Appendix F
Flow Charts

The charts in this appendix are arranged by fluid type and differential temperatures. The charts are further broken down into columns of flow by the on-center (o.c.) distance of the tubing. On the left side of each chart is the BTU/h/ft^2 column. See **Figure F-1**.

Note: The shaded area on the charts should not be used for residential applications. Never exceed 12 inches on center for residential applications.

Example

Determine the flow per loop for the room.

- The room is 12 foot by 12 foot with the tubing installed at 9 inches on center. The load for the room is 40 BTU/h/ft^2.The room is 15 feet from the manifold location.
- First determine the amount of tubing in the room.

  12 x 12 = 144 square feet
  144 x 1.333 = 192 feet
  There is 192 feet of active loop in the room.

- Next determine the amount of leader length from the room to the manifold location. The distance from the room to the manifold location is 15 feet. The distance is doubled to account for the supply and return tubing.

  15 x 2 = 30 feet
  Vertical distance of tubing at the manifold = 3 feet

  30 + 6 = 36 feet
  There is 36 feet of leader length for this loop.

- Total loop length is the active and leader length added together.
  192 + 36 = 228 total loop length

- To determine the flow for the loop, select the appropriate chart. In this example, use the 100% water at 10ºF differential chart.

❶ Enter the chart at the BTU/h/ft^2 for the room (40).

❷ Move to the right to the 9" o.c. column.

❸ Where the two lines intersect is the value in gallons per minute (gpm) per foot of tubing (0.00608).

4. Multiply the active loop length by the value found in line 3 above.

192 x 0.00608 = 1.17 gpm

5. Flow for the loop in the example room is 1.17 gpm.

Note: Flow is based on the active loop length in the room. Head pressure drop is computed from the flow for the loop and the total loop length. Do not use the total loop length to determine the flow for the loop. See **Appendix G** for pressure loss charts.

100% Water
10º Supply/Return Differential
Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c. ❷	10" o.c.	12" o.c.	15" o.c.
❶ 40	0.00405	0.00473	0.00541	0.00608	0.00676	0.00811	0.01014
39	0.00395	0.00461	0.00527	0.00593	0.00659	0.00791	0.00988
38	0.00385	0.00449	0.00513	0.00578	0.00642	0.00770	0.00963
37	0.00375	0.00437	0.00500	0.00563	0.00625	0.00750	0.00938
36	0.00365	0.00426	0.00486	0.00547	0.00608	0.00730	0.00912

Figure F-1: Flow Chart Example

Appendix F
Flow Charts

100% Water

10º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00507	0.00591	0.00676	0.00760	0.00845	0.01014	0.01267
49	0.00497	0.00579	0.00662	0.00745	0.00828	0.00993	0.01242
48	0.00487	0.00568	0.00649	0.00730	0.00811	0.00973	0.01216
47	0.00476	0.00556	0.00635	0.00715	0.00794	0.00953	0.01191
46	0.00466	0.00544	0.00622	0.00699	0.00777	0.00932	0.01166
45	0.00456	0.00532	0.00608	0.00684	0.00760	0.00912	0.01140
44	0.00446	0.00520	0.00595	0.00669	0.00743	0.00892	0.01115
43	0.00436	0.00508	0.00581	0.00654	0.00726	0.00872	0.01090
42	0.00426	0.00497	0.00568	0.00639	0.00709	0.00851	0.01064
41	0.00416	0.00485	0.00554	0.00623	0.00693	0.00831	0.01039
40	0.00405	0.00473	0.00541	0.00608	0.00676	0.00811	0.01014
39	0.00395	0.00461	0.00527	0.00593	0.00659	0.00791	0.00988
38	0.00385	0.00449	0.00513	0.00578	0.00642	0.00770	0.00963
37	0.00375	0.00437	0.00500	0.00563	0.00625	0.00750	0.00938
36	0.00365	0.00426	0.00486	0.00547	0.00608	0.00730	0.00912
35	0.00355	0.00414	0.00473	0.00532	0.00591	0.00709	0.00887
34	0.00345	0.00402	0.00459	0.00517	0.00574	0.00689	0.00862
33	0.00334	0.00390	0.00446	0.00502	0.00557	0.00669	0.00836
32	0.00324	0.00378	0.00432	0.00487	0.00541	0.00649	0.00811
31	0.00314	0.00367	0.00419	0.00471	0.00524	0.00628	0.00786
30	0.00304	0.00355	0.00405	0.00456	0.00507	0.00608	0.00760
29	0.00294	0.00343	0.00392	0.00441	0.00490	0.00588	0.00735
28	0.00284	0.00331	0.00378	0.00426	0.00473	0.00568	0.00709
27	0.00274	0.00319	0.00365	0.00410	0.00456	0.00547	0.00684
26	0.00264	0.00307	0.00351	0.00395	0.00439	0.00527	0.00659
25	0.00253	0.00296	0.00338	0.00380	0.00422	0.00507	0.00633
24	0.00243	0.00284	0.00324	0.00365	0.00405	0.00487	0.00608
23	0.00233	0.00272	0.00311	0.00350	0.00389	0.00466	0.00583
22	0.00223	0.00260	0.00297	0.00334	0.00372	0.00446	0.00557
21	0.00213	0.00248	0.00284	0.00319	0.00355	0.00426	0.00532
20	0.00203	0.00236	0.00270	0.00304	0.00338	0.00405	0.00507
19	0.00193	0.00225	0.00257	0.00289	0.00321	0.00385	0.00481
18	0.00182	0.00213	0.00243	0.00274	0.00304	0.00365	0.00456
17	0.00172	0.00201	0.00230	0.00258	0.00287	0.00345	0.00431
16	0.00162	0.00189	0.00216	0.00243	0.00270	0.00324	0.00405
15	0.00152	0.00177	0.00203	0.00228	0.00253	0.00304	0.00380
14	0.00142	0.00166	0.00189	0.00213	0.00236	0.00284	0.00355
13	0.00132	0.00154	0.00176	0.00198	0.00220	0.00264	0.00329
12	0.00122	0.00142	0.00162	0.00182	0.00203	0.00243	0.00304
11	0.00111	0.00130	0.00149	0.00167	0.00186	0.00223	0.00279
10	0.00101	0.00118	0.00135	0.00152	0.00169	0.00203	0.00253
9	0.00091	0.00106	0.00122	0.00137	0.00152	0.00182	0.00228
8	0.00081	0.00095	0.00108	0.00122	0.00135	0.00162	0.00203
7	0.00071	0.00083	0.00095	0.00106	0.00118	0.00142	0.00177
6	0.00061	0.00071	0.00081	0.00091	0.00101	0.00122	0.00152
5	0.00051	0.00059	0.00068	0.00076	0.00084	0.00101	0.00127

Note: Flow is based on 100% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

100% Water

20º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	**6" o.c.**	**7" o.c.**	**8" o.c.**	**9" o.c.**	**10" o.c.**	**12" o.c.**	**15" o.c.**
50	0.00253	0.00296	0.00338	0.00380	0.00422	0.00507	0.00633
49	0.00248	0.00290	0.00331	0.00372	0.00414	0.00497	0.00621
48	0.00243	0.00284	0.00324	0.00365	0.00405	0.00487	0.00608
47	0.00238	0.00278	0.00318	0.00357	0.00397	0.00476	0.00595
46	0.00233	0.00272	0.00311	0.00350	0.00389	0.00466	0.00583
45	0.00228	0.00266	0.00304	0.00342	0.00380	0.00456	0.00570
44	0.00223	0.00260	0.00297	0.00334	0.00372	0.00446	0.00557
43	0.00218	0.00254	0.00291	0.00327	0.00363	0.00436	0.00545
42	0.00213	0.00248	0.00284	0.00319	0.00355	0.00426	0.00532
41	0.00208	0.00242	0.00277	0.00312	0.00346	0.00416	0.00519
40	0.00203	0.00236	0.00270	0.00304	0.00338	0.00405	0.00507
39	0.00198	0.00231	0.00263	0.00296	0.00329	0.00395	0.00494
38	0.00193	0.00225	0.00257	0.00289	0.00321	0.00385	0.00481
37	0.00188	0.00219	0.00250	0.00281	0.00313	0.00375	0.00469
36	0.00182	0.00213	0.00243	0.00274	0.00304	0.00365	0.00456
35	0.00177	0.00207	0.00236	0.00266	0.00296	0.00355	0.00443
34	0.00172	0.00201	0.00230	0.00258	0.00287	0.00345	0.00431
33	0.00167	0.00195	0.00223	0.00251	0.00279	0.00334	0.00418
32	0.00162	0.00189	0.00216	0.00243	0.00270	0.00324	0.00405
31	0.00157	0.00183	0.00209	0.00236	0.00262	0.00314	0.00393
30	0.00152	0.00177	0.00203	0.00228	0.00253	0.00304	0.00380
29	0.00147	0.00171	0.00196	0.00220	0.00245	0.00294	0.00367
28	0.00142	0.00166	0.00189	0.00213	0.00236	0.00284	0.00355
27	0.00137	0.00160	0.00182	0.00205	0.00228	0.00274	0.00342
26	0.00132	0.00154	0.00176	0.00198	0.00220	0.00264	0.00329
25	0.00127	0.00148	0.00169	0.00190	0.00211	0.00253	0.00317
24	0.00122	0.00142	0.00162	0.00182	0.00203	0.00243	0.00304
23	0.00117	0.00136	0.00155	0.00175	0.00194	0.00233	0.00291
22	0.00111	0.00130	0.00149	0.00167	0.00186	0.00223	0.00279
21	0.00106	0.00124	0.00142	0.00160	0.00177	0.00213	0.00266
20	0.00101	0.00118	0.00135	0.00152	0.00169	0.00203	0.00253
19	0.00096	0.00112	0.00128	0.00144	0.00160	0.00193	0.00241
18	0.00091	0.00106	0.00122	0.00137	0.00152	0.00182	0.00228
17	0.00086	0.00101	0.00115	0.00129	0.00144	0.00172	0.00215
16	0.00081	0.00095	0.00108	0.00122	0.00135	0.00162	0.00203
15	0.00076	0.00089	0.00101	0.00114	0.00127	0.00152	0.00190
14	0.00071	0.00083	0.00095	0.00106	0.00118	0.00142	0.00177
13	0.00066	0.00077	0.00088	0.00099	0.00110	0.00132	0.00165
12	0.00061	0.00071	0.00081	0.00091	0.00101	0.00122	0.00152
11	0.00056	0.00065	0.00074	0.00084	0.00093	0.00111	0.00139
10	0.00051	0.00059	0.00068	0.00076	0.00084	0.00101	0.00127
9	0.00046	0.00053	0.00061	0.00068	0.00076	0.00091	0.00114
8	0.00041	0.00047	0.00054	0.00061	0.00068	0.00081	0.00101
7	0.00035	0.00041	0.00047	0.00053	0.00059	0.00071	0.00089
6	0.00030	0.00035	0.00041	0.00046	0.00051	0.00061	0.00076
5	0.00025	0.00030	0.00034	0.00038	0.00042	0.00051	0.00063

Note: Flow is based on 100% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

30% Water

10º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00528	0.00616	0.00704	0.00792	0.00880	0.01056	0.01320
49	0.00517	0.00603	0.00690	0.00776	0.00862	0.01035	0.01293
48	0.00507	0.00591	0.00676	0.00760	0.00844	0.01013	0.01267
47	0.00496	0.00579	0.00661	0.00744	0.00827	0.00992	0.01240
46	0.00486	0.00566	0.00647	0.00728	0.00809	0.00971	0.01214
45	0.00475	0.00554	0.00633	0.00713	0.00792	0.00950	0.01188
44	0.00464	0.00542	0.00619	0.00697	0.00774	0.00929	0.01161
43	0.00454	0.00530	0.00605	0.00681	0.00757	0.00908	0.01135
42	0.00443	0.00517	0.00591	0.00665	0.00739	0.00887	0.01108
41	0.00433	0.00505	0.00577	0.00649	0.00721	0.00866	0.01082
40	0.00422	0.00493	0.00563	0.00633	0.00704	0.00845	0.01056
39	0.00412	0.00480	0.00549	0.00618	0.00686	0.00823	0.01029
38	0.00401	0.00468	0.00535	0.00602	0.00669	0.00802	0.01003
37	0.00391	0.00456	0.00521	0.00586	0.00651	0.00781	0.00976
36	0.00380	0.00443	0.00507	0.00570	0.00633	0.00760	0.00950
35	0.00369	0.00431	0.00493	0.00554	0.00616	0.00739	0.00924
34	0.00359	0.00419	0.00479	0.00538	0.00598	0.00718	0.00897
33	0.00348	0.00406	0.00464	0.00523	0.00581	0.00697	0.00871
32	0.00338	0.00394	0.00450	0.00507	0.00563	0.00676	0.00845
31	0.00327	0.00382	0.00436	0.00491	0.00545	0.00654	0.00818
30	0.00317	0.00369	0.00422	0.00475	0.00528	0.00633	0.00792
29	0.00306	0.00357	0.00408	0.00459	0.00510	0.00612	0.00765
28	0.00296	0.00345	0.00394	0.00443	0.00493	0.00591	0.00739
27	0.00285	0.00333	0.00380	0.00428	0.00475	0.00570	0.00713
26	0.00274	0.00320	0.00366	0.00412	0.00457	0.00549	0.00686
25	0.00264	0.00308	0.00352	0.00396	0.00440	0.00528	0.00660
24	0.00253	0.00296	0.00338	0.00380	0.00422	0.00507	0.00633
23	0.00243	0.00283	0.00324	0.00364	0.00405	0.00486	0.00607
22	0.00232	0.00271	0.00310	0.00348	0.00387	0.00464	0.00581
21	0.00222	0.00259	0.00296	0.00333	0.00369	0.00443	0.00554
20	0.00211	0.00246	0.00281	0.00317	0.00352	0.00422	0.00528
19	0.00201	0.00234	0.00267	0.00301	0.00334	0.00401	0.00501
18	0.00190	0.00222	0.00253	0.00285	0.00317	0.00380	0.00475
17	0.00179	0.00209	0.00239	0.00269	0.00299	0.00359	0.00449
16	0.00169	0.00197	0.00225	0.00253	0.00281	0.00338	0.00422
15	0.00158	0.00185	0.00211	0.00238	0.00264	0.00317	0.00396
14	0.00148	0.00172	0.00197	0.00222	0.00246	0.00296	0.00369
13	0.00137	0.00160	0.00183	0.00206	0.00229	0.00274	0.00343
12	0.00127	0.00148	0.00169	0.00190	0.00211	0.00253	0.00317
11	0.00116	0.00135	0.00155	0.00174	0.00194	0.00232	0.00290
10	0.00106	0.00123	0.00141	0.00158	0.00176	0.00211	0.00264
9	0.00095	0.00111	0.00127	0.00143	0.00158	0.00190	0.00238
8	0.00084	0.00099	0.00113	0.00127	0.00141	0.00169	0.00211
7	0.00074	0.00086	0.00099	0.00111	0.00123	0.00148	0.00185
6	0.00063	0.00074	0.00084	0.00095	0.00106	0.00127	0.00158
5	0.00053	0.00062	0.00070	0.00079	0.00088	0.00106	0.00132

Note: Flow is based on 30% water at 120ºF.
Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

30% Water

20º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00264	0.00308	0.00352	0.00396	0.00440	0.00528	0.00660
49	0.00259	0.00302	0.00345	0.00388	0.00431	0.00517	0.00647
48	0.00253	0.00296	0.00338	0.00380	0.00422	0.00507	0.00633
47	0.00248	0.00289	0.00331	0.00372	0.00413	0.00496	0.00620
46	0.00243	0.00283	0.00324	0.00364	0.00405	0.00486	0.00607
45	0.00238	0.00277	0.00317	0.00356	0.00396	0.00475	0.00594
44	0.00232	0.00271	0.00310	0.00348	0.00387	0.00464	0.00581
43	0.00227	0.00265	0.00303	0.00340	0.00378	0.00454	0.00567
42	0.00222	0.00259	0.00296	0.00333	0.00369	0.00443	0.00554
41	0.00216	0.00252	0.00289	0.00325	0.00361	0.00433	0.00541
40	0.00211	0.00246	0.00281	0.00317	0.00352	0.00422	0.00528
39	0.00206	0.00240	0.00274	0.00309	0.00343	0.00412	0.00515
38	0.00201	0.00234	0.00267	0.00301	0.00334	0.00401	0.00501
37	0.00195	0.00228	0.00260	0.00293	0.00325	0.00391	0.00488
36	0.00190	0.00222	0.00253	0.00285	0.00317	0.00380	0.00475
35	0.00185	0.00216	0.00246	0.00277	0.00308	0.00369	0.00462
34	0.00179	0.00209	0.00239	0.00269	0.00299	0.00359	0.00449
33	0.00174	0.00203	0.00232	0.00261	0.00290	0.00348	0.00435
32	0.00169	0.00197	0.00225	0.00253	0.00281	0.00338	0.00422
31	0.00164	0.00191	0.00218	0.00245	0.00273	0.00327	0.00409
30	0.00158	0.00185	0.00211	0.00238	0.00264	0.00317	0.00396
29	0.00153	0.00179	0.00204	0.00230	0.00255	0.00306	0.00383
28	0.00148	0.00172	0.00197	0.00222	0.00246	0.00296	0.00369
27	0.00143	0.00166	0.00190	0.00214	0.00238	0.00285	0.00356
26	0.00137	0.00160	0.00183	0.00206	0.00229	0.00274	0.00343
25	0.00132	0.00154	0.00176	0.00198	0.00220	0.00264	0.00330
24	0.00127	0.00148	0.00169	0.00190	0.00211	0.00253	0.00317
23	0.00121	0.00142	0.00162	0.00182	0.00202	0.00243	0.00303
22	0.00116	0.00135	0.00155	0.00174	0.00194	0.00232	0.00290
21	0.00111	0.00129	0.00148	0.00166	0.00185	0.00222	0.00277
20	0.00106	0.00123	0.00141	0.00158	0.00176	0.00211	0.00264
19	0.00100	0.00117	0.00134	0.00150	0.00167	0.00201	0.00251
18	0.00095	0.00111	0.00127	0.00143	0.00158	0.00190	0.00238
17	0.00090	0.00105	0.00120	0.00135	0.00150	0.00179	0.00224
16	0.00084	0.00099	0.00113	0.00127	0.00141	0.00169	0.00211
15	0.00079	0.00092	0.00106	0.00119	0.00132	0.00158	0.00198
14	0.00074	0.00086	0.00099	0.00111	0.00123	0.00148	0.00185
13	0.00069	0.00080	0.00091	0.00103	0.00114	0.00137	0.00172
12	0.00063	0.00074	0.00084	0.00095	0.00106	0.00127	0.00158
11	0.00058	0.00068	0.00077	0.00087	0.00097	0.00116	0.00145
10	0.00053	0.00062	0.00070	0.00079	0.00088	0.00106	0.00132
9	0.00048	0.00055	0.00063	0.00071	0.00079	0.00095	0.00119
8	0.00042	0.00049	0.00056	0.00063	0.00070	0.00084	0.00106
7	0.00037	0.00043	0.00049	0.00055	0.00062	0.00074	0.00092
6	0.00032	0.00037	0.00042	0.00048	0.00053	0.00063	0.00079
5	0.00026	0.00031	0.00035	0.00040	0.00044	0.00053	0.00066

Note: Flow is based on 30% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

40% Water

10º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00542	0.00632	0.00722	0.00813	0.00903	0.01084	0.01354
49	0.00531	0.00619	0.00708	0.00796	0.00885	0.01062	0.01327
48	0.00520	0.00607	0.00693	0.00780	0.00867	0.01040	0.01300
47	0.00509	0.00594	0.00679	0.00764	0.00849	0.01019	0.01273
46	0.00498	0.00581	0.00665	0.00748	0.00831	0.00997	0.01246
45	0.00488	0.00569	0.00650	0.00731	0.00813	0.00975	0.01219
44	0.00477	0.00556	0.00636	0.00715	0.00795	0.00954	0.01192
43	0.00466	0.00544	0.00621	0.00699	0.00777	0.00932	0.01165
42	0.00455	0.00531	0.00607	0.00683	0.00758	0.00910	0.01138
41	0.00444	0.00518	0.00592	0.00666	0.00740	0.00888	0.01111
40	0.00433	0.00506	0.00578	0.00650	0.00722	0.00867	0.01084
39	0.00423	0.00493	0.00563	0.00634	0.00704	0.00845	0.01056
38	0.00412	0.00480	0.00549	0.00618	0.00686	0.00823	0.01029
37	0.00401	0.00468	0.00534	0.00601	0.00668	0.00802	0.01002
36	0.00390	0.00455	0.00520	0.00585	0.00650	0.00780	0.00975
35	0.00379	0.00442	0.00506	0.00569	0.00632	0.00758	0.00948
34	0.00368	0.00430	0.00491	0.00553	0.00614	0.00737	0.00921
33	0.00358	0.00417	0.00477	0.00536	0.00596	0.00715	0.00894
32	0.00347	0.00404	0.00462	0.00520	0.00578	0.00693	0.00867
31	0.00336	0.00392	0.00448	0.00504	0.00560	0.00672	0.00840
30	0.00325	0.00379	0.00433	0.00488	0.00542	0.00650	0.00813
29	0.00314	0.00367	0.00419	0.00471	0.00524	0.00628	0.00786
28	0.00303	0.00354	0.00404	0.00455	0.00506	0.00607	0.00758
27	0.00293	0.00341	0.00390	0.00439	0.00488	0.00585	0.00731
26	0.00282	0.00329	0.00376	0.00423	0.00470	0.00563	0.00704
25	0.00271	0.00316	0.00361	0.00406	0.00451	0.00542	0.00677
24	0.00260	0.00303	0.00347	0.00390	0.00433	0.00520	0.00650
23	0.00249	0.00291	0.00332	0.00374	0.00415	0.00498	0.00623
22	0.00238	0.00278	0.00318	0.00358	0.00397	0.00477	0.00596
21	0.00228	0.00265	0.00303	0.00341	0.00379	0.00455	0.00569
20	0.00217	0.00253	0.00289	0.00325	0.00361	0.00433	0.00542
19	0.00206	0.00240	0.00274	0.00309	0.00343	0.00412	0.00515
18	0.00195	0.00228	0.00260	0.00293	0.00325	0.00390	0.00488
17	0.00184	0.00215	0.00246	0.00276	0.00307	0.00368	0.00461
16	0.00173	0.00202	0.00231	0.00260	0.00289	0.00347	0.00433
15	0.00163	0.00190	0.00217	0.00244	0.00271	0.00325	0.00406
14	0.00152	0.00177	0.00202	0.00228	0.00253	0.00303	0.00379
13	0.00141	0.00164	0.00188	0.00211	0.00235	0.00282	0.00352
12	0.00130	0.00152	0.00173	0.00195	0.00217	0.00260	0.00325
11	0.00119	0.00139	0.00159	0.00179	0.00199	0.00238	0.00298
10	0.00108	0.00126	0.00144	0.00163	0.00181	0.00217	0.00271
9	0.00098	0.00114	0.00130	0.00146	0.00163	0.00195	0.00244
8	0.00087	0.00101	0.00116	0.00130	0.00144	0.00173	0.00217
7	0.00076	0.00088	0.00101	0.00114	0.00126	0.00152	0.00190
6	0.00065	0.00076	0.00087	0.00098	0.00108	0.00130	0.00163
5	0.00054	0.00063	0.00072	0.00081	0.00090	0.00108	0.00135

Note: Flow is based on 40% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

40% Water

20º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00271	0.00316	0.00361	0.00406	0.00451	0.00542	0.00677
49	0.00265	0.00310	0.00354	0.00398	0.00442	0.00531	0.00664
48	0.00260	0.00303	0.00347	0.00390	0.00433	0.00520	0.00650
47	0.00255	0.00297	0.00339	0.00382	0.00424	0.00509	0.00637
46	0.00249	0.00291	0.00332	0.00374	0.00415	0.00498	0.00623
45	0.00244	0.00284	0.00325	0.00366	0.00406	0.00488	0.00609
44	0.00238	0.00278	0.00318	0.00358	0.00397	0.00477	0.00596
43	0.00233	0.00272	0.00311	0.00349	0.00388	0.00466	0.00582
42	0.00228	0.00265	0.00303	0.00341	0.00379	0.00455	0.00569
41	0.00222	0.00259	0.00296	0.00333	0.00370	0.00444	0.00555
40	0.00217	0.00253	0.00289	0.00325	0.00361	0.00433	0.00542
39	0.00211	0.00246	0.00282	0.00317	0.00352	0.00423	0.00528
38	0.00206	0.00240	0.00274	0.00309	0.00343	0.00412	0.00515
37	0.00200	0.00234	0.00267	0.00301	0.00334	0.00401	0.00501
36	0.00195	0.00228	0.00260	0.00293	0.00325	0.00390	0.00488
35	0.00190	0.00221	0.00253	0.00284	0.00316	0.00379	0.00474
34	0.00184	0.00215	0.00246	0.00276	0.00307	0.00368	0.00461
33	0.00179	0.00209	0.00238	0.00268	0.00298	0.00358	0.00447
32	0.00173	0.00202	0.00231	0.00260	0.00289	0.00347	0.00433
31	0.00168	0.00196	0.00224	0.00252	0.00280	0.00336	0.00420
30	0.00163	0.00190	0.00217	0.00244	0.00271	0.00325	0.00406
29	0.00157	0.00183	0.00209	0.00236	0.00262	0.00314	0.00393
28	0.00152	0.00177	0.00202	0.00228	0.00253	0.00303	0.00379
27	0.00146	0.00171	0.00195	0.00219	0.00244	0.00293	0.00366
26	0.00141	0.00164	0.00188	0.00211	0.00235	0.00282	0.00352
25	0.00135	0.00158	0.00181	0.00203	0.00226	0.00271	0.00339
24	0.00130	0.00152	0.00173	0.00195	0.00217	0.00260	0.00325
23	0.00125	0.00145	0.00166	0.00187	0.00208	0.00249	0.00312
22	0.00119	0.00139	0.00159	0.00179	0.00199	0.00238	0.00298
21	0.00114	0.00133	0.00152	0.00171	0.00190	0.00228	0.00284
20	0.00108	0.00126	0.00144	0.00163	0.00181	0.00217	0.00271
19	0.00103	0.00120	0.00137	0.00154	0.00172	0.00206	0.00257
18	0.00098	0.00114	0.00130	0.00146	0.00163	0.00195	0.00244
17	0.00092	0.00107	0.00123	0.00138	0.00153	0.00184	0.00230
16	0.00087	0.00101	0.00116	0.00130	0.00144	0.00173	0.00217
15	0.00081	0.00095	0.00108	0.00122	0.00135	0.00163	0.00203
14	0.00076	0.00088	0.00101	0.00114	0.00126	0.00152	0.00190
13	0.00070	0.00082	0.00094	0.00106	0.00117	0.00141	0.00176
12	0.00065	0.00076	0.00087	0.00098	0.00108	0.00130	0.00163
11	0.00060	0.00070	0.00079	0.00089	0.00099	0.00119	0.00149
10	0.00054	0.00063	0.00072	0.00081	0.00090	0.00108	0.00135
9	0.00049	0.00057	0.00065	0.00073	0.00081	0.00098	0.00122
8	0.00043	0.00051	0.00058	0.00065	0.00072	0.00087	0.00108
7	0.00038	0.00044	0.00051	0.00057	0.00063	0.00076	0.00095
6	0.00033	0.00038	0.00043	0.00049	0.00054	0.00065	0.00081
5	0.00027	0.00032	0.00036	0.00041	0.00045	0.00054	0.00068

Note: Flow is based on 40% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

50% Water

10º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00568	0.00663	0.00758	0.00852	0.00947	0.01136	0.01421
49	0.00557	0.00650	0.00742	0.00835	0.00928	0.01114	0.01392
48	0.00546	0.00636	0.00727	0.00818	0.00909	0.01091	0.01364
47	0.00534	0.00623	0.00712	0.00801	0.00890	0.01068	0.01335
46	0.00523	0.00610	0.00697	0.00784	0.00871	0.01046	0.01307
45	0.00511	0.00597	0.00682	0.00767	0.00852	0.01023	0.01279
44	0.00500	0.00583	0.00667	0.00750	0.00833	0.01000	0.01250
43	0.00489	0.00570	0.00652	0.00733	0.00814	0.00977	0.01222
42	0.00477	0.00557	0.00636	0.00716	0.00796	0.00955	0.01193
41	0.00466	0.00544	0.00621	0.00699	0.00777	0.00932	0.01165
40	0.00455	0.00530	0.00606	0.00682	0.00758	0.00909	0.01136
39	0.00443	0.00517	0.00591	0.00665	0.00739	0.00886	0.01108
38	0.00432	0.00504	0.00576	0.00648	0.00720	0.00864	0.01080
37	0.00421	0.00491	0.00561	0.00631	0.00701	0.00841	0.01051
36	0.00409	0.00477	0.00545	0.00614	0.00682	0.00818	0.01023
35	0.00398	0.00464	0.00530	0.00597	0.00663	0.00796	0.00994
34	0.00386	0.00451	0.00515	0.00580	0.00644	0.00773	0.00966
33	0.00375	0.00438	0.00500	0.00563	0.00625	0.00750	0.00938
32	0.00364	0.00424	0.00485	0.00546	0.00606	0.00727	0.00909
31	0.00352	0.00411	0.00470	0.00528	0.00587	0.00705	0.00881
30	0.00341	0.00398	0.00455	0.00511	0.00568	0.00682	0.00852
29	0.00330	0.00384	0.00439	0.00494	0.00549	0.00659	0.00824
28	0.00318	0.00371	0.00424	0.00477	0.00530	0.00636	0.00796
27	0.00307	0.00358	0.00409	0.00460	0.00511	0.00614	0.00767
26	0.00295	0.00345	0.00394	0.00443	0.00492	0.00591	0.00739
25	0.00284	0.00331	0.00379	0.00426	0.00474	0.00568	0.00710
24	0.00273	0.00318	0.00364	0.00409	0.00455	0.00546	0.00682
23	0.00261	0.00305	0.00348	0.00392	0.00436	0.00523	0.00653
22	0.00250	0.00292	0.00333	0.00375	0.00417	0.00500	0.00625
21	0.00239	0.00278	0.00318	0.00358	0.00398	0.00477	0.00597
20	0.00227	0.00265	0.00303	0.00341	0.00379	0.00455	0.00568
19	0.00216	0.00252	0.00288	0.00324	0.00360	0.00432	0.00540
18	0.00205	0.00239	0.00273	0.00307	0.00341	0.00409	0.00511
17	0.00193	0.00225	0.00258	0.00290	0.00322	0.00386	0.00483
16	0.00182	0.00212	0.00242	0.00273	0.00303	0.00364	0.00455
15	0.00170	0.00199	0.00227	0.00256	0.00284	0.00341	0.00426
14	0.00159	0.00186	0.00212	0.00239	0.00265	0.00318	0.00398
13	0.00148	0.00172	0.00197	0.00222	0.00246	0.00295	0.00369
12	0.00136	0.00159	0.00182	0.00205	0.00227	0.00273	0.00341
11	0.00125	0.00146	0.00167	0.00188	0.00208	0.00250	0.00313
10	0.00114	0.00133	0.00152	0.00170	0.00189	0.00227	0.00284
9	0.00102	0.00119	0.00136	0.00153	0.00170	0.00205	0.00256
8	0.00091	0.00106	0.00121	0.00136	0.00152	0.00182	0.00227
7	0.00080	0.00093	0.00106	0.00119	0.00133	0.00159	0.00199
6	0.00068	0.00080	0.00091	0.00102	0.00114	0.00136	0.00170
5	0.00057	0.00066	0.00076	0.00085	0.00095	0.00114	0.00142

Note: Flow is based on 50% water at 120ºF.

Do not use 15" o.c. with residential applications.

Appendix F
Flow Charts

50% Water

20º Supply/Return Differential Flow in GPM Per Foot of Tubing

	Tubing On-Center Distances						
BTU/h/ft^2	6" o.c.	7" o.c.	8" o.c.	9" o.c.	10" o.c.	12" o.c.	15" o.c.
50	0.00507	0.00591	0.00676	0.00760	0.00845	0.01014	0.01267
49	0.00497	0.00579	0.00662	0.00745	0.00828	0.00993	0.01242
48	0.00487	0.00568	0.00649	0.00730	0.00811	0.00973	0.01216
47	0.00476	0.00556	0.00635	0.00715	0.00794	0.00953	0.01191
46	0.00466	0.00544	0.00622	0.00699	0.00777	0.00932	0.01166
45	0.00456	0.00532	0.00608	0.00684	0.00760	0.00912	0.01140
44	0.00446	0.00520	0.00595	0.00669	0.00743	0.00892	0.01115
43	0.00436	0.00508	0.00581	0.00654	0.00726	0.00872	0.01090
42	0.00426	0.00497	0.00568	0.00639	0.00709	0.00851	0.01064
41	0.00416	0.00485	0.00554	0.00623	0.00693	0.00831	0.01039
40	0.00405	0.00473	0.00541	0.00608	0.00676	0.00811	0.01014
39	0.00395	0.00461	0.00527	0.00593	0.00659	0.00791	0.00988
38	0.00385	0.00449	0.00513	0.00578	0.00642	0.00770	0.00963
37	0.00375	0.00437	0.00500	0.00563	0.00625	0.00750	0.00938
36	0.00365	0.00426	0.00486	0.00547	0.00608	0.00730	0.00912
35	0.00355	0.00414	0.00473	0.00532	0.00591	0.00709	0.00887
34	0.00345	0.00402	0.00459	0.00517	0.00574	0.00689	0.00862
33	0.00334	0.00390	0.00446	0.00502	0.00557	0.00669	0.00836
32	0.00324	0.00378	0.00432	0.00487	0.00541	0.00649	0.00811
31	0.00314	0.00367	0.00419	0.00471	0.00524	0.00628	0.00786
30	0.00304	0.00355	0.00405	0.00456	0.00507	0.00608	0.00760
29	0.00294	0.00343	0.00392	0.00441	0.00490	0.00588	0.00735
28	0.00284	0.00331	0.00378	0.00426	0.00473	0.00568	0.00709
27	0.00274	0.00319	0.00365	0.00410	0.00456	0.00547	0.00684
26	0.00264	0.00307	0.00351	0.00395	0.00439	0.00527	0.00659
25	0.00253	0.00296	0.00338	0.00380	0.00422	0.00507	0.00633
24	0.00243	0.00284	0.00324	0.00365	0.00405	0.00487	0.00608
23	0.00233	0.00272	0.00311	0.00350	0.00389	0.00466	0.00583
22	0.00223	0.00260	0.00297	0.00334	0.00372	0.00446	0.00557
21	0.00213	0.00248	0.00284	0.00319	0.00355	0.00426	0.00532
20	0.00203	0.00236	0.00270	0.00304	0.00338	0.00405	0.00507
19	0.00193	0.00225	0.00257	0.00289	0.00321	0.00385	0.00481
18	0.00182	0.00213	0.00243	0.00274	0.00304	0.00365	0.00456
17	0.00172	0.00201	0.00230	0.00258	0.00287	0.00345	0.00431
16	0.00162	0.00189	0.00216	0.00243	0.00270	0.00324	0.00405
15	0.00152	0.00177	0.00203	0.00228	0.00253	0.00304	0.00380
14	0.00142	0.00166	0.00189	0.00213	0.00236	0.00284	0.00355
13	0.00132	0.00154	0.00176	0.00198	0.00220	0.00264	0.00329
12	0.00122	0.00142	0.00162	0.00182	0.00203	0.00243	0.00304
11	0.00111	0.00130	0.00149	0.00167	0.00186	0.00223	0.00279
10	0.00101	0.00118	0.00135	0.00152	0.00169	0.00203	0.00253
9	0.00091	0.00106	0.00122	0.00137	0.00152	0.00182	0.00228
8	0.00081	0.00095	0.00108	0.00122	0.00135	0.00162	0.00203
7	0.00071	0.00083	0.00095	0.00106	0.00118	0.00142	0.00177
6	0.00061	0.00071	0.00081	0.00091	0.00101	0.00122	0.00152
5	0.00051	0.00059	0.00068	0.00076	0.00084	0.00101	0.00127

Note: Flow is based on 50% water at 120ºF.

Do not use 15" o.c. with residential applications.