.8	23	31	36
1A 23 086	16	35	44	50	55	58	20	34	41	46	50	0	20	31	38	43	0	4.9	23	31	37
1A 23 096	19	40	52	59	64	68	23	39	48	54	58	0	23	36	44	49	0	5.7	26	36	43
2A 24 112	24	47	64	75	82	87	2.9	43	57	66	73	0	13	40	53	61	0	0	17	38	50
2A 24 126	30	58	78	91	99	106	3.5	52	70	81	89	0	16	49	64	74	0	0	21	47	60
2A 24 137	35	68	92	107	117	125	4.2	61	82	95	105	0	19	58	76	88	0	0	25	55	71
2A 25 158	35	58	88	104	115	123	0	43	73	89	100	0	0	43	68	82	0	0	11	50	68
2A 25 172	45	74	113	133	147	158	0	55	94	115	129	0	0	55	87	106	0	0	14	64	87
2A 26 190	48	60	114	140	156	169	0	60	102	124	140	0	0	26	80	105	0	0	0	49	83
2A 26 206	56	70	133	162	182	196	0	70	119	145	162	0	0	30	93	123	0	0	0	57	97

Note: For R134a and R502 use R22 charge
 For R404A and R507 use R22 charge x 0.87
 For R407C use R22 charge x 0.97
 For R12 use R22 charge x 1.10
 For 90% full volume charge see P. 5

INSTALLATION

INSPECTION

A thorough inspection of the equipment, including all component parts and accessories, should be made immediately upon delivery. Any damage caused in transit, or missing parts, should be reported to the carrier at once. The consignee is responsible for making any claim for losses or damage. Electrical characteristics should also be checked at this time to ensure that they are correct.

LOCATION

Before handling and placing the unit into position a review of the most suitable location must be made. This condenser is designed for outdoor installation. A number of factors must be taken into consideration

when selecting a location. Most important is the provision for a supply of ambient air to the condenser, and removal of heated air from the condenser area.

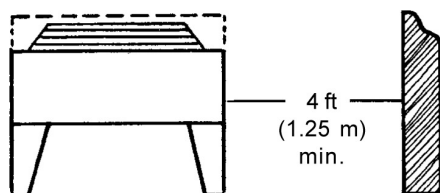
Higher condensing temperatures, decreased performance, and the possibility of equipment failure may result from inadequate air supply.

Other considerations include:

1. Customer requests
2. Loading capacity of the roof or floor.
3. Distance to suitable electrical supply.
4. Accessibility for maintenance.
5. Local building codes.
6. Adjacent buildings relative to noise levels.

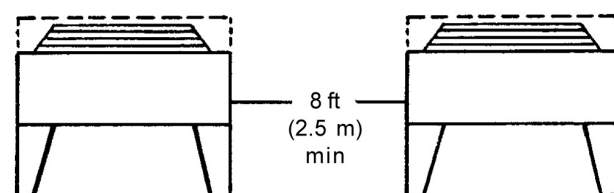
WALLS OR OBSTRUCTIONS

All sides of the unit must be a minimum of 4 feet (1.25 m) away from any wall or obstruction. Overhead obstructions are not permitted. If enclosed by three walls, the condenser must be installed as indicated for units in a pit.



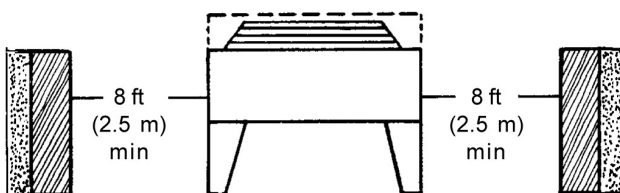
MULTIPLE UNITS

A minimum of 8 feet (2.5 m) is required between multiple units placed side by side. If placed end to end, the minimum distance between units is 4 feet (1.25 m).



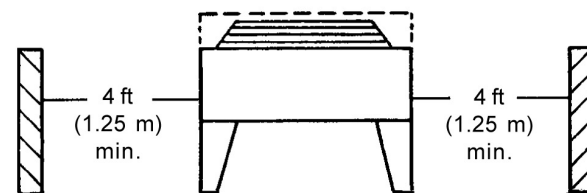
UNITS IN PITS

The top of the condenser must be level with, or above the top of the pit. In addition, a minimum of 8 feet (2.5 m) is required between the unit and the pit walls.



LOUVERS/FENCES

Louvers/fences must have a minimum of 80% free area and 4 feet (1.25 m) minimum clearance between the unit and louvers/fence. Height of louver/fence must not exceed top of unit.



PLACEMENT

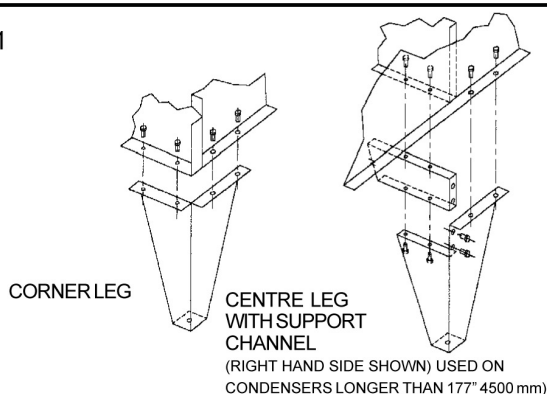
Once a suitable location is selected ensure all the remote mounting parts (legs and hardware) are available. Refer to Fig.1 (P. 37) And the dimensional data On Pages 7 and 8

for the leg mounting locations. On 8, 10 and 12 fan models a 90" (2.3 m) channel is also included for maximum support. Single row 4, 5 and 6 fan models use a 45" (1.15m) channel.

INSTALLATION

LEG INSTALLATION INSTRUCTIONS

Fig. 1

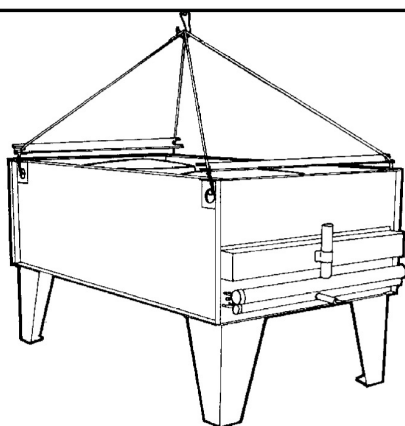


- 1) Assemble R.H. center leg L.H. center leg and 90" (or 45" on single row) channel as shown.
Remove 2 bolts from bottom flange of unit side panels that match the hole pattern on the top flanges of both legs. Attach center leg and channel assembly using hardware provided at divider panel locations required for applicable model as shown in dimensional data. Replace bolts that were removed from side panels to secure leg assembly to bottom flanges of side panels.
- 2) Assemble four corner legs to bottom flanges on unit side panels and end panels using hardware provided, at matching mounting hole patterns. All corner legs are the same.

Air cooled condensers are large, heavy mechanical equipment and must be handled as such. A fully qualified and properly equipped crew with necessary rigging should be engaged to set the condenser into position.

Lifting brackets or holes have been provided at the corners for attaching lifting slings. Spreader bars must be used when lifting so that the lifting force must be applied vertically. See Fig. 2. **Under no circumstances should the coil headers or return bends be used in lifting or moving the condenser.**

Fig. 2



Ensure the unit is placed in a level position (to ensure proper drainage of liquid refrigerant and oil). The legs should be securely anchored to the building structure, sleeper or concrete pad. The weight of the condenser is not enough to hold in place during a strong wind, **the legs must be anchored.**

REFRIGERANT PIPING

All refrigeration piping must be installed by a qualified refrigeration mechanic. The importance of correct refrigerant pipe sizing and layout cannot be over-emphasized. Failure to observe proper refrigerant piping practices can result in equipment failure which may not be covered under warranty.

All air cooled condensers are supplied complete with headers and refrigerant connections sized for connecting

to standard refrigeration tubing. These connections may not be the same as the actual line sizes required for the field installation. Refer to a recognized source (ASHRAE charts, manufacturer's engineering manuals etc.) for line sizing.

DISCHARGE LINES

The proper design of discharge lines involves following objective:

- (1) to minimize refrigerant pressure drop, since high pressure losses increase the required compressor horsepower per ton of refrigeration.

Discharge lines must be pitched away from the compressor to ensure proper drainage of oil being carried in the line. A discharge check-valve at the bottom of a vertical riser will prevent oil (and liquid refrigerant) from draining back to the compressor during the off-cycle. When the vertical lift exceeds 30 feet (9 m), insert close-coupled traps in the riser at 30 feet (9 m) intervals.

An alternate method of handling the oil problem would be the addition of an oil separator see Figure 4 (b).

A reverse trap should be installed at the top of all vertical risers. The top of the reverse trap should be the highest point in the discharge line and should have an access valve installed to allow the reclamation of non-condensable gas from the system.

Pulsation of the hot gas in the discharge line is an inherent characteristic of systems utilizing reciprocating compressors. The discharge line must be rigidly supported along its entire length to prevent transmission of vibration and movement of the line.

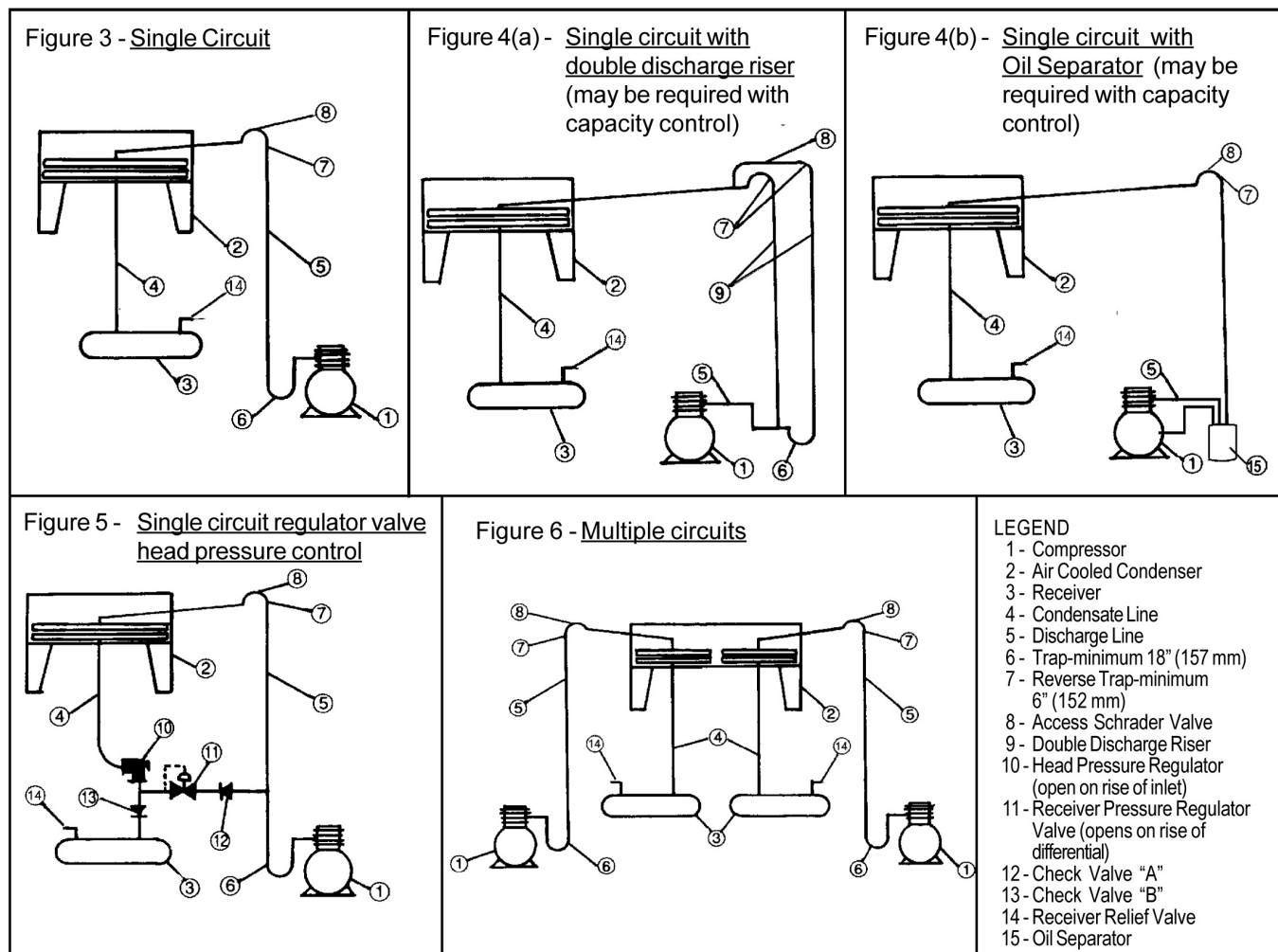
CONDENSATE LINES

The condensate line must be designed to allow free drainage of refrigerant from the condenser coil to the receiver. Refer to Fig. 5 for typical condensate line piping when utilizing head pressure regulating valves.

INSTALLATION

Fig. 3 - 6

OAVC TYPICAL SYSTEM PIPING



SYSTEM START-UP CHECKS

1. Check the electrical characteristics of all components to be sure they agree with the power supply.
2. Check tightness of all fans and motor mounts.
3. Check tightness of all electrical connections.
4. Upon start-up, check fans for correct rotation. Air is drawn through the condenser coil. To change rotation on 3 phase units reverse any two (2) fan motor leads.
5. All system piping must be thoroughly leak checked before a refrigerant charge is introduced.

MAINTENANCE

A semi annual inspection should be carried out by a qualified refrigeration service mechanic. The main power supply must be disconnected.

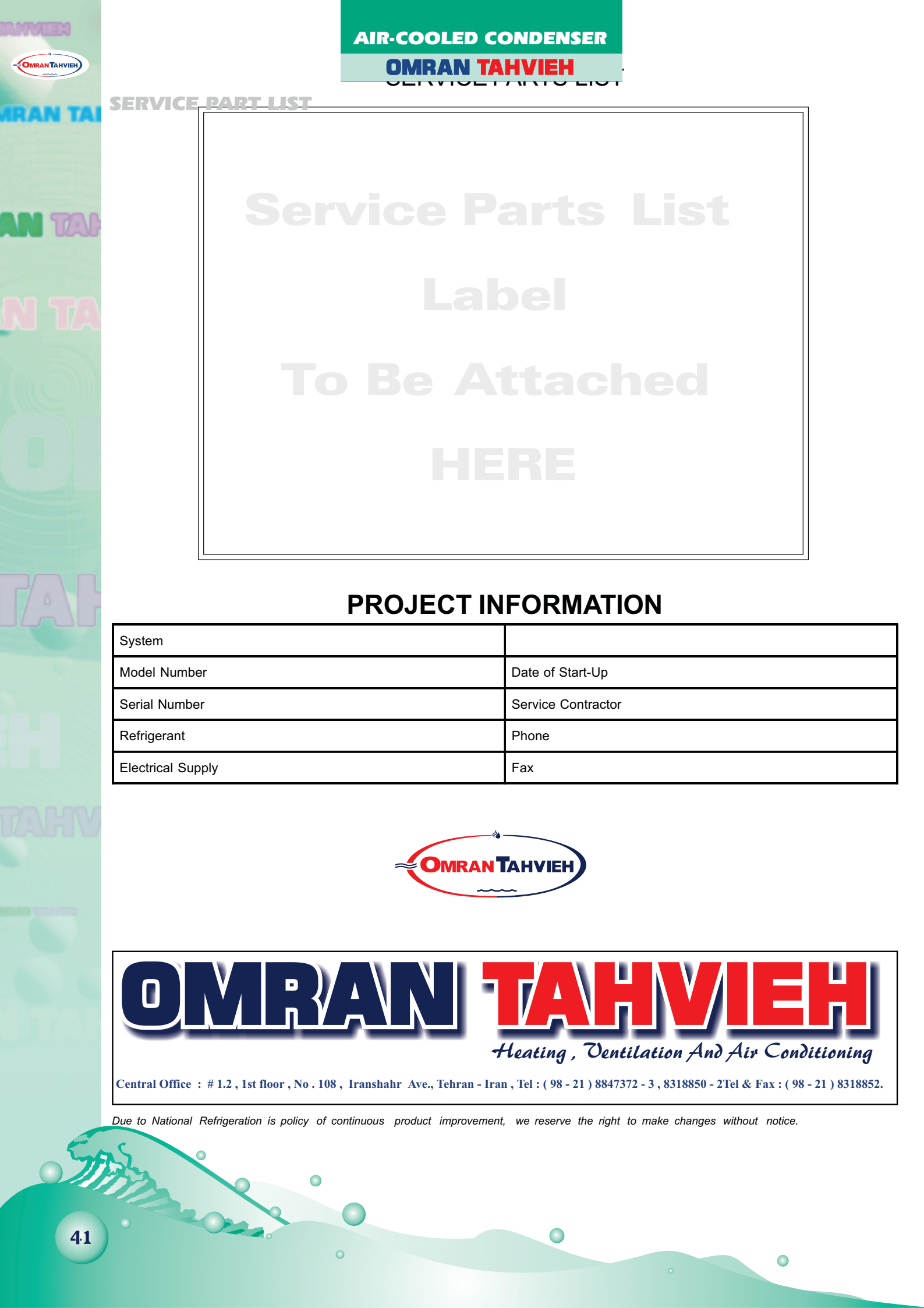
1. Check electrical components. Tighten any loose connections.
2. Check control capillary tubes and lines for signs of wear due to excessive vibration or rubbing on metal parts. Secure if necessary.
3. Check tightness of all fans and motor mounts. Remove any deposits which could effect fan balance. Note: Fan motors are permanently lubricated and require only visual inspection.
4. Clean the condenser coil using a soft brush or by flushing with cool water or coil cleansers available through NRP (National Refrigeration Products Inc.)
5. Update service log information (back page of service manual)

SERVICE PART LIST

PART DESCRIPTION	MODELS	PART NUMBER
FAN MOTORS-60 Hz		
850 RPM Models		
208/230-1-60	850 RPM (3/4 HP)	1048725-001
208/230-3-60	850 RPM (1 HP)	1048726-001
460-3-60	850 RPM (1 HP)	1048727-001
575-3-60	850 RPM (1 HP)	1048728-001
208/230/460 -3-60	850 RPM (1 HP)	1062967-001
550 RPM Models		
208/230/460 -3-60	550 RPM (1/2 HP)	1068176-001
575-3-60	550 RPM (1/2 HP)	1068177-001
1140 RPM Models		
208/230/460 -3-60	1140 RPM (2 HP)	1067454-001
575-3-60	1140 RPM (2 HP)	1068175-001
FAN MOTORS-50 Hz		
850 RPM Models		
200/220-1-50	700 RPM (3/4 HP)	1048725-001
200/220-3-50	700 RPM (1 HP)	1048726-001
380-3-50	700 RPM (1 HP)	1048727-001
200/220/380 -3-50	700 RPM (1 HP)	1062967-001
550 RPM Models		
200/220/380 -3-50	450 RPM (1/2 HP)	1068176-001
1140 RPM Models		
200/220/380 -3-50	950 RPM (1.5 HP)	1067454-001
MOTOR MOUNT RAIL (2 REQ'D)	35" WIDE FAN SECTION 45" WIDE FAN SECTION	1046500 1046502
FAN BLADES		
30" 4 BLADE	UP TO 144" LONG MODELS	1048739
30" 4 BLADE	183" LONG AND OVER MODELS	1048738
FAN GUARD	ALL	1048603
MOUNTING LEGS		
20" CORNER LEG	ALL	106025
20" LEFT HAND CENTRE LEG	144" LONG AND OVER MODELS	107024-001
20" RIGHT HAND CENTRE LEG	144" LONG AND OVER MODELS	107024-002
90" SUPPORT RAIL - DOUBLE ROW	144" LONG AND OVER MODELS	107025
45" SUPPORT RAIL - SINGLE ROW	144" LONG AND OVER MODELS	1065906



NOTES



AIR-COOLED CONDENSER

OMRAN TAHVIEH

SERVICE PART LIST

Service Parts List
Label
To Be Attached
HERE

PROJECT INFORMATION

System	
Model Number	Date of Start-Up
Serial Number	Service Contractor
Refrigerant	Phone
Electrical Supply	Fax



OMRAN TAHVIEH

Heating , Ventilation And Air Conditioning

Central Office : # 1.2 , 1st floor , No . 108 , Iranshahr Ave., Tehran - Iran , Tel : (98 - 21) 8847372 - 3 , 8318850 - 2Tel & Fax : (98 - 21) 8318852.

Due to National Refrigeration is policy of continuous product improvement, we reserve the right to make changes without notice.