Appendix G:

Hydronic friction loss tables

5/16" Uponor PEX-a — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.10	0.00908	0.00873	0.00841	0.00814	0.00789	0.00767	0.00747	0.00729	0.00712	0.00697	0.00683	0.00670	0.00659
0.6	0.13	0.01230	0.01183	0.01141	0.01105	0.01072	0.01043	0.01016	0.00992	0.00970	0.00950	0.00931	0.00914	0.00899
0.7	0.15	0.01591	0.01531	0.01479	0.01433	0.01391	0.01354	0.01320	0.01289	0.01261	0.01235	0.01212	0.01190	0.01170
0.8	0.17	0.01990	0.01917	0.01852	0.01795	0.01744	0.01698	0.01657	0.01619	0.01584	0.01552	0.01523	0.01496	0.01471
0.9	0.19	0.02426	0.02338	0.02261	0.02192	0.02131	0.02075	0.02025	0.01979	0.01938	0.01899	0.01864	0.01832	0.01802
1.0	0.21	0.02898	0.02795	0.02703	0.02622	0.02550	0.02484	0.02425	0.02371	0.02322	0.02276	0.02235	0.02197	0.02161
1.1	0.23	0.03405	0.03285	0.03179	0.03085	0.03000	0.02924	0.02856	0.02793	0.02735	0.02682	0.02634	0.02589	0.02548
1.2	0.25	0.03946	0.03808	0.03687	0.03579	0.03482	0.03395	0.03316	0.03243	0.03178	0.03116	0.03061	0.03010	0.02962
1.3	0.27	0.04520	0.04364	0.04226	0.04104	0.03994	0.03895	0.03805	0.03723	0.03648	0.03579	0.03516	0.03458	0.03404
1.4	0.29	0.05127	0.04952	0.04797	0.04660	0.04536	0.04424	0.04324	0.04231	0.04147	0.04068	0.03998	0.03932	0.03871
1.5	0.31	0.05767	0.05572	0.05399	0.05246	0.05107	0.04983	0.04870	0.04767	0.04673	0.04585	0.04506	0.04433	0.04365
1.6	0.33	0.06438	0.06222	0.06031	0.05861	0.05707	0.05569	0.05445	0.05330	0.05226	0.05128	0.05041	0.04959	0.04884
1.7	0.35	0.07141	0.06903	0.06692	0.06505	0.06336	0.06184	0.06047	0.05920	0.05805	0.05698	0.05601	0.05512	0.05428
1.8	0.38	0.07874	0.07614	0.07383	0.07178	0.06993	0.06826	0.06676	0.06537	0.06411	0.06293	0.06187	0.06089	0.05997
1.9	0.40	0.08638	0.08355	0.08103	0.07880	0.07678	0.07496	0.07332	0.07180	0.07043	0.06914	0.06799	0.06692	0.06592
2.0	0.42	0.09433	0.09125	0.08852	0.08609	0.08390	0.08193	0.08014	0.07850	0.07701	0.07561	0.07435	0.07319	0.07210
2.1	0.44	0.10257	0.09924	0.09629	0.09367	0.09130	0.08916	0.08723	0.08545	0.08384	0.08233	0.08097	0.07970	0.07853
2.2	0.46	0.11110	0.10752	0.10434	0.10152	0.09896	0.09666	0.09458	0.09266	0.09092	0.08929	0.08782	0.08646	0.08519
2.3	0.48	0.11993	0.11609	0.11267	0.10964	0.10689	0.10442	0.10219	0.10013	0.09826	0.09650	0.09493	0.09346	0.09210
2.4	0.50	0.12905	0.12494	0.12128	0.11803	0.11509	0.11244	0.11005	0.10784	0.10584	0.10396	0.10227	0.10070	0.09924
2.5	0.52	0.13845	0.13406	0.13015	0.12669	0.12355	0.12072	0.11816	0.11580	0.11367	0.11165	0.10985	0.10817	0.10661
2.6	0.54	0.14814	0.14346	0.13930	0.13561	0.13226	0.12925	0.12653	0.12401	0.12174	0.11959	0.11767	0.11588	0.11422
2.7	0.56	0.15811	0.15314	0.14872	0.14480	0.14124	0.13804	0.13514	0.13247	0.13005	0.12777	0.12572	0.12382	0.12205
2.8	0.58	0.16836	0.16309	0.15841	0.15424	0.15047	0.14708	0.14400	0.14117	0.13860	0.13618	0.13401	0.13199	0.13011
2.9	0.61	0.17888	0.17331	0.16835	0.16395	0.15996	0.15636	0.15311	0.15011	0.14739	0.14483	0.14253	0.14039	0.13840
3.0	0.63	0.18968	0.18380	0.17856	0.17391	0.16970	0.16590	0.16246	0.15929	0.15641	0.15371	0.15128	0.14902	0.14692
3.1	0.65	0.20076	0.19456	0.18904	0.18413	0.17968	0.17568	0.17205	0.16871	0.16568	0.16282	0.16026	0.15788	0.15566
3.2	0.67	0.21210	0.20558	0.19977	0.19460	0.18992	0.18571	0.18189	0.17837	0.17517	0.17217	0.16947	0.16696	0.16462
3.3	0.69	0.22372	0.21686	0.21075	0.20533	0.20041	0.19597	0.19196	0.18826	0.18490	0.18174	0.17890	0.17626	0.17380
3.4	0.71	0.23560	0.22841	0.22200	0.21630	0.21114	0.20648	0.20227	0.19838	0.19486	0.19154	0.18856	0.18579	0.18320

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

5/16" Uponor PEX-a — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.10	0.01318	0.01231	0.01159	0.01096	0.01044	0.00998	0.00957	0.00924	0.00893	0.00864	0.00840	0.00817	0.00800
0.6	0.13	0.01767	0.01654	0.01559	0.01477	0.01409	0.01348	0.01294	0.01251	0.01209	0.01171	0.01140	0.01109	0.01087
0.7	0.15	0.02268	0.02126	0.02007	0.01903	0.01817	0.01741	0.01672	0.01618	0.01565	0.01517	0.01477	0.01438	0.01410
0.8	0.17	0.02819	0.02646	0.02499	0.02373	0.02267	0.02174	0.02090	0.02023	0.01958	0.01899	0.01850	0.01803	0.01767
0.9	0.19	0.03417	0.03211	0.03036	0.02885	0.02759	0.02647	0.02546	0.02466	0.02388	0.02317	0.02258	0.02201	0.02159
1.0	0.21	0.04061	0.03820	0.03615	0.03438	0.03289	0.03157	0.03039	0.02945	0.02853	0.02769	0.02700	0.02632	0.02583
1.1	0.23	0.04750	0.04472	0.04235	0.04030	0.03858	0.03706	0.03568	0.03459	0.03353	0.03256	0.03175	0.03096	0.03038
1.2	0.25	0.05483	0.05165	0.04895	0.04661	0.04465	0.04290	0.04133	0.04008	0.03886	0.03775	0.03683	0.03592	0.03526
1.3	0.27	0.06259	0.05900	0.05595	0.05330	0.05108	0.04910	0.04732	0.04590	0.04452	0.04326	0.04222	0.04119	0.04044
1.4	0.29	0.07077	0.06675	0.06333	0.06037	0.05787	0.05566	0.05365	0.05206	0.05051	0.04910	0.04792	0.04677	0.04592
1.5	0.31	0.07936	0.07490	0.07110	0.06780	0.06502	0.06255	0.06032	0.05855	0.05682	0.05524	0.05393	0.05264	0.05170
1.6	0.33	0.08836	0.08343	0.07923	0.07559	0.07252	0.06979	0.06732	0.06536	0.06344	0.06169	0.06024	0.05882	0.05777
1.7	0.35	0.09776	0.09235	0.08773	0.08373	0.08036	0.07735	0.07464	0.07248	0.07038	0.06845	0.06685	0.06528	0.06412
1.8	0.38	0.10754	0.10164	0.09660	0.09222	0.08853	0.08525	0.08228	0.07992	0.07761	0.07551	0.07376	0.07204	0.07077
1.9	0.40	0.11772	0.11130	0.10582	0.10106	0.09705	0.09347	0.09024	0.08766	0.08515	0.08286	0.08095	0.07907	0.07769
2.0	0.42	0.12827	0.12133	0.11539	0.11024	0.10589	0.10201	0.09851	0.09572	0.09299	0.09050	0.08843	0.08639	0.08489
2.1	0.44	0.13921	0.13172	0.12532	0.11975	0.11506	0.11087	0.10709	0.10407	0.10113	0.09843	0.09619	0.09399	0.09237
2.2	0.46	0.15051	0.14246	0.13558	0.12960	0.12455	0.12004	0.11597	0.11272	0.10955	0.10665	0.10424	0.10187	0.10012
2.3	0.48	0.16219	0.15356	0.14619	0.13977	0.13435	0.12952	0.12515	0.12167	0.11826	0.11515	0.11256	0.11001	0.10813
2.4	0.50	0.17423	0.16501	0.15713	0.15027	0.14448	0.13931	0.13463	0.13090	0.12726	0.12393	0.12116	0.11843	0.11642
2.5	0.52	0.18663	0.17681	0.16841	0.16109	0.15492	0.14940	0.14441	0.14043	0.13655	0.13299	0.13003	0.12711	0.12497
2.6	0.54	0.19938	0.18895	0.18002	0.17223	0.16566	0.15980	0.15449	0.15025	0.14611	0.14232	0.13917	0.13607	0.13378
2.7	0.56	0.21249	0.20143	0.19195	0.18369	0.17672	0.17049	0.16485	0.16035	0.15595	0.15192	0.14858	0.14528	0.14285
2.8	0.58	0.22596	0.21424	0.20421	0.19547	0.18808	0.18148	0.17550	0.17073	0.16607	0.16180	0.15825	0.15476	0.15218
2.9	0.61	0.23977	0.22739	0.21679	0.20755	0.19974	0.19276	0.18644	0.18139	0.17647	0.17195	0.16819	0.16449	0.16176

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

5/16" Uponor PEX-a — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.10	0.01528	0.01408	0.01311	0.01229	0.01158	0.01100	0.01048	0.01005	0.00968	0.00932	0.00906	0.00876	0.00855
0.6	0.13	0.02041	0.01885	0.01758	0.01651	0.01559	0.01482	0.01414	0.01357	0.01309	0.01262	0.01227	0.01188	0.01160
0.7	0.15	0.02611	0.02416	0.02257	0.02123	0.02006	0.01909	0.01824	0.01752	0.01691	0.01631	0.01587	0.01538	0.01502
0.8	0.17	0.03235	0.02999	0.02805	0.02641	0.02499	0.02380	0.02276	0.02188	0.02113	0.02040	0.01985	0.01925	0.01881
0.9	0.19	0.03913	0.03631	0.03400	0.03205	0.03036	0.02894	0.02768	0.02663	0.02574	0.02486	0.02420	0.02348	0.02295
1.0	0.21	0.04641	0.04312	0.04042	0.03813	0.03614	0.03448	0.03300	0.03177	0.03072	0.02968	0.02891	0.02806	0.02743
1.1	0.23	0.05419	0.05040	0.04728	0.04464	0.04235	0.04042	0.03871	0.03729	0.03607	0.03486	0.03397	0.03298	0.03225
1.2	0.25	0.06245	0.05813	0.05458	0.05157	0.04895	0.04674	0.04480	0.04317	0.04177	0.04039	0.03937	0.03823	0.03740
1.3	0.27	0.07118	0.06632	0.06231	0.05891	0.05595	0.05345	0.05125	0.04940	0.04782	0.04626	0.04510	0.04381	0.04287
1.4	0.29	0.08037	0.07494	0.07046	0.06665	0.06333	0.06054	0.05806	0.05599	0.05422	0.05246	0.05116	0.04971	0.04865
1.5	0.31	0.09002	0.08399	0.07901	0.07478	0.07109	0.06798	0.06523	0.06293	0.06095	0.05899	0.05754	0.05592	0.05475
1.6	0.33	0.10011	0.09346	0.08797	0.08330	0.07923	0.07579	0.07275	0.07020	0.06802	0.06585	0.06424	0.06245	0.06115
1.7	0.35	0.11064	0.10335	0.09733	0.09221	0.08773	0.08396	0.08061	0.07781	0.07541	0.07302	0.07126	0.06928	0.06785
1.8	0.38	0.12159	0.11365	0.10708	0.10148	0.09659	0.09247	0.08882	0.08575	0.08312	0.08051	0.07858	0.07642	0.07485
1.9	0.40	0.13297	0.12435	0.11721	0.11113	0.10582	0.10133	0.09735	0.09401	0.09115	0.08831	0.08620	0.08385	0.08214
2.0	0.42	0.14477	0.13545	0.12773	0.12115	0.11539	0.11053	0.10622	0.10260	0.09950	0.09641	0.09413	0.09158	0.08972
2.1	0.44	0.15699	0.14694	0.13862	0.13152	0.12531	0.12007	0.11541	0.11151	0.10816	0.10482	0.10236	0.09960	0.09759
2.2	0.46	0.16961	0.15882	0.14988	0.14225	0.13558	0.12994	0.12493	0.12073	0.11712	0.11353	0.11088	0.10790	0.10574
2.3	0.48	0.18263	0.17108	0.16151	0.15334	0.14618	0.14014	0.13477	0.13026	0.12639	0.12254	0.11969	0.11650	0.11417
2.4	0.50	0.19605	0.18372	0.17350	0.16477	0.15712	0.15066	0.14492	0.14010	0.13596	0.13184	0.12879	0.12537	0.12289
2.5	0.52	0.20987	0.19674	0.18585	0.17655	0.16840	0.16151	0.15539	0.15024	0.14583	0.14143	0.13817	0.13453	0.13187
2.6	0.54	0.22407	0.21013	0.19856	0.18868	0.18001	0.17268	0.16617	0.16069	0.15599	0.15131	0.14784	0.14396	0.14113
2.7	0.56	0.23867	0.22389	0.21162	0.20114	0.19194	0.18417	0.17725	0.17144	0.16645	0.16147	0.15779	0.15367	0.15067
2.8	0.58	0.25364	0.23801	0.22503	0.21394	0.20420	0.19597	0.18864	0.18248	0.17719	0.17192	0.16802	0.16365	0.16047

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

5/16" Uponor PEX-a — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.10	0.01774	0.01620	0.01495	0.01391	0.01303	0.01228	0.01164	0.01109	0.01061	0.01018	0.00980	0.00948	0.00918
0.6	0.13	0.02360	0.02161	0.01997	0.01862	0.01748	0.01650	0.01566	0.01494	0.01431	0.01374	0.01324	0.01283	0.01243
0.7	0.15	0.03009	0.02761	0.02557	0.02387	0.02244	0.02121	0.02015	0.01924	0.01846	0.01774	0.01710	0.01658	0.01608
0.8	0.17	0.03718	0.03417	0.03170	0.02964	0.02789	0.02639	0.02510	0.02399	0.02303	0.02215	0.02136	0.02072	0.02011
0.9	0.19	0.04486	0.04129	0.03835	0.03589	0.03381	0.03203	0.03049	0.02916	0.02801	0.02695	0.02601	0.02525	0.02451
1.0	0.21	0.05309	0.04893	0.04550	0.04263	0.04019	0.03811	0.03630	0.03474	0.03339	0.03215	0.03104	0.03014	0.02927
1.1	0.23	0.06187	0.05709	0.05314	0.04983	0.04702	0.04461	0.04252	0.04072	0.03915	0.03772	0.03644	0.03540	0.03439
1.2	0.25	0.07119	0.06575	0.06125	0.05749	0.05428	0.05154	0.04915	0.04709	0.04530	0.04366	0.04219	0.04100	0.03985
1.3	0.27	0.08102	0.07490	0.06984	0.06559	0.06197	0.05887	0.05617	0.05384	0.05182	0.04996	0.04830	0.04695	0.04564
1.4	0.29	0.09135	0.08453	0.07887	0.07413	0.07008	0.06660	0.06358	0.06097	0.05870	0.05662	0.05476	0.05324	0.05177
1.5	0.31	0.10219	0.09463	0.08835	0.08309	0.07859	0.07473	0.07137	0.06847	0.06594	0.06363	0.06155	0.05986	0.05822
1.6	0.33	0.11351	0.10518	0.09827	0.09247	0.08751	0.08325	0.07954	0.07633	0.07354	0.07097	0.06868	0.06681	0.06500
1.7	0.35	0.12531	0.11620	0.10862	0.10226	0.09682	0.09215	0.08807	0.08455	0.08148	0.07866	0.07614	0.07408	0.07208
1.8	0.38	0.13758	0.12765	0.11940	0.11246	0.10652	0.10142	0.09697	0.09312	0.08976	0.08668	0.08392	0.08167	0.07948
1.9	0.40	0.15032	0.13955	0.13060	0.12306	0.11661	0.11106	0.10622	0.10203	0.09838	0.09503	0.09202	0.08957	0.08719
2.0	0.42	0.16351	0.15188	0.14220	0.13406	0.12707	0.12107	0.11583	0.11129	0.10734	0.10370	0.10044	0.09779	0.09520
2.1	0.44	0.17715	0.16464	0.15422	0.14544	0.13791	0.13144	0.12578	0.12089	0.11662	0.11269	0.10918	0.10631	0.10351
2.2	0.46	0.19124	0.17782	0.16663	0.15721	0.14912	0.14216	0.13608	0.13082	0.12623	0.12200	0.11822	0.11513	0.11212
2.3	0.48	0.20578	0.19142	0.17945	0.16936	0.16070	0.15324	0.14673	0.14108	0.13616	0.13163	0.12757	0.12425	0.12102
2.4	0.50	0.22074	0.20543	0.19266	0.18188	0.17264	0.16467	0.15771	0.15167	0.14641	0.14156	0.13722	0.13367	0.13022
2.5	0.52	0.23614	0.21985	0.20625	0.19478	0.18493	0.17644	0.16902	0.16259	0.15698	0.15180	0.14717	0.14338	0.13970
2.6	0.54	0.25196	0.23467	0.22023	0.20805	0.19758	0.18856	0.18067	0.17383	0.16785	0.16235	0.15742	0.15339	0.14947
2.7	0.56	0.26821	0.24989	0.23460	0.22168	0.21058	0.20101	0.19264	0.18538	0.17904	0.17320	0.16796	0.16369	0.15952

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

⅜" Uponor PEX-a — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.6	0.18	0.00713	0.00685	0.00661	0.00640	0.00621	0.00604	0.00589	0.00575	0.00562	0.00550	0.00540	0.00530	0.00521
0.7	0.21	0.00966	0.00930	0.00899	0.00871	0.00845	0.00823	0.00802	0.00784	0.00767	0.00751	0.00737	0.00724	0.00711
0.8	0.24	0.01252	0.01206	0.01166	0.01130	0.01098	0.01069	0.01043	0.01019	0.00998	0.00977	0.00959	0.00943	0.00927
0.9	0.27	0.01567	0.01511	0.01461	0.01417	0.01378	0.01342	0.01310	0.01281	0.01254	0.01229	0.01207	0.01186	0.01167
1.0	0.30	0.01912	0.01845	0.01785	0.01732	0.01685	0.01642	0.01603	0.01568	0.01535	0.01505	0.01478	0.01453	0.01430
1.1	0.33	0.02286	0.02207	0.02136	0.02074	0.02017	0.01967	0.01921	0.01879	0.01841	0.01805	0.01773	0.01744	0.01716
1.2	0.36	0.02688	0.02595	0.02513	0.02441	0.02375	0.02316	0.02263	0.02214	0.02170	0.02128	0.02091	0.02056	0.02024
1.3	0.39	0.03117	0.03011	0.02917	0.02833	0.02758	0.02690	0.02629	0.02573	0.02522	0.02474	0.02431	0.02392	0.02355
1.4	0.42	0.03572	0.03452	0.03345	0.03251	0.03165	0.03088	0.03019	0.02955	0.02897	0.02843	0.02794	0.02749	0.02706
1.5	0.45	0.04054	0.03919	0.03799	0.03692	0.03596	0.03510	0.03431	0.03359	0.03294	0.03233	0.03178	0.03127	0.03079
1.6	0.48	0.04562	0.04411	0.04277	0.04158	0.04051	0.03954	0.03867	0.03786	0.03713	0.03645	0.03583	0.03526	0.03473
1.7	0.51	0.05095	0.04928	0.04780	0.04648	0.04529	0.04421	0.04324	0.04235	0.04154	0.04078	0.04010	0.03947	0.03888
1.8	0.54	0.05653	0.05469	0.05306	0.05161	0.05029	0.04911	0.04804	0.04706	0.04616	0.04533	0.04457	0.04387	0.04322
1.9	0.57	0.06237	0.06035	0.05856	0.05697	0.05553	0.05423	0.05306	0.05198	0.05100	0.05008	0.04925	0.04848	0.04777
2.0	0.60	0.06844	0.06624	0.06429	0.06255	0.06098	0.05957	0.05829	0.05711	0.05604	0.05504	0.05413	0.05330	0.05252
2.1	0.63	0.07476	0.07237	0.07025	0.06836	0.06666	0.06512	0.06373	0.06245	0.06129	0.06020	0.05922	0.05831	0.05746
2.2	0.66	0.08131	0.07873	0.07644	0.07440	0.07255	0.07089	0.06939	0.06800	0.06674	0.06556	0.06450	0.06351	0.06259
2.3	0.69	0.08810	0.08532	0.08285	0.08065	0.07866	0.07687	0.07525	0.07376	0.07240	0.07112	0.06998	0.06892	0.06792
2.4	0.72	0.09513	0.09214	0.08949	0.08713	0.08499	0.08306	0.08132	0.07971	0.07826	0.07689	0.07565	0.07451	0.07344
2.5	0.75	0.10239	0.09919	0.09635	0.09382	0.09153	0.08946	0.08760	0.08588	0.08431	0.08284	0.08152	0.08030	0.07915
2.6	0.78	0.10987	0.10646	0.10342	0.10072	0.09827	0.09607	0.09408	0.09224	0.09057	0.08899	0.08758	0.08627	0.08505
2.7	0.81	0.11759	0.11395	0.11072	0.10784	0.10523	0.10288	0.10076	0.09879	0.09701	0.09534	0.09384	0.09244	0.09113
2.8	0.84	0.12553	0.12167	0.11823	0.11517	0.11240	0.10990	0.10764	0.10555	0.10366	0.10188	0.10028	0.09879	0.09740
2.9	0.87	0.13369	0.12960	0.12595	0.12270	0.11976	0.11712	0.11472	0.11250	0.11049	0.10860	0.10690	0.10533	0.10385
3.0	0.90	0.14208	0.13775	0.13388	0.13045	0.12734	0.12453	0.12199	0.11965	0.11752	0.11552	0.11372	0.11205	0.11049
3.1	0.93	0.15069	0.14611	0.14203	0.13840	0.13511	0.13215	0.12946	0.12699	0.12474	0.12262	0.12072	0.11895	0.11730
3.2	0.96	0.15951	0.15469	0.15038	0.14656	0.14309	0.13996	0.13713	0.13452	0.13214	0.12991	0.12790	0.12604	0.12430
3.3	0.99	0.16856	0.16348	0.15895	0.15492	0.15127	0.14797	0.14499	0.14224	0.13974	0.13739	0.13527	0.13331	0.13147
3.4	1.02	0.17782	0.17248	0.16772	0.16348	0.15964	0.15618	0.15304	0.15015	0.14752	0.14504	0.14282	0.14075	0.13883
3.5	1.05	0.18729	0.18169	0.17669	0.17225	0.16821	0.16458	0.16129	0.15825	0.15549	0.15289	0.15055	0.14838	0.14636
3.6	1.08	0.19698	0.19111	0.18587	0.18121	0.17698	0.17317	0.16972	0.16653	0.16364	0.16091	0.15846	0.15619	0.15406
3.7	1.11	0.20688	0.20074	0.19525	0.19037	0.18595	0.18196	0.17834	0.17500	0.17197	0.16912	0.16655	0.16417	0.16194
3.8	1.14	0.21700	0.21057	0.20484	0.19974	0.19511	0.19093	0.18715	0.18366	0.18049	0.17750	0.17482	0.17233	0.17000
3.8	1.14	0.22732	0.22061	0.21462	0.20929	0.20446	0.20010	0.19615	0.19250	0.18919	0.18607	0.18327	0.18066	0.17823

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

⅜" Uponor PEX-a — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.15	0.01025	0.00960	0.00904	0.00857	0.00817	0.00782	0.00751	0.00726	0.00702	0.00680	0.00662	0.00644	0.00631
0.6	0.18	0.01377	0.01292	0.01219	0.01157	0.01105	0.01059	0.01017	0.00984	0.00952	0.00923	0.00899	0.00876	0.00859
0.7	0.21	0.01771	0.01663	0.01572	0.01493	0.01427	0.01369	0.01316	0.01275	0.01234	0.01197	0.01167	0.01137	0.01115
0.8	0.24	0.02203	0.02072	0.01960	0.01864	0.01783	0.01712	0.01647	0.01596	0.01546	0.01501	0.01464	0.01427	0.01400
0.9	0.27	0.02674	0.02517	0.02384	0.02269	0.02172	0.02086	0.02009	0.01947	0.01888	0.01833	0.01788	0.01744	0.01711
1.0	0.30	0.03182	0.02998	0.02841	0.02706	0.02592	0.02491	0.02400	0.02328	0.02257	0.02193	0.02140	0.02088	0.02049
1.1	0.33	0.03725	0.03513	0.03332	0.03175	0.03043	0.02926	0.02820	0.02737	0.02655	0.02580	0.02519	0.02458	0.02413
1.2	0.36	0.04304	0.04061	0.03854	0.03675	0.03524	0.03390	0.03269	0.03173	0.03080	0.02994	0.02923	0.02854	0.02802
1.3	0.39	0.04917	0.04642	0.04408	0.04206	0.04035	0.03883	0.03746	0.03637	0.03531	0.03434	0.03354	0.03275	0.03216
1.4	0.42	0.05563	0.05256	0.04994	0.04766	0.04575	0.04404	0.04250	0.04128	0.04009	0.03900	0.03809	0.03720	0.03655
1.5	0.45	0.06242	0.05901	0.05609	0.05356	0.05143	0.04953	0.04782	0.04645	0.04512	0.04390	0.04290	0.04190	0.04117
1.6	0.48	0.06954	0.06577	0.06255	0.05975	0.05739	0.05529	0.05339	0.05188	0.05041	0.04906	0.04794	0.04685	0.04604
1.7	0.51	0.07698	0.07284	0.06930	0.06622	0.06363	0.06132	0.05923	0.05757	0.05595	0.05446	0.05323	0.05202	0.05113
1.8	0.54	0.08473	0.08020	0.07634	0.07298	0.07014	0.06761	0.06533	0.06351	0.06173	0.06011	0.05876	0.05744	0.05646
1.9	0.57	0.09279	0.08787	0.08367	0.08001	0.07692	0.07417	0.07168	0.06970	0.06776	0.06599	0.06452	0.06308	0.06201
2.0	0.60	0.10116	0.09583	0.09128	0.08731	0.08397	0.08098	0.07829	0.07613	0.07404	0.07211	0.07052	0.06895	0.06779
2.1	0.63	0.10983	0.10408	0.09917	0.09489	0.09128	0.08805	0.08514	0.08281	0.08055	0.07847	0.07675	0.07505	0.07380
2.2	0.66	0.11880	0.11262	0.10734	0.10273	0.09885	0.09538	0.09224	0.08974	0.08730	0.08506	0.08320	0.08137	0.08003
2.3	0.69	0.12807	0.12145	0.11578	0.11084	0.10667	0.10295	0.09958	0.09690	0.09428	0.09188	0.08988	0.08792	0.08647
2.4	0.72	0.13763	0.13055	0.12449	0.11921	0.11475	0.11078	0.10717	0.10430	0.10149	0.09892	0.09679	0.09468	0.09313
2.5	0.75	0.14748	0.13993	0.13347	0.12785	0.12309	0.11884	0.11500	0.11193	0.10894	0.10619	0.10391	0.10167	0.10001
2.6	0.78	0.15761	0.14959	0.14272	0.13674	0.13167	0.12716	0.12306	0.11980	0.11661	0.11369	0.11126	0.10887	0.10711
2.7	0.81	0.16803	0.15953	0.15224	0.14588	0.14051	0.13571	0.13136	0.12790	0.12451	0.12140	0.11883	0.11629	0.11441
2.8	0.84	0.17873	0.16973	0.16201	0.15528	0.14959	0.14451	0.13990	0.13622	0.13263	0.12934	0.12661	0.12392	0.12193
2.9	0.87	0.18972	0.18020	0.17205	0.16493	0.15891	0.15354	0.14867	0.14478	0.14098	0.13750	0.13461	0.13176	0.12966
3.0	0.90	0.20098	0.19094	0.18234	0.17483	0.16848	0.16281	0.15767	0.15356	0.14955	0.14588	0.14282	0.13981	0.13759
3.1	0.93	0.21251	0.20195	0.19289	0.18498	0.17829	0.17231	0.16689	0.16257	0.15834	0.15447	0.15125	0.14807	0.14573
3.2	0.96	0.22432	0.21322	0.20369	0.19537	0.18834	0.18205	0.17635	0.17180	0.16735	0.16327	0.15988	0.15655	0.15408
3.3	0.99	0.23640	0.22475	0.21475	0.20601	0.19863	0.19202	0.18603	0.18125	0.17658	0.17229	0.16873	0.16522	0.16264

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

⅜" Uponor PEX-a — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.15	0.01183	0.01093	0.01019	0.00957	0.00903	0.00859	0.00819	0.00787	0.00759	0.00731	0.00711	0.00688	0.00672
0.6	0.18	0.01583	0.01465	0.01369	0.01288	0.01218	0.01159	0.01107	0.01064	0.01027	0.00991	0.00964	0.00934	0.00913
0.7	0.21	0.02028	0.01881	0.01760	0.01658	0.01570	0.01496	0.01430	0.01375	0.01329	0.01283	0.01249	0.01211	0.01183
0.8	0.24	0.02517	0.02338	0.02191	0.02066	0.01958	0.01867	0.01786	0.01719	0.01662	0.01605	0.01564	0.01517	0.01483
0.9	0.27	0.03048	0.02834	0.02659	0.02510	0.02380	0.02271	0.02175	0.02095	0.02026	0.01958	0.01908	0.01852	0.01811
1.0	0.30	0.03619	0.03369	0.03163	0.02989	0.02837	0.02709	0.02596	0.02501	0.02420	0.02340	0.02281	0.02215	0.02167
1.1	0.33	0.04229	0.03941	0.03703	0.03502	0.03326	0.03178	0.03047	0.02937	0.02844	0.02750	0.02682	0.02605	0.02549
1.2	0.36	0.04878	0.04549	0.04278	0.04048	0.03847	0.03678	0.03528	0.03403	0.03295	0.03189	0.03110	0.03022	0.02958
1.3	0.39	0.05565	0.05194	0.04887	0.04627	0.04400	0.04208	0.04039	0.03897	0.03775	0.03654	0.03565	0.03465	0.03392
1.4	0.42	0.06287	0.05873	0.05530	0.05238	0.04983	0.04769	0.04578	0.04419	0.04282	0.04146	0.04046	0.03933	0.03852
1.5	0.45	0.07046	0.06586	0.06205	0.05881	0.05597	0.05358	0.05146	0.04968	0.04816	0.04664	0.04552	0.04427	0.04336
1.6	0.48	0.07841	0.07333	0.06912	0.06554	0.06241	0.05976	0.05742	0.05545	0.05376	0.05209	0.05085	0.04946	0.04845
1.7	0.51	0.08670	0.08113	0.07651	0.07258	0.06913	0.06623	0.06365	0.06149	0.05963	0.05778	0.05642	0.05489	0.05378
1.8	0.54	0.09533	0.08925	0.08421	0.07992	0.07615	0.07298	0.07015	0.06779	0.06575	0.06373	0.06224	0.06056	0.05934
1.9	0.57	0.10430	0.09770	0.09222	0.08755	0.08346	0.08000	0.07693	0.07435	0.07213	0.06993	0.06830	0.06648	0.06515
2.0	0.60	0.11361	0.10646	0.10053	0.09547	0.09104	0.08729	0.08396	0.08117	0.07876	0.07637	0.07461	0.07262	0.07118
2.1	0.63	0.12324	0.11554	0.10915	0.10369	0.09890	0.09486	0.09126	0.08824	0.08564	0.08306	0.08115	0.07901	0.07745
2.2	0.66	0.13320	0.12492	0.11806	0.11219	0.10704	0.10269	0.09882	0.09556	0.09277	0.08999	0.08793	0.08562	0.08394
2.3	0.69	0.14348	0.13462	0.12726	0.12097	0.11545	0.11078	0.10663	0.10314	0.10014	0.09715	0.09494	0.09246	0.09066
2.4	0.72	0.15408	0.14461	0.13675	0.13003	0.12413	0.11913	0.11469	0.11096	0.10775	0.10455	0.10218	0.09953	0.09760
2.5	0.75	0.16499	0.15491	0.14653	0.13936	0.13307	0.12775	0.12301	0.11902	0.11560	0.11218	0.10966	0.10682	0.10476
2.6	0.78	0.17621	0.16550	0.15659	0.14897	0.14228	0.13661	0.13157	0.12733	0.12368	0.12005	0.11736	0.11434	0.11214
2.7	0.81	0.18774	0.17639	0.16694	0.15886	0.15175	0.14574	0.14038	0.13588	0.13200	0.12814	0.12528	0.12208	0.11974
2.8	0.84	0.19958	0.18756	0.17757	0.16901	0.16148	0.15511	0.14944	0.14466	0.14056	0.13647	0.13343	0.13003	0.12755
2.9	0.87	0.21172	0.19903	0.18847	0.17942	0.17147	0.16473	0.15874	0.15369	0.14934	0.14501	0.14180	0.13821	0.13558
3.0	0.90	0.22416	0.21078	0.19964	0.19010	0.18171	0.17461	0.16827	0.16294	0.15836	0.15379	0.15040	0.14660	0.14383
3.1	0.93	0.23690	0.22282	0.21109	0.20105	0.19221	0.18472	0.17805	0.17243	0.16760	0.16278	0.15921	0.15520	0.15228
3.2	0.96	0.24993	0.23514	0.22282	0.21225	0.20296	0.19508	0.18807	0.18215	0.17707	0.17200	0.16824	0.16402	0.16094

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

Appendix G:

Hydronic friction loss tables

⅜" Uponor PEX-a — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.15	0.01368	0.01252	0.01158	0.01079	0.01013	0.00956	0.00908	0.00866	0.00830	0.00796	0.00767	0.00743	0.00720
0.6	0.18	0.01823	0.01674	0.01550	0.01448	0.01361	0.01287	0.01223	0.01168	0.01121	0.01077	0.01038	0.01007	0.00977
0.7	0.21	0.02329	0.02142	0.01988	0.01859	0.01750	0.01657	0.01576	0.01507	0.01447	0.01392	0.01343	0.01303	0.01265
0.8	0.24	0.02882	0.02655	0.02468	0.02311	0.02178	0.02064	0.01966	0.01881	0.01807	0.01740	0.01680	0.01631	0.01583
0.9	0.27	0.03482	0.03212	0.02989	0.02802	0.02644	0.02508	0.02390	0.02288	0.02200	0.02119	0.02047	0.01989	0.01932
1.0	0.30	0.04126	0.03811	0.03550	0.03332	0.03146	0.02987	0.02848	0.02729	0.02625	0.02530	0.02445	0.02376	0.02309
1.1	0.33	0.04813	0.04450	0.04150	0.03898	0.03683	0.03499	0.03339	0.03201	0.03081	0.02971	0.02872	0.02792	0.02714
1.2	0.36	0.05542	0.05130	0.04788	0.04501	0.04256	0.04045	0.03862	0.03704	0.03567	0.03441	0.03328	0.03236	0.03147
1.3	0.39	0.06313	0.05848	0.05462	0.05138	0.04862	0.04624	0.04417	0.04238	0.04083	0.03940	0.03812	0.03708	0.03606
1.4	0.42	0.07123	0.06604	0.06173	0.05811	0.05501	0.05235	0.05003	0.04802	0.04628	0.04467	0.04323	0.04206	0.04093
1.5	0.45	0.07973	0.07398	0.06919	0.06517	0.06173	0.05877	0.05619	0.05395	0.05201	0.05022	0.04862	0.04732	0.04605
1.6	0.48	0.08862	0.08228	0.07701	0.07257	0.06877	0.06550	0.06264	0.06018	0.05803	0.05605	0.05428	0.05283	0.05143
1.7	0.51	0.09789	0.09095	0.08516	0.08029	0.07612	0.07253	0.06940	0.06668	0.06432	0.06214	0.06019	0.05861	0.05706
1.8	0.54	0.10753	0.09996	0.09366	0.08834	0.08379	0.07986	0.07644	0.07347	0.07089	0.06851	0.06637	0.06463	0.06294
1.9	0.57	0.11755	0.10933	0.10248	0.09671	0.09176	0.08749	0.08377	0.08054	0.07772	0.07513	0.07281	0.07091	0.06907
2.0	0.60	0.12792	0.11905	0.11164	0.10539	0.10003	0.09541	0.09138	0.08788	0.08483	0.08201	0.07949	0.07744	0.07543
2.1	0.63	0.13866	0.12910	0.12112	0.11439	0.10861	0.10362	0.09926	0.09549	0.09219	0.08916	0.08643	0.08421	0.08204
2.2	0.66	0.14975	0.13949	0.13092	0.12369	0.11747	0.11212	0.10743	0.10337	0.09982	0.09655	0.09362	0.09122	0.08889
2.3	0.69	0.16119	0.15021	0.14104	0.13329	0.12664	0.12089	0.11587	0.11151	0.10770	0.10420	0.10105	0.09848	0.09598
2.4	0.72	0.17298	0.16127	0.15147	0.14320	0.13609	0.12995	0.12457	0.11991	0.11584	0.11209	0.10872	0.10597	0.10329
2.5	0.75	0.18511	0.17264	0.16222	0.15340	0.14582	0.13928	0.13355	0.12858	0.12424	0.12023	0.11664	0.11370	0.11084
2.6	0.78	0.19758	0.18434	0.17326	0.16390	0.15584	0.14888	0.14279	0.13750	0.13288	0.12862	0.12479	0.12167	0.11862
2.7	0.81	0.21039	0.19636	0.18462	0.17469	0.16614	0.15876	0.15229	0.14668	0.14177	0.13725	0.13318	0.12986	0.12663
2.8	0.84	0.22352	0.20869	0.19627	0.18577	0.17672	0.16890	0.16205	0.15611	0.15091	0.14611	0.14181	0.13829	0.13486
2.9	0.87	0.23699	0.22134	0.20823	0.19713	0.18757	0.17931	0.17207	0.16579	0.16029	0.15522	0.15066	0.14694	0.14331
3.0	0.90	0.25079	0.23430	0.22048	0.20878	0.19870	0.18999	0.18235	0.17572	0.16992	0.16456	0.15975	0.15582	0.15199

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.28	0.00626	0.00588	0.00545	0.00532	0.00518	0.00507	0.00495	0.00475	0.00458	0.00442	0.00429	0.00416	0.00405	0.00396	0.00386	0.00378	0.00371	0.00364	0.00357	0.00351
0.6	0.33	0.00846	0.00795	0.00739	0.00721	0.00703	0.00688	0.00672	0.00646	0.00623	0.00602	0.00584	0.00568	0.00553	0.00540	0.00528	0.00517	0.00507	0.00497	0.00489	0.00481
0.7	0.39	0.01091	0.01027	0.00956	0.00934	0.00910	0.00891	0.00872	0.00838	0.00809	0.00783	0.00760	0.00739	0.00720	0.00703	0.00688	0.00674	0.00661	0.00649	0.00638	0.00628
0.8	0.44	0.01362	0.01284	0.01196	0.01169	0.01140	0.01117	0.01093	0.01051	0.01015	0.00983	0.00954	0.00929	0.00906	0.00885	0.00866	0.00848	0.00832	0.00817	0.00804	0.00791
0.9	0.50	0.01658	0.01564	0.01459	0.01426	0.01392	0.01364	0.01334	0.01284	0.01241	0.01202	0.01168	0.01137	0.01109	0.01084	0.01061	0.01040	0.01020	0.01002	0.00986	0.00971
1.0	0.55	0.01977	0.01867	0.01743	0.01704	0.01664	0.01631	0.01596	0.01537	0.01486	0.01440	0.01399	0.01363	0.01330	0.01300	0.01273	0.01248	0.01224	0.01203	0.01184	0.01166
1.1	0.61	0.02320	0.02192	0.02048	0.02003	0.01956	0.01918	0.01878	0.01809	0.01749	0.01696	0.01649	0.01606	0.01568	0.01533	0.01501	0.01472	0.01445	0.01420	0.01398	0.01377
1.2	0.66	0.02685	0.02538	0.02374	0.02323	0.02269	0.02225	0.02179	0.02100	0.02031	0.01970	0.01916	0.01867	0.01823	0.01783	0.01746	0.01712	0.01681	0.01653	0.01627	0.01602
1.3	0.72	0.03073	0.02906	0.02720	0.02662	0.02601	0.02551	0.02498	0.02409	0.02331	0.02262	0.02200	0.02144	0.02094	0.02048	0.02006	0.01968	0.01933	0.01901	0.01871	0.01843
1.4	0.77	0.03482	0.03295	0.03086	0.03020	0.02952	0.02895	0.02837	0.02736	0.02648	0.02570	0.02501	0.02438	0.02381	0.02330	0.02283	0.02240	0.02200	0.02163	0.02130	0.02098
1.5	0.83	0.03913	0.03705	0.03472	0.03398	0.03322	0.03259	0.03193	0.03081	0.02983	0.02896	0.02818	0.02748	0.02684	0.02627	0.02574	0.02526	0.02481	0.02441	0.02403	0.02368
1.6	0.88	0.04365	0.04134	0.03876	0.03795	0.03710	0.03641	0.03568	0.03444	0.03335	0.03238	0.03152	0.03074	0.03003	0.02940	0.02881	0.02828	0.02778	0.02733	0.02691	0.02652
1.7	0.94	0.04837	0.04584	0.04300	0.04211	0.04117	0.04040	0.03960	0.03824	0.03704	0.03597	0.03502	0.03415	0.03338	0.03268	0.03203	0.03144	0.03089	0.03039	0.02993	0.02950
1.8	0.99	0.05330	0.05053	0.04742	0.04644	0.04542	0.04458	0.04370	0.04220	0.04089	0.03971	0.03867	0.03773	0.03688	0.03611	0.03540	0.03475	0.03415	0.03360	0.03309	0.03262
1.9	1.05	0.05843	0.05541	0.05203	0.05096	0.04985	0.04893	0.04798	0.04634	0.04490	0.04362	0.04249	0.04146	0.04053	0.03969	0.03891	0.03821	0.03754	0.03695	0.03639	0.03588
2.0	1.10	0.06376	0.06049	0.05682	0.05566	0.05445	0.05346	0.05242	0.05064	0.04908	0.04769	0.04646	0.04534	0.04433	0.04341	0.04257	0.04180	0.04108	0.04043	0.03983	0.03927
2.1	1.16	0.06929	0.06576	0.06179	0.06054	0.05923	0.05815	0.05703	0.05511	0.05342	0.05192	0.05058	0.04937	0.04827	0.04728	0.04637	0.04554	0.04476	0.04406	0.04341	0.04280
2.2	1.22	0.07501	0.07121	0.06693	0.06559	0.06418	0.06302	0.06181	0.05974	0.05792	0.05630	0.05485	0.05355	0.05237	0.05130	0.05031	0.04942	0.04858	0.04782	0.04711	0.04646
2.3	1.27	0.08093	0.07685	0.07226	0.07081	0.06930	0.06805	0.06675	0.06453	0.06258	0.06083	0.05928	0.05787	0.05661	0.05546	0.05440	0.05343	0.05253	0.05171	0.05096	0.05025
2.4	1.33	0.08703	0.08267	0.07775	0.07621	0.07459	0.07325	0.07186	0.06948	0.06739	0.06552	0.06386	0.06235	0.06099	0.05976	0.05862	0.05759	0.05662	0.05574	0.05493	0.05417
2.5	1.38	0.09333	0.08867	0.08343	0.08177	0.08004	0.07862	0.07713	0.07459	0.07235	0.07036	0.06858	0.06697	0.06552	0.06420	0.06298	0.06188	0.06084	0.05991	0.05904	0.05823
2.6	1.44	0.09981	0.09485	0.08927	0.08751	0.08566	0.08415	0.08257	0.07986	0.07747	0.07534	0.07345	0.07173	0.07019	0.06878	0.06748	0.06631	0.06520	0.06420	0.06328	0.06241
2.7	1.49	0.10648	0.10121	0.09528	0.09341	0.09145	0.08984	0.08816	0.08528	0.08274	0.08048	0.07847	0.07664	0.07499	0.07350	0.07212	0.07087	0.06969	0.06863	0.06764	0.06672
2.8	1.55	0.11333	0.10775	0.10146	0.09948	0.09740	0.09570	0.09391	0.09086	0.08817	0.08577	0.08363	0.08169	0.07994	0.07836	0.07689	0.07556	0.07431	0.07319	0.07214	0.07116
2.9	1.60	0.12036	0.11446	0.10781	0.10571	0.10352	0.10171	0.09982	0.09659	0.09374	0.09120	0.08894	0.08688	0.08503	0.08335	0.08180	0.08039	0.07906	0.07787	0.07676	0.07573
3.0	1.66	0.12758	0.12135	0.11433	0.11211	0.10979	0.10788	0.10589	0.10247	0.09946	0.09677	0.09438	0.09221	0.09025	0.08848	0.08684	0.08535	0.08395	0.08269	0.08151	0.08042
3.1	1.71	0.13497	0.12841	0.12101	0.11867	0.11622	0.11421	0.11211	0.10850	0.10533	0.10250	0.09997	0.09768	0.09562	0.09374	0.09201	0.09044	0.08896	0.08763	0.08639	0.08523
3.2	1.77	0.14255	0.13564	0.12785	0.12539	0.12282	0.12070	0.11848	0.11469	0.11135	0.10836	0.10570	0.10329	0.10111	0.09914	0.09732	0.09566	0.09410	0.09270	0.09139	0.09017
3.3	1.82	0.15030	0.14304	0.13486	0.13228	0.12957	0.12734	0.12501	0.12102	0.11751	0.11437	0.11157	0.10904	0.10675	0.10467	0.10275	0.10101	0.09937	0.09789	0.09652	0.09524
3.4	1.88	0.15823	0.15061	0.14203	0.13932	0.13647	0.13414	0.13169	0.12750	0.12381	0.12052	0.11758	0.11492	0.11252	0.11033	0.10832	0.10649	0.10476	0.10321	0.10177	0.10042
3.5	1.93	0.16633	0.15835	0.14936	0.14652	0.14354	0.14109	0.13853	0.13413	0.13027	0.12681	0.12373	0.12094	0.11842	0.11613	0.11402	0.11210	0.11029	0.10866	0.10714	0.10573
3.6	1.99	0.17460	0.16626	0.15684	0.15387	0.15075	0.14819	0.14551	0.14091	0.13686	0.13324	0.13002	0.12709	0.12445	0.12205	0.11984	0.11783	0.11593	0.11423	0.11264	0.11116
3.7	2.04	0.18305	0.17433	0.16449	0.16138	0.15812	0.15544	0.15264	0.14783	0.14360	0.13981	0.13644	0.13338	0.13062	0.12811	0.12579	0.12369	0.12171	0.11992	0.11826	0.11671
3.8	2.10	0.19167	0.18257	0.17230	0.16905	0.16565	0.16285	0.15992	0.15490	0.15048	0.14652	0.14300	0.13980	0.13692	0.13430	0.13188	0.12968	0.12760	0.12574	0.12400	0.12238

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.9	2.15	0.20046	0.19097	0.18026	0.17688	0.17333	0.17040	0.16735	0.16211	0.15750	0.15337	0.14970	0.14636	0.14335	0.14061	0.13808	0.13579	0.13362	0.13168	0.12987	0.12818
4.0	2.21	0.20942	0.19954	0.18838	0.18485	0.18115	0.17811	0.17493	0.16947	0.16466	0.16036	0.15653	0.15305	0.14990	0.14705	0.14442	0.14203	0.13977	0.13774	0.13585	0.13409
4.1	2.26	0.21855	0.20827	0.19665	0.19298	0.18913	0.18596	0.18265	0.17697	0.17196	0.16748	0.16349	0.15987	0.15659	0.15362	0.15088	0.14839	0.14604	0.14392	0.14195	0.14012
4.2	2.32	0.22785	0.21716	0.20508	0.20127	0.19726	0.19397	0.19052	0.18461	0.17940	0.17474	0.17059	0.16682	0.16341	0.16032	0.15747	0.15487	0.15243	0.15022	0.14818	0.14627
4.3	2.38	0.23732	0.22621	0.21367	0.20970	0.20554	0.20212	0.19854	0.19239	0.18698	0.18213	0.17782	0.17390	0.17036	0.16715	0.16418	0.16148	0.15894	0.15665	0.15452	0.15253
4.4	2.43	0.24695	0.23542	0.22240	0.21829	0.21397	0.21041	0.20669	0.20031	0.19469	0.18966	0.18518	0.18111	0.17743	0.17410	0.17101	0.16821	0.16557	0.16319	0.16098	0.15891
4.5	2.49	0.25674	0.24480	0.23129	0.22702	0.22254	0.21885	0.21500	0.20838	0.20254	0.19733	0.19268	0.18845	0.18464	0.18117	0.17797	0.17506	0.17232	0.16985	0.16756	0.16542
4.6	2.54	0.26670	0.25433	0.24033	0.23591	0.23126	0.22744	0.22344	0.21658	0.21053	0.20512	0.20030	0.19592	0.19197	0.18838	0.18506	0.18204	0.17919	0.17664	0.17426	0.17203

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.28	0.00940	0.00897	0.00852	0.00817	0.00781	0.00752	0.00721	0.00673	0.00631	0.00597	0.00566	0.00541	0.00519	0.00499	0.00483	0.00468	0.00453	0.00442	0.00430	0.00422
0.6	0.33	0.01255	0.01200	0.01141	0.01096	0.01048	0.01010	0.00970	0.00906	0.00852	0.00806	0.00767	0.00733	0.00704	0.00677	0.00656	0.00636	0.00617	0.00602	0.00586	0.00575
0.7	0.39	0.01606	0.01536	0.01463	0.01406	0.01346	0.01299	0.01248	0.01168	0.01100	0.01042	0.00991	0.00949	0.00912	0.00878	0.00851	0.00825	0.00802	0.00782	0.00762	0.00748
0.8	0.44	0.01990	0.01905	0.01816	0.01747	0.01674	0.01616	0.01555	0.01456	0.01373	0.01301	0.01240	0.01188	0.01142	0.01101	0.01068	0.01035	0.01006	0.00982	0.00958	0.00940
0.9	0.50	0.02406	0.02306	0.02199	0.02117	0.02031	0.01961	0.01888	0.01770	0.01670	0.01585	0.01511	0.01449	0.01394	0.01344	0.01304	0.01266	0.01230	0.01201	0.01172	0.01151
1.0	0.55	0.02854	0.02737	0.02612	0.02516	0.02415	0.02333	0.02247	0.02109	0.01992	0.01892	0.01805	0.01731	0.01666	0.01607	0.01561	0.01515	0.01473	0.01439	0.01404	0.01379
1.1	0.61	0.03332	0.03197	0.03054	0.02943	0.02826	0.02732	0.02633	0.02473	0.02337	0.02221	0.02120	0.02035	0.01959	0.01891	0.01836	0.01783	0.01735	0.01694	0.01655	0.01626
1.2	0.66	0.03840	0.03687	0.03523	0.03397	0.03263	0.03156	0.03043	0.02860	0.02704	0.02572	0.02456	0.02359	0.02272	0.02194	0.02131	0.02070	0.02014	0.01968	0.01923	0.01889
1.3	0.72	0.04377	0.04204	0.04019	0.03877	0.03726	0.03605	0.03477	0.03271	0.03095	0.02944	0.02813	0.02703	0.02605	0.02516	0.02445	0.02375	0.02312	0.02259	0.02207	0.02169
1.4	0.77	0.04943	0.04749	0.04543	0.04383	0.04215	0.04079	0.03935	0.03704	0.03506	0.03338	0.03191	0.03067	0.02956	0.02856	0.02776	0.02698	0.02627	0.02568	0.02509	0.02466
1.5	0.83	0.05536	0.05321	0.05092	0.04915	0.04727	0.04577	0.04417	0.04160	0.03940	0.03752	0.03588	0.03450	0.03327	0.03215	0.03126	0.03039	0.02959	0.02893	0.02828	0.02780
1.6	0.88	0.06156	0.05919	0.05667	0.05472	0.05265	0.05098	0.04922	0.04638	0.04395	0.04187	0.04005	0.03852	0.03716	0.03592	0.03493	0.03397	0.03308	0.03235	0.03162	0.03109
1.7	0.94	0.06803	0.06544	0.06267	0.06053	0.05826	0.05643	0.05450	0.05137	0.04870	0.04641	0.04442	0.04273	0.04123	0.03987	0.03878	0.03772	0.03674	0.03593	0.03513	0.03454
1.8	0.99	0.07477	0.07194	0.06892	0.06659	0.06411	0.06211	0.06000	0.05658	0.05366	0.05116	0.04898	0.04713	0.04548	0.04399	0.04280	0.04163	0.04056	0.03968	0.03880	0.03816
1.9	1.05	0.08177	0.07869	0.07542	0.07288	0.07019	0.06802	0.06572	0.06200	0.05883	0.05610	0.05372	0.05171	0.04992	0.04829	0.04699	0.04572	0.04455	0.04358	0.04263	0.04192
2.0	1.10	0.08902	0.08570	0.08215	0.07941	0.07649	0.07415	0.07166	0.06763	0.06419	0.06123	0.05866	0.05648	0.05453	0.05276	0.05135	0.04997	0.04870	0.04765	0.04661	0.04584
2.1	1.16	0.09653	0.09295	0.08913	0.08617	0.08303	0.08050	0.07781	0.07347	0.06975	0.06656	0.06377	0.06142	0.05931	0.05740	0.05587	0.05438	0.05301	0.05187	0.05074	0.04992
2.2	1.22	0.10429	0.10044	0.09634	0.09317	0.08979	0.08707	0.08418	0.07951	0.07551	0.07207	0.06907	0.06654	0.06427	0.06221	0.06056	0.05895	0.05747	0.05624	0.05503	0.05414
2.3	1.27	0.11229	0.10818	0.10379	0.10039	0.09677	0.09385	0.09076	0.08575	0.08146	0.07777	0.07455	0.07183	0.06939	0.06718	0.06541	0.06368	0.06210	0.06078	0.05947	0.05851
2.4	1.33	0.12054	0.11615	0.11146	0.10783	0.10397	0.10085	0.09754	0.09219	0.08760	0.08366	0.08021	0.07730	0.07469	0.07232	0.07043	0.06857	0.06687	0.06546	0.06406	0.06303
2.5	1.38	0.12904	0.12436	0.11937	0.11550	0.11138	0.10806	0.10454	0.09883	0.09393	0.08973	0.08605	0.08294	0.08015	0.07762	0.07560	0.07362	0.07180	0.07029	0.06880	0.06770
2.6	1.44	0.13777	0.13281	0.12750	0.12339	0.11901	0.11548	0.11173	0.10566	0.10045	0.09598	0.09206	0.08875	0.08578	0.08309	0.08093	0.07882	0.07689	0.07528	0.07369	0.07251
2.7	1.49	0.14674	0.14148	0.13586	0.13150	0.12685	0.12311	0.11913	0.11269	0.10716	0.10241	0.09825	0.09473	0.09158	0.08871	0.08642	0.08418	0.08212	0.08041	0.07872	0.07747
2.8	1.55	0.15594	0.15038	0.14443	0.13982	0.13491	0.13094	0.12673	0.11991	0.11405	0.10902	0.10461	0.10088	0.09753	0.09450	0.09207	0.08969	0.08751	0.08569	0.08389	0.08257
2.9	1.60	0.16538	0.15951	0.15323	0.14836	0.14317	0.13898	0.13453	0.12732	0.12113	0.11580	0.11114	0.10719	0.10366	0.10044	0.09787	0.09535	0.09304	0.09112	0.08922	0.08781
3.0	1.66	0.17505	0.16886	0.16224	0.15711	0.15164	0.14722	0.14253	0.13492	0.12839	0.12276	0.11785	0.11367	0.10994	0.10654	0.10382	0.10117	0.09872	0.09669	0.09468	0.09320
3.1	1.71	0.18495	0.17844	0.17148	0.16607	0.16031	0.15566	0.15072	0.14271	0.13583	0.12990	0.12472	0.12032	0.11638	0.11280	0.10993	0.10713	0.10455	0.10240	0.10029	0.09872
3.2	1.77	0.19508	0.18824	0.18092	0.17524	0.16919	0.16430	0.15911	0.15068	0.14344	0.13721	0.13175	0.12713	0.12298	0.11921	0.11619	0.11324	0.11052	0.10826	0.10603	0.10438
3.3	1.82	0.20543	0.19826	0.19058	0.18462	0.17827	0.17314	0.16769	0.15884	0.15124	0.14469	0.13896	0.13410	0.12974	0.12578	0.12260	0.11950	0.11664	0.11427	0.11192	0.11019
3.4	1.88	0.21601	0.20849	0.20045	0.19421	0.18755	0.18218	0.17646	0.16719	0.15921	0.15234	0.14633	0.14123	0.13665	0.13249	0.12917	0.12591	0.12291	0.12041	0.11795	0.11613
3.5	1.93	0.22680	0.21895	0.21053	0.20400	0.19703	0.19141	0.18542	0.17571	0.16736	0.16017	0.15387	0.14852	0.14372	0.13936	0.13588	0.13246	0.12932	0.12670	0.12411	0.12220
3.6	1.99	0.23782	0.22961	0.22082	0.21399	0.20671	0.20083	0.19458	0.18442	0.17568	0.16816	0.16156	0.15597	0.15095	0.14639	0.14273	0.13916	0.13586	0.13313	0.13042	0.12842
3.7	2.04	0.24906	0.24050	0.23132	0.22419	0.21659	0.21045	0.20392	0.19331	0.18418	0.17632	0.16943	0.16358	0.15833	0.15356	0.14974	0.14600	0.14256	0.13969	0.13686	0.13477
3.8	2.10	0.26052	0.25159	0.24202	0.23459	0.22666	0.22026	0.21344	0.20237	0.19285	0.18464	0.17745	0.17134	0.16586	0.16088	0.15689	0.15298	0.14939	0.14640	0.14344	0.14125

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
3.9	2.15	0.27219	0.26289	0.25293	0.24519	0.23693	0.23026	0.22315	0.21162	0.20169	0.19313	0.18563	0.17926	0.17355	0.16835	0.16419	0.16011	0.15636	0.15324	0.15015	0.14787
4.0	2.21	0.28408	0.27441	0.26404	0.25598	0.24739	0.24044	0.23305	0.22104	0.21070	0.20179	0.19398	0.18734	0.18139	0.17597	0.17163	0.16739	0.16347	0.16022	0.15700	0.15462
4.1	2.26	0.29618	0.28613	0.27535	0.26698	0.25804	0.25082	0.24313	0.23064	0.21988	0.21061	0.20248	0.19557	0.18938	0.18374	0.17922	0.17480	0.17073	0.16734	0.16398	0.16151

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.28	0.01170	0.01103	0.01032	0.00980	0.00925	0.00884	0.00840	0.00772	0.00715	0.00669	0.00630	0.00596	0.00568	0.00543	0.00522	0.00505	0.00487	0.00474	0.00460	0.00449
0.6	0.33	0.01553	0.01467	0.01375	0.01308	0.01236	0.01183	0.01126	0.01036	0.00963	0.00902	0.00851	0.00806	0.00769	0.00736	0.00708	0.00685	0.00662	0.00644	0.00625	0.00611
0.7	0.39	0.01977	0.01870	0.01755	0.01671	0.01582	0.01515	0.01444	0.01331	0.01239	0.01162	0.01098	0.01042	0.00994	0.00953	0.00918	0.00888	0.00858	0.00836	0.00812	0.00794
0.8	0.44	0.02440	0.02310	0.02171	0.02069	0.01961	0.01880	0.01793	0.01656	0.01543	0.01450	0.01370	0.01301	0.01243	0.01192	0.01149	0.01112	0.01076	0.01049	0.01019	0.00997
0.9	0.50	0.02941	0.02786	0.02622	0.02501	0.02372	0.02275	0.02172	0.02009	0.01874	0.01762	0.01668	0.01585	0.01515	0.01454	0.01402	0.01358	0.01314	0.01282	0.01245	0.01219
1.0	0.55	0.03477	0.03297	0.03105	0.02965	0.02815	0.02701	0.02580	0.02389	0.02231	0.02100	0.01989	0.01892	0.01810	0.01737	0.01676	0.01624	0.01572	0.01534	0.01491	0.01460
1.1	0.61	0.04048	0.03842	0.03622	0.03460	0.03287	0.03156	0.03017	0.02796	0.02613	0.02462	0.02333	0.02221	0.02126	0.02041	0.01971	0.01910	0.01850	0.01806	0.01756	0.01720
1.2	0.66	0.04654	0.04420	0.04169	0.03985	0.03788	0.03639	0.03481	0.03229	0.03021	0.02848	0.02700	0.02572	0.02463	0.02366	0.02285	0.02216	0.02147	0.02096	0.02039	0.01997
1.3	0.72	0.05293	0.05029	0.04748	0.04540	0.04319	0.04151	0.03972	0.03688	0.03452	0.03257	0.03090	0.02944	0.02821	0.02711	0.02620	0.02541	0.02462	0.02404	0.02339	0.02292
1.4	0.77	0.05964	0.05671	0.05356	0.05124	0.04877	0.04689	0.04490	0.04172	0.03907	0.03688	0.03501	0.03338	0.03199	0.03076	0.02973	0.02884	0.02796	0.02731	0.02658	0.02605
1.5	0.83	0.06667	0.06342	0.05994	0.05737	0.05463	0.05255	0.05033	0.04680	0.04386	0.04142	0.03934	0.03752	0.03598	0.03461	0.03345	0.03247	0.03148	0.03075	0.02994	0.02934
1.6	0.88	0.07401	0.07044	0.06661	0.06378	0.06076	0.05847	0.05602	0.05212	0.04888	0.04618	0.04388	0.04186	0.04016	0.03864	0.03736	0.03627	0.03518	0.03437	0.03346	0.03281
1.7	0.94	0.08167	0.07776	0.07356	0.07047	0.06716	0.06464	0.06196	0.05769	0.05412	0.05116	0.04863	0.04641	0.04453	0.04286	0.04146	0.04025	0.03905	0.03816	0.03716	0.03644
1.8	0.99	0.08962	0.08537	0.08080	0.07742	0.07381	0.07107	0.06815	0.06348	0.05959	0.05635	0.05359	0.05116	0.04910	0.04727	0.04574	0.04441	0.04310	0.04212	0.04103	0.04023
1.9	1.05	0.09787	0.09326	0.08830	0.08465	0.08073	0.07775	0.07457	0.06950	0.06527	0.06175	0.05874	0.05610	0.05386	0.05187	0.05019	0.04875	0.04731	0.04625	0.04506	0.04419
2.0	1.10	0.10641	0.10144	0.09609	0.09213	0.08790	0.08468	0.08124	0.07576	0.07117	0.06736	0.06410	0.06123	0.05880	0.05664	0.05482	0.05326	0.05170	0.05054	0.04925	0.04830
2.1	1.16	0.11525	0.10989	0.10414	0.09988	0.09532	0.09185	0.08815	0.08223	0.07729	0.07318	0.06965	0.06656	0.06393	0.06160	0.05963	0.05794	0.05625	0.05500	0.05360	0.05258
2.2	1.22	0.12436	0.11863	0.11245	0.10788	0.10299	0.09927	0.09529	0.08893	0.08362	0.07919	0.07540	0.07207	0.06925	0.06673	0.06461	0.06279	0.06097	0.05962	0.05811	0.05701
2.3	1.27	0.13376	0.12763	0.12103	0.11614	0.11091	0.10692	0.10266	0.09585	0.09016	0.08541	0.08135	0.07777	0.07474	0.07204	0.06976	0.06781	0.06585	0.06441	0.06278	0.06160
2.4	1.33	0.14344	0.13690	0.12986	0.12465	0.11906	0.11481	0.11026	0.10299	0.09690	0.09183	0.08748	0.08366	0.08041	0.07752	0.07509	0.07299	0.07090	0.06935	0.06761	0.06634
2.5	1.38	0.15340	0.14644	0.13895	0.13341	0.12746	0.12293	0.11809	0.11034	0.10385	0.09844	0.09381	0.08972	0.08626	0.08318	0.08058	0.07834	0.07611	0.07445	0.07259	0.07124
2.6	1.44	0.16363	0.15625	0.14830	0.14241	0.13610	0.13128	0.12614	0.11790	0.11100	0.10525	0.10032	0.09597	0.09229	0.08900	0.08623	0.08385	0.08147	0.07971	0.07773	0.07628
2.7	1.49	0.17412	0.16631	0.15789	0.15166	0.14497	0.13986	0.13441	0.12568	0.11836	0.11226	0.10702	0.10240	0.09849	0.09500	0.09206	0.08952	0.08699	0.08512	0.08301	0.08148
2.8	1.55	0.18489	0.17664	0.16774	0.16115	0.15407	0.14867	0.14290	0.13366	0.12591	0.11945	0.11390	0.10901	0.10486	0.10116	0.09804	0.09536	0.09268	0.09069	0.08845	0.08682
2.9	1.60	0.19592	0.18721	0.17783	0.17087	0.16340	0.15771	0.15162	0.14185	0.13367	0.12683	0.12097	0.11580	0.11141	0.10750	0.10419	0.10135	0.09851	0.09641	0.09404	0.09232
3.0	1.66	0.20721	0.19805	0.18816	0.18084	0.17297	0.16696	0.16054	0.15025	0.14162	0.13441	0.12822	0.12276	0.11813	0.11399	0.11051	0.10750	0.10450	0.10228	0.09978	0.09796
3.1	1.71	0.21876	0.20913	0.19874	0.19103	0.18276	0.17644	0.16969	0.15885	0.14976	0.14217	0.13565	0.12990	0.12501	0.12065	0.11698	0.11381	0.11065	0.10830	0.10567	0.10374
3.2	1.77	0.23057	0.22046	0.20955	0.20147	0.19277	0.18614	0.17904	0.16765	0.15810	0.15011	0.14325	0.13720	0.13207	0.12748	0.12361	0.12028	0.11695	0.11448	0.11170	0.10968
3.3	1.82	0.24263	0.23204	0.22061	0.21213	0.20301	0.19605	0.18861	0.17666	0.16663	0.15824	0.15104	0.14469	0.13929	0.13447	0.13040	0.12690	0.12340	0.12080	0.11788	0.11575
3.4	1.88	0.25495	0.24387	0.23190	0.22302	0.21348	0.20619	0.19838	0.18586	0.17535	0.16656	0.15900	0.15234	0.14668	0.14162	0.13735	0.13367	0.13000	0.12727	0.12421	0.12197
3.5	1.93	0.26752	0.25594	0.24343	0.23414	0.22416	0.21653	0.20837	0.19527	0.18426	0.17505	0.16714	0.16016	0.15423	0.14893	0.14445	0.14060	0.13675	0.13389	0.13068	0.12833
3.6	1.99	0.28034	0.26825	0.25518	0.24549	0.23506	0.22709	0.21856	0.20487	0.19336	0.18373	0.17546	0.16815	0.16194	0.15640	0.15172	0.14768	0.14365	0.14065	0.13729	0.13484
3.7	2.04	0.29341	0.28080	0.26717	0.25706	0.24618	0.23786	0.22896	0.21466	0.20264	0.19259	0.18394	0.17631	0.16982	0.16402	0.15913	0.15491	0.15070	0.14757	0.14405	0.14148
3.8	2.10	0.30673	0.29359	0.27939	0.26885	0.25751	0.24884	0.23956	0.22465	0.21211	0.20162	0.19260	0.18463	0.17786	0.17181	0.16670	0.16229	0.15789	0.15462	0.15095	0.14826
3.9	2.15	0.32029	0.30662	0.29184	0.28087	0.26906	0.26003	0.25037	0.23483	0.22177	0.21084	0.20143	0.19312	0.18606	0.17975	0.17442	0.16983	0.16523	0.16182	0.15799	0.15519
4.0	2.21	0.33409	0.31988	0.30452	0.29310	0.28082	0.27143	0.26137	0.24521	0.23161	0.22023	0.21043	0.20178	0.19442	0.18785	0.18230	0.17751	0.17272	0.16916	0.16517	0.16225

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

½" **Uponor PEX-a** — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.28	0.01398	0.01312	0.01221	0.01154	0.01083	0.01030	0.00974	0.00887	0.00815	0.00756	0.00707	0.00665	0.00630	0.00599	0.00573	0.00550	0.00529	0.00510	0.00495	0.00480
0.6	0.33	0.01848	0.01737	0.01619	0.01533	0.01441	0.01372	0.01300	0.01186	0.01093	0.01016	0.00952	0.00897	0.00850	0.00810	0.00775	0.00744	0.00717	0.00692	0.00672	0.00652
0.7	0.39	0.02343	0.02205	0.02059	0.01952	0.01838	0.01752	0.01661	0.01519	0.01402	0.01306	0.01225	0.01156	0.01097	0.01046	0.01002	0.00963	0.00928	0.00897	0.00871	0.00846
0.8	0.44	0.02881	0.02716	0.02539	0.02409	0.02271	0.02168	0.02058	0.01885	0.01743	0.01625	0.01526	0.01442	0.01369	0.01307	0.01252	0.01205	0.01162	0.01123	0.01092	0.01062
0.9	0.50	0.03462	0.03266	0.03058	0.02904	0.02740	0.02617	0.02487	0.02282	0.02112	0.01972	0.01854	0.01753	0.01666	0.01591	0.01526	0.01470	0.01418	0.01371	0.01334	0.01297
1.0	0.55	0.04083	0.03856	0.03613	0.03434	0.03244	0.03100	0.02948	0.02708	0.02510	0.02346	0.02207	0.02089	0.01987	0.01899	0.01822	0.01756	0.01695	0.01640	0.01595	0.01552
1.1	0.61	0.04743	0.04483	0.04205	0.03999	0.03781	0.03616	0.03441	0.03165	0.02936	0.02746	0.02586	0.02449	0.02332	0.02229	0.02140	0.02063	0.01992	0.01929	0.01877	0.01826
1.2	0.66	0.05441	0.05146	0.04831	0.04598	0.04350	0.04163	0.03963	0.03649	0.03389	0.03172	0.02989	0.02833	0.02699	0.02581	0.02480	0.02391	0.02310	0.02237	0.02178	0.02120
1.3	0.72	0.06177	0.05846	0.05492	0.05230	0.04951	0.04740	0.04516	0.04162	0.03868	0.03623	0.03417	0.03240	0.03088	0.02955	0.02840	0.02740	0.02647	0.02565	0.02497	0.02431
1.4	0.77	0.06948	0.06580	0.06186	0.05894	0.05583	0.05348	0.05097	0.04702	0.04373	0.04099	0.03868	0.03670	0.03499	0.03350	0.03221	0.03108	0.03004	0.02911	0.02835	0.02761
1.5	0.83	0.07755	0.07348	0.06913	0.06590	0.06246	0.05985	0.05707	0.05268	0.04904	0.04599	0.04342	0.04122	0.03932	0.03766	0.03622	0.03496	0.03380	0.03277	0.03192	0.03109
1.6	0.88	0.08597	0.08150	0.07672	0.07317	0.06938	0.06651	0.06345	0.05862	0.05459	0.05123	0.04839	0.04596	0.04386	0.04202	0.04042	0.03903	0.03775	0.03660	0.03566	0.03475
1.7	0.94	0.09473	0.08985	0.08462	0.08074	0.07659	0.07345	0.07011	0.06481	0.06039	0.05670	0.05359	0.05091	0.04860	0.04658	0.04483	0.04330	0.04189	0.04062	0.03959	0.03858
1.8	0.99	0.10383	0.09852	0.09283	0.08861	0.08410	0.08068	0.07703	0.07125	0.06643	0.06241	0.05900	0.05608	0.05355	0.05134	0.04942	0.04775	0.04620	0.04482	0.04368	0.04258
1.9	1.05	0.11325	0.10751	0.10135	0.09678	0.09188	0.08818	0.08422	0.07795	0.07272	0.06834	0.06464	0.06146	0.05871	0.05630	0.05421	0.05238	0.05070	0.04919	0.04795	0.04675
2.0	1.10	0.12301	0.11682	0.11017	0.10523	0.09995	0.09595	0.09167	0.08489	0.07923	0.07450	0.07049	0.06704	0.06406	0.06145	0.05918	0.05720	0.05537	0.05373	0.05239	0.05109
2.1	1.16	0.13308	0.12643	0.11929	0.11398	0.10830	0.10399	0.09938	0.09208	0.08598	0.08087	0.07655	0.07283	0.06961	0.06679	0.06434	0.06220	0.06023	0.05845	0.05700	0.05559
2.2	1.22	0.14347	0.13635	0.12869	0.12301	0.11691	0.11229	0.10735	0.09951	0.09296	0.08747	0.08282	0.07882	0.07536	0.07232	0.06969	0.06738	0.06525	0.06334	0.06178	0.06026
2.3	1.27	0.15417	0.14657	0.13839	0.13231	0.12580	0.12085	0.11557	0.10718	0.10017	0.09429	0.08930	0.08501	0.08130	0.07804	0.07521	0.07274	0.07045	0.06840	0.06672	0.06509
2.4	1.33	0.16518	0.15708	0.14837	0.14190	0.13495	0.12968	0.12404	0.11509	0.10760	0.10131	0.09599	0.09140	0.08743	0.08395	0.08092	0.07827	0.07583	0.07363	0.07183	0.07008
2.5	1.38	0.17650	0.16790	0.15864	0.15175	0.14437	0.13876	0.13276	0.12323	0.11525	0.10855	0.10288	0.09799	0.09375	0.09003	0.08680	0.08398	0.08137	0.07902	0.07710	0.07523
2.6	1.44	0.18812	0.17900	0.16919	0.16188	0.15404	0.14809	0.14172	0.13160	0.12312	0.11601	0.10997	0.10477	0.10026	0.09630	0.09287	0.08986	0.08707	0.08458	0.08253	0.08053
2.7	1.49	0.20004	0.19039	0.18001	0.17227	0.16398	0.15767	0.15093	0.14020	0.13121	0.12367	0.11726	0.11174	0.10695	0.10276	0.09910	0.09591	0.09295	0.09029	0.08812	0.08600
2.8	1.55	0.21225	0.20207	0.19110	0.18293	0.17417	0.16750	0.16037	0.14903	0.13952	0.13153	0.12475	0.11890	0.11383	0.10938	0.10551	0.10212	0.09899	0.09618	0.09387	0.09162
2.9	1.60	0.22476	0.21403	0.20247	0.19386	0.18461	0.17758	0.17006	0.15808	0.14804	0.13960	0.13244	0.12625	0.12090	0.11619	0.11210	0.10851	0.10520	0.10222	0.09978	0.09739
3.0	1.66	0.23755	0.22627	0.21410	0.20504	0.19531	0.18790	0.17998	0.16736	0.15678	0.14788	0.14032	0.13380	0.12814	0.12318	0.11885	0.11507	0.11157	0.10842	0.10584	0.10332
3.1	1.71	0.25064	0.23878	0.22601	0.21648	0.20625	0.19847	0.19013	0.17686	0.16572	0.15635	0.14840	0.14152	0.13557	0.13033	0.12578	0.12179	0.11810	0.11478	0.11206	0.10940
3.2	1.77	0.26400	0.25157	0.23817	0.22818	0.21744	0.20927	0.20052	0.18658	0.17487	0.16503	0.15667	0.14944	0.14317	0.13767	0.13287	0.12867	0.12479	0.12129	0.11843	0.11564
3.3	1.82	0.27766	0.26464	0.25060	0.24013	0.22888	0.22031	0.21114	0.19651	0.18424	0.17390	0.16512	0.15753	0.15095	0.14517	0.14013	0.13572	0.13164	0.12797	0.12496	0.12202
3.4	1.88	0.29159	0.27797	0.26329	0.25233	0.24055	0.23159	0.22198	0.20666	0.19380	0.18298	0.17377	0.16581	0.15891	0.15285	0.14756	0.14293	0.13865	0.13479	0.13163	0.12855
3.5	1.93	0.30580	0.29158	0.27623	0.26478	0.25247	0.24310	0.23305	0.21703	0.20358	0.19224	0.18261	0.17427	0.16705	0.16069	0.15516	0.15030	0.14581	0.14177	0.13846	0.13523
3.6	1.99	0.32028	0.30545	0.28944	0.27748	0.26463	0.25484	0.24435	0.22761	0.21355	0.20171	0.19163	0.18292	0.17536	0.16871	0.16291	0.15784	0.15314	0.14891	0.14544	0.14206
3.7	2.04	0.33504	0.31958	0.30289	0.29043	0.27703	0.26682	0.25587	0.23841	0.22373	0.21136	0.20084	0.19174	0.18384	0.17689	0.17084	0.16553	0.16062	0.15620	0.15257	0.14903
3.8	2.10	0.35007	0.33398	0.31660	0.30362	0.28966	0.27902	0.26762	0.24941	0.23411	0.22121	0.21023	0.20073	0.19249	0.18524	0.17892	0.17338	0.16825	0.16364	0.15985	0.15616
3.9	2.15	0.36538	0.34864	0.33056	0.31706	0.30253	0.29146	0.27958	0.26063	0.24469	0.23125	0.21981	0.20991	0.20132	0.19376	0.18717	0.18139	0.17604	0.17123	0.16728	0.16342

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" Uponor PEX-a — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.40	0.00485	0.00456	0.00423	0.00413	0.00403	0.00394	0.00385	0.00370	0.00357	0.00345	0.00335	0.00326	0.00317	0.00310	0.00303	0.00296	0.00290	0.00285	0.00280	0.00276
0.6	0.48	0.00655	0.00617	0.00575	0.00561	0.00547	0.00536	0.00524	0.00504	0.00486	0.00471	0.00457	0.00445	0.00433	0.00423	0.00414	0.00406	0.00398	0.00391	0.00384	0.00378
0.7	0.56	0.00847	0.00799	0.00745	0.00728	0.00710	0.00696	0.00680	0.00655	0.00632	0.00613	0.00595	0.00579	0.00565	0.00552	0.00540	0.00529	0.00519	0.00510	0.00501	0.00494
0.8	0.65	0.01059	0.00999	0.00933	0.00912	0.00890	0.00872	0.00854	0.00822	0.00794	0.00770	0.00748	0.00728	0.00711	0.00695	0.00680	0.00667	0.00654	0.00643	0.00632	0.00623
0.9	0.73	0.01290	0.01218	0.01138	0.01113	0.01087	0.01066	0.01043	0.01005	0.00972	0.00942	0.00916	0.00892	0.00871	0.00852	0.00834	0.00818	0.00802	0.00789	0.00776	0.00764
1.0	0.81	0.01540	0.01455	0.01361	0.01332	0.01301	0.01276	0.01249	0.01204	0.01165	0.01130	0.01099	0.01070	0.01045	0.01022	0.01001	0.00982	0.00964	0.00948	0.00933	0.00919
1.1	0.89	0.01808	0.01710	0.01601	0.01566	0.01531	0.01501	0.01471	0.01418	0.01372	0.01331	0.01295	0.01262	0.01233	0.01206	0.01181	0.01159	0.01138	0.01119	0.01102	0.01085
1.2	0.97	0.02094	0.01982	0.01857	0.01817	0.01776	0.01742	0.01707	0.01647	0.01594	0.01547	0.01506	0.01468	0.01434	0.01403	0.01375	0.01349	0.01325	0.01303	0.01283	0.01264
1.3	1.05	0.02397	0.02271	0.02128	0.02084	0.02037	0.01999	0.01959	0.01890	0.01830	0.01777	0.01730	0.01687	0.01648	0.01613	0.01581	0.01551	0.01524	0.01499	0.01476	0.01454
1.4	1.13	0.02718	0.02576	0.02416	0.02366	0.02313	0.02270	0.02225	0.02148	0.02081	0.02020	0.01967	0.01918	0.01875	0.01835	0.01799	0.01766	0.01735	0.01707	0.01681	0.01657
1.5	1.21	0.03056	0.02897	0.02719	0.02663	0.02604	0.02556	0.02506	0.02420	0.02344	0.02277	0.02217	0.02163	0.02114	0.02070	0.02029	0.01992	0.01958	0.01926	0.01897	0.01870
1.6	1.29	0.03411	0.03235	0.03037	0.02975	0.02910	0.02857	0.02801	0.02706	0.02622	0.02547	0.02481	0.02421	0.02367	0.02317	0.02272	0.02231	0.02192	0.02158	0.02125	0.02095
1.7	1.37	0.03781	0.03588	0.03371	0.03302	0.03230	0.03172	0.03110	0.03005	0.02913	0.02830	0.02757	0.02691	0.02631	0.02577	0.02527	0.02481	0.02439	0.02400	0.02365	0.02331
1.8	1.45	0.04169	0.03957	0.03719	0.03644	0.03565	0.03501	0.03433	0.03318	0.03217	0.03126	0.03046	0.02973	0.02908	0.02848	0.02793	0.02743	0.02696	0.02654	0.02615	0.02578
1.9	1.53	0.04572	0.04341	0.04081	0.04000	0.03914	0.03844	0.03770	0.03644	0.03534	0.03435	0.03348	0.03268	0.03196	0.03131	0.03071	0.03017	0.02966	0.02919	0.02877	0.02837
2.0	1.61	0.04990	0.04740	0.04458	0.04370	0.04277	0.04200	0.04121	0.03984	0.03864	0.03757	0.03661	0.03575	0.03497	0.03426	0.03361	0.03302	0.03246	0.03196	0.03149	0.03106
2.1	1.69	0.05425	0.05154	0.04850	0.04754	0.04653	0.04571	0.04484	0.04337	0.04207	0.04091	0.03987	0.03894	0.03809	0.03733	0.03662	0.03598	0.03537	0.03483	0.03432	0.03385
2.2	1.77	0.05875	0.05583	0.05255	0.05152	0.05044	0.04955	0.04862	0.04702	0.04562	0.04437	0.04325	0.04224	0.04133	0.04051	0.03974	0.03905	0.03840	0.03781	0.03726	0.03675
2.3	1.86	0.06340	0.06027	0.05675	0.05564	0.05447	0.05352	0.05252	0.05081	0.04930	0.04795	0.04676	0.04567	0.04469	0.04380	0.04298	0.04223	0.04153	0.04090	0.04031	0.03976
2.4	1.94	0.06820	0.06485	0.06108	0.05989	0.05865	0.05762	0.05655	0.05472	0.05310	0.05166	0.05038	0.04921	0.04816	0.04721	0.04633	0.04553	0.04477	0.04409	0.04346	0.04288
2.5	2.02	0.07315	0.06958	0.06555	0.06428	0.06295	0.06186	0.06071	0.05875	0.05703	0.05549	0.05411	0.05287	0.05174	0.05072	0.04978	0.04893	0.04812	0.04740	0.04672	0.04609
2.6	2.10	0.07825	0.07445	0.07016	0.06881	0.06739	0.06622	0.06500	0.06291	0.06107	0.05943	0.05797	0.05664	0.05544	0.05435	0.05335	0.05244	0.05158	0.05080	0.05008	0.04941
2.7	2.18	0.08350	0.07946	0.07490	0.07347	0.07196	0.07072	0.06942	0.06720	0.06524	0.06350	0.06194	0.06053	0.05925	0.05809	0.05702	0.05605	0.05514	0.05432	0.05355	0.05284
2.8	2.26	0.08889	0.08461	0.07978	0.07826	0.07666	0.07534	0.07397	0.07161	0.06953	0.06768	0.06603	0.06453	0.06317	0.06194	0.06081	0.05978	0.05881	0.05793	0.05712	0.05636
2.9	2.34	0.09443	0.08990	0.08479	0.08318	0.08148	0.08009	0.07864	0.07614	0.07394	0.07198	0.07023	0.06864	0.06720	0.06590	0.06470	0.06361	0.06258	0.06165	0.06079	0.05998
3.0	2.42	0.10012	0.09533	0.08993	0.08823	0.08644	0.08497	0.08343	0.08079	0.07847	0.07639	0.07454	0.07286	0.07134	0.06997	0.06870	0.06754	0.06645	0.06547	0.06456	0.06371
3.1	2.50	0.10594	0.10090	0.09521	0.09341	0.09152	0.08997	0.08835	0.08556	0.08311	0.08092	0.07897	0.07720	0.07559	0.07414	0.07280	0.07158	0.07043	0.06939	0.06843	0.06753
3.2	2.58	0.11191	0.10660	0.10061	0.09872	0.09673	0.09509	0.09339	0.09046	0.08787	0.08556	0.08351	0.08164	0.07995	0.07842	0.07701	0.07572	0.07451	0.07342	0.07240	0.07146
3.3	2.66	0.11801	0.11244	0.10614	0.10415	0.10206	0.10034	0.09855	0.09547	0.09275	0.09032	0.08816	0.08619	0.08442	0.08281	0.08132	0.07997	0.07869	0.07754	0.07648	0.07548
3.4	2.74	0.12426	0.11841	0.11180	0.10971	0.10752	0.10572	0.10383	0.10060	0.09774	0.09519	0.09292	0.09086	0.08899	0.08730	0.08574	0.08431	0.08297	0.08177	0.08065	0.07960
3.5	2.82	0.13065	0.12452	0.11759	0.11540	0.11310	0.11121	0.10924	0.10584	0.10285	0.10018	0.09779	0.09563	0.09367	0.09190	0.09026	0.08877	0.08736	0.08609	0.08492	0.08382
3.6	2.90	0.13717	0.13076	0.12351	0.12121	0.11881	0.11683	0.11476	0.11121	0.10807	0.10527	0.10278	0.10051	0.09846	0.09660	0.09488	0.09332	0.09184	0.09052	0.08928	0.08813
3.7	2.98	0.14383	0.13713	0.12955	0.12715	0.12464	0.12257	0.12040	0.11669	0.11341	0.11048	0.10787	0.10549	0.10335	0.10140	0.09961	0.09797	0.09643	0.09504	0.09375	0.09254
3.8	3.07	0.15063	0.14363	0.13571	0.13321	0.13059	0.12842	0.12616	0.12228	0.11886	0.11580	0.11307	0.11059	0.10835	0.10631	0.10443	0.10272	0.10111	0.09966	0.09831	0.09705

Continued on next page

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" **Uponor PEX-a** — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
3.9	3.15	0.15756	0.15026	0.14201	0.13940	0.13666	0.13440	0.13204	0.12799	0.12442	0.12122	0.11837	0.11579	0.11345	0.11132	0.10936	0.10758	0.10589	0.10438	0.10297	0.10165
4.0	3.23	0.16463	0.15703	0.14842	0.14570	0.14285	0.14050	0.13804	0.13381	0.13009	0.12676	0.12379	0.12109	0.11865	0.11644	0.11439	0.11253	0.11078	0.10920	0.10773	0.10635
4.1	3.31	0.17183	0.16392	0.15496	0.15213	0.14916	0.14671	0.14415	0.13975	0.13587	0.13241	0.12931	0.12650	0.12396	0.12165	0.11952	0.11758	0.11575	0.11411	0.11258	0.11115
4.2	3.39	0.17917	0.17094	0.16163	0.15868	0.15559	0.15304	0.15038	0.14580	0.14177	0.13816	0.13494	0.13202	0.12937	0.12697	0.12475	0.12273	0.12083	0.11912	0.11752	0.11604
4.3	3.47	0.18664	0.17809	0.16841	0.16535	0.16214	0.15949	0.15672	0.15197	0.14777	0.14402	0.14068	0.13763	0.13489	0.13239	0.13008	0.12798	0.12600	0.12422	0.12257	0.12102
4.4	3.55	0.19424	0.18536	0.17532	0.17214	0.16880	0.16606	0.16318	0.15824	0.15389	0.14999	0.14652	0.14336	0.14050	0.13791	0.13551	0.13333	0.13127	0.12942	0.12770	0.12609
4.5	3.63	0.20197	0.19277	0.18235	0.17905	0.17559	0.17274	0.16976	0.16463	0.16011	0.15607	0.15246	0.14918	0.14622	0.14353	0.14104	0.13878	0.13664	0.13472	0.13293	0.13126
4.6	3.71	0.20983	0.20030	0.18950	0.18608	0.18249	0.17954	0.17644	0.17113	0.16645	0.16225	0.15851	0.15511	0.15204	0.14925	0.14667	0.14432	0.14210	0.14011	0.13826	0.13652
4.7	3.79	0.21782	0.20795	0.19677	0.19323	0.18951	0.18645	0.18325	0.17774	0.17289	0.16854	0.16467	0.16114	0.15796	0.15506	0.15239	0.14996	0.14766	0.14560	0.14368	0.14188
4.8	3.87	0.22595	0.21573	0.20416	0.20049	0.19664	0.19348	0.19016	0.18446	0.17944	0.17494	0.17092	0.16728	0.16398	0.16098	0.15821	0.15569	0.15332	0.15118	0.14919	0.14733
4.9	3.95	0.23420	0.22363	0.21166	0.20787	0.20389	0.20062	0.19719	0.19129	0.18609	0.18144	0.17729	0.17351	0.17010	0.16700	0.16413	0.16152	0.15907	0.15685	0.15479	0.15287
5.0	4.03	0.24258	0.23166	0.21929	0.21537	0.21126	0.20787	0.20433	0.19823	0.19286	0.18805	0.18375	0.17985	0.17632	0.17311	0.17015	0.16745	0.16491	0.16262	0.16049	0.15850
5.1	4.11	0.25109	0.23981	0.22704	0.22299	0.21874	0.21524	0.21158	0.20528	0.19973	0.19476	0.19032	0.18628	0.18264	0.17932	0.17626	0.17347	0.17085	0.16848	0.16628	0.16422
5.2	4.19	0.25973	0.24809	0.23490	0.23072	0.22634	0.22272	0.21894	0.21244	0.20671	0.20157	0.19699	0.19282	0.18906	0.18563	0.18247	0.17959	0.17688	0.17443	0.17216	0.17003

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" Uponor PEX-a — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.40	0.00719	0.00687	0.00654	0.00628	0.00601	0.00579	0.00556	0.00519	0.00489	0.00462	0.00440	0.00420	0.00404	0.00388	0.00376	0.00365	0.00354	0.00345	0.00336	0.00330
0.6	0.48	0.00963	0.00921	0.00877	0.00844	0.00808	0.00779	0.00749	0.00701	0.00661	0.00626	0.00596	0.00571	0.00548	0.00528	0.00512	0.00496	0.00482	0.00470	0.00459	0.00450
0.7	0.56	0.01234	0.01182	0.01127	0.01084	0.01039	0.01004	0.00966	0.00905	0.00853	0.00810	0.00772	0.00740	0.00711	0.00685	0.00665	0.00645	0.00627	0.00612	0.00597	0.00586
0.8	0.65	0.01531	0.01468	0.01401	0.01349	0.01294	0.01250	0.01204	0.01130	0.01067	0.01013	0.00966	0.00926	0.00891	0.00860	0.00835	0.00810	0.00788	0.00769	0.00751	0.00737
0.9	0.73	0.01854	0.01778	0.01698	0.01637	0.01572	0.01519	0.01464	0.01375	0.01299	0.01234	0.01178	0.01131	0.01089	0.01051	0.01020	0.00991	0.00964	0.00941	0.00919	0.00903
1.0	0.81	0.02201	0.02113	0.02019	0.01947	0.01871	0.01809	0.01744	0.01640	0.01551	0.01474	0.01408	0.01352	0.01303	0.01258	0.01222	0.01187	0.01155	0.01128	0.01102	0.01083
1.1	0.89	0.02572	0.02471	0.02363	0.02279	0.02191	0.02120	0.02045	0.01924	0.01820	0.01732	0.01655	0.01591	0.01533	0.01481	0.01439	0.01398	0.01361	0.01330	0.01300	0.01277
1.2	0.97	0.02967	0.02851	0.02728	0.02633	0.02532	0.02451	0.02365	0.02227	0.02108	0.02007	0.01919	0.01845	0.01779	0.01719	0.01671	0.01624	0.01581	0.01546	0.01511	0.01485
1.3	1.05	0.03385	0.03254	0.03115	0.03007	0.02893	0.02802	0.02704	0.02548	0.02414	0.02299	0.02200	0.02115	0.02040	0.01972	0.01917	0.01864	0.01816	0.01775	0.01735	0.01706
1.4	1.13	0.03824	0.03678	0.03523	0.03402	0.03274	0.03172	0.03063	0.02887	0.02737	0.02608	0.02496	0.02401	0.02317	0.02240	0.02179	0.02119	0.02064	0.02018	0.01973	0.01940
1.5	1.21	0.04286	0.04124	0.03951	0.03817	0.03675	0.03561	0.03440	0.03244	0.03077	0.02933	0.02808	0.02702	0.02608	0.02522	0.02454	0.02387	0.02326	0.02275	0.02225	0.02188
1.6	1.29	0.04769	0.04590	0.04400	0.04252	0.04095	0.03969	0.03835	0.03619	0.03433	0.03275	0.03136	0.03019	0.02914	0.02819	0.02743	0.02669	0.02601	0.02545	0.02489	0.02448
1.7	1.37	0.05274	0.05077	0.04868	0.04706	0.04534	0.04395	0.04248	0.04010	0.03807	0.03632	0.03479	0.03350	0.03235	0.03130	0.03047	0.02965	0.02890	0.02828	0.02766	0.02721
1.8	1.45	0.05799	0.05585	0.05356	0.05179	0.04991	0.04840	0.04679	0.04419	0.04196	0.04005	0.03838	0.03696	0.03570	0.03455	0.03364	0.03274	0.03192	0.03124	0.03056	0.03006
1.9	1.53	0.06344	0.06112	0.05864	0.05671	0.05467	0.05302	0.05127	0.04844	0.04601	0.04393	0.04211	0.04057	0.03919	0.03794	0.03694	0.03596	0.03507	0.03432	0.03358	0.03304
2.0	1.61	0.06910	0.06659	0.06390	0.06182	0.05961	0.05782	0.05593	0.05286	0.05023	0.04797	0.04599	0.04432	0.04283	0.04147	0.04038	0.03932	0.03834	0.03753	0.03673	0.03614
2.1	1.69	0.07496	0.07225	0.06936	0.06711	0.06472	0.06280	0.06075	0.05744	0.05460	0.05216	0.05002	0.04821	0.04660	0.04513	0.04395	0.04280	0.04175	0.04087	0.04000	0.03936
2.2	1.77	0.08102	0.07811	0.07500	0.07259	0.07002	0.06795	0.06575	0.06218	0.05912	0.05650	0.05420	0.05225	0.05050	0.04892	0.04765	0.04641	0.04527	0.04433	0.04339	0.04270
2.3	1.86	0.08727	0.08416	0.08082	0.07824	0.07549	0.07327	0.07091	0.06708	0.06380	0.06098	0.05851	0.05642	0.05455	0.05285	0.05148	0.05015	0.04893	0.04791	0.04690	0.04616
2.4	1.94	0.09372	0.09039	0.08683	0.08407	0.08113	0.07876	0.07623	0.07214	0.06863	0.06561	0.06297	0.06073	0.05873	0.05690	0.05544	0.05402	0.05270	0.05161	0.05053	0.04974
2.5	2.02	0.10036	0.09681	0.09302	0.09008	0.08694	0.08441	0.08172	0.07736	0.07362	0.07039	0.06757	0.06518	0.06304	0.06109	0.05953	0.05801	0.05660	0.05544	0.05428	0.05343
2.6	2.10	0.10718	0.10342	0.09939	0.09626	0.09292	0.09023	0.08737	0.08273	0.07875	0.07531	0.07231	0.06976	0.06748	0.06540	0.06374	0.06212	0.06062	0.05938	0.05815	0.05724
2.7	2.18	0.11420	0.11021	0.10593	0.10261	0.09907	0.09622	0.09318	0.08826	0.08402	0.08038	0.07719	0.07448	0.07205	0.06985	0.06808	0.06635	0.06476	0.06344	0.06213	0.06117
2.8	2.26	0.12140	0.11717	0.11265	0.10914	0.10539	0.10237	0.09915	0.09394	0.08945	0.08559	0.08220	0.07933	0.07676	0.07442	0.07254	0.07071	0.06902	0.06762	0.06623	0.06520
2.9	2.34	0.12878	0.12432	0.11954	0.11583	0.11187	0.10868	0.10528	0.09976	0.09502	0.09093	0.08735	0.08431	0.08159	0.07911	0.07713	0.07519	0.07340	0.07191	0.07044	0.06936
3.0	2.42	0.13635	0.13165	0.12661	0.12269	0.11852	0.11515	0.11157	0.10574	0.10073	0.09642	0.09264	0.08943	0.08655	0.08393	0.08184	0.07978	0.07790	0.07632	0.07477	0.07362
3.1	2.50	0.14410	0.13915	0.13384	0.12973	0.12533	0.12178	0.11800	0.11187	0.10659	0.10205	0.09806	0.09468	0.09164	0.08888	0.08667	0.08450	0.08251	0.08085	0.07921	0.07800
3.2	2.58	0.15203	0.14682	0.14125	0.13692	0.13230	0.12857	0.12460	0.11815	0.11259	0.10781	0.10361	0.10005	0.09685	0.09395	0.09162	0.08934	0.08724	0.08549	0.08376	0.08249
3.3	2.66	0.16013	0.15467	0.14883	0.14428	0.13943	0.13552	0.13134	0.12457	0.11874	0.11371	0.10930	0.10555	0.10219	0.09914	0.09669	0.09429	0.09208	0.09024	0.08843	0.08708
3.4	2.74	0.16841	0.16270	0.15657	0.15181	0.14672	0.14262	0.13824	0.13114	0.12502	0.11974	0.11512	0.11119	0.10766	0.10445	0.10188	0.09936	0.09704	0.09511	0.09320	0.09179
3.5	2.82	0.17687	0.17089	0.16448	0.15949	0.15417	0.14987	0.14529	0.13785	0.13144	0.12591	0.12106	0.11694	0.11325	0.10988	0.10719	0.10455	0.10212	0.10009	0.09809	0.09661
3.6	2.90	0.18551	0.17926	0.17255	0.16734	0.16178	0.15728	0.15249	0.14471	0.13800	0.13222	0.12714	0.12283	0.11896	0.11544	0.11262	0.10985	0.10730	0.10518	0.10309	0.10153
3.7	2.98	0.19431	0.18779	0.18079	0.17535	0.16954	0.16484	0.15984	0.15171	0.14470	0.13865	0.13335	0.12884	0.12480	0.12111	0.11816	0.11527	0.11260	0.11038	0.10819	0.10657
3.8	3.07	0.20329	0.19649	0.18919	0.18352	0.17746	0.17256	0.16734	0.15885	0.15153	0.14522	0.13968	0.13498	0.13075	0.12690	0.12382	0.12080	0.11802	0.11570	0.11340	0.11171

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" Uponor PEX-a — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.9	3.15	0.21244	0.20536	0.19775	0.19184	0.18553	0.18042	0.17498	0.16613	0.15851	0.15192	0.14615	0.14124	0.13683	0.13281	0.12960	0.12644	0.12354	0.12112	0.11873	0.11696
4.0	3.23	0.22176	0.21439	0.20648	0.20032	0.19375	0.18843	0.18277	0.17356	0.16561	0.15876	0.15274	0.14762	0.14303	0.13884	0.13549	0.13220	0.12917	0.12665	0.12416	0.12231
4.1	3.31	0.23125	0.22359	0.21536	0.20896	0.20213	0.19660	0.19071	0.18112	0.17286	0.16572	0.15946	0.15413	0.14935	0.14499	0.14150	0.13807	0.13492	0.13229	0.12970	0.12777
4.2	3.39	0.24091	0.23295	0.22441	0.21776	0.21066	0.20491	0.19879	0.18882	0.18023	0.17281	0.16630	0.16076	0.15578	0.15125	0.14762	0.14406	0.14078	0.13804	0.13534	0.13334
4.3	3.47	0.25074	0.24248	0.23361	0.22671	0.21933	0.21337	0.20701	0.19667	0.18774	0.18003	0.17327	0.16751	0.16234	0.15763	0.15385	0.15015	0.14674	0.14390	0.14109	0.13901
4.4	3.55	0.26073	0.25216	0.24297	0.23581	0.22816	0.22198	0.21538	0.20465	0.19538	0.18738	0.18036	0.17438	0.16902	0.16412	0.16020	0.15636	0.15282	0.14987	0.14695	0.14479
4.5	3.63	0.27089	0.26201	0.25248	0.24507	0.23714	0.23073	0.22389	0.21276	0.20316	0.19486	0.18758	0.18138	0.17581	0.17073	0.16667	0.16268	0.15900	0.15594	0.15291	0.15067
4.6	3.71	0.28121	0.27202	0.26216	0.25448	0.24627	0.23963	0.23254	0.22101	0.21106	0.20247	0.19492	0.18849	0.18272	0.17746	0.17324	0.16910	0.16529	0.16212	0.15898	0.15665
4.7	3.79	0.29169	0.28219	0.27198	0.26404	0.25554	0.24867	0.24134	0.22940	0.21910	0.21020	0.20238	0.19572	0.18975	0.18430	0.17993	0.17564	0.17169	0.16840	0.16515	0.16274

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" **Uponor PEX-a** — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
0.5	0.40	0.00890	0.00840	0.00788	0.00749	0.00708	0.00678	0.00645	0.00594	0.00552	0.00517	0.00488	0.00462	0.00441	0.00422	0.00406	0.00393	0.00379	0.00369	0.00358	0.00350
0.6	0.48	0.01184	0.01120	0.01052	0.01002	0.00949	0.00909	0.00866	0.00799	0.00744	0.00698	0.00659	0.00626	0.00598	0.00573	0.00552	0.00534	0.00516	0.00503	0.00488	0.00478
0.7	0.56	0.01510	0.01430	0.01345	0.01283	0.01216	0.01166	0.01113	0.01028	0.00958	0.00901	0.00852	0.00810	0.00774	0.00742	0.00715	0.00693	0.00670	0.00653	0.00635	0.00621
0.8	0.65	0.01867	0.01770	0.01666	0.01591	0.01510	0.01448	0.01383	0.01280	0.01195	0.01125	0.01065	0.01013	0.00969	0.00929	0.00897	0.00869	0.00841	0.00820	0.00797	0.00781
0.9	0.73	0.02253	0.02138	0.02015	0.01925	0.01828	0.01755	0.01678	0.01555	0.01453	0.01369	0.01297	0.01234	0.01181	0.01135	0.01095	0.01062	0.01028	0.01003	0.00976	0.00955
1.0	0.81	0.02667	0.02533	0.02389	0.02284	0.02171	0.02086	0.01995	0.01851	0.01732	0.01633	0.01548	0.01474	0.01412	0.01357	0.01310	0.01271	0.01231	0.01202	0.01169	0.01145
1.1	0.89	0.03109	0.02954	0.02789	0.02668	0.02538	0.02440	0.02335	0.02169	0.02030	0.01916	0.01818	0.01732	0.01660	0.01596	0.01542	0.01495	0.01449	0.01415	0.01377	0.01349
1.2	0.97	0.03577	0.03402	0.03214	0.03076	0.02928	0.02816	0.02697	0.02506	0.02348	0.02217	0.02105	0.02007	0.01924	0.01851	0.01789	0.01736	0.01683	0.01644	0.01600	0.01568
1.3	1.05	0.04071	0.03874	0.03663	0.03507	0.03340	0.03214	0.03079	0.02864	0.02686	0.02537	0.02410	0.02299	0.02205	0.02122	0.02051	0.01991	0.01931	0.01887	0.01837	0.01800
1.4	1.13	0.04591	0.04371	0.04135	0.03961	0.03775	0.03633	0.03483	0.03242	0.03042	0.02875	0.02733	0.02608	0.02502	0.02408	0.02329	0.02262	0.02194	0.02144	0.02088	0.02047
1.5	1.21	0.05136	0.04893	0.04631	0.04438	0.04231	0.04074	0.03907	0.03639	0.03416	0.03231	0.03072	0.02933	0.02815	0.02711	0.02622	0.02547	0.02471	0.02415	0.02352	0.02307
1.6	1.29	0.05706	0.05438	0.05150	0.04937	0.04709	0.04535	0.04351	0.04055	0.03809	0.03604	0.03429	0.03274	0.03144	0.03028	0.02930	0.02846	0.02762	0.02700	0.02631	0.02580
1.7	1.37	0.06300	0.06006	0.05690	0.05457	0.05207	0.05017	0.04814	0.04490	0.04219	0.03994	0.03801	0.03632	0.03488	0.03360	0.03253	0.03160	0.03068	0.02999	0.02923	0.02867
1.8	1.45	0.06917	0.06597	0.06253	0.05999	0.05727	0.05519	0.05298	0.04944	0.04648	0.04401	0.04190	0.04005	0.03847	0.03707	0.03589	0.03488	0.03387	0.03312	0.03228	0.03166
1.9	1.53	0.07558	0.07211	0.06838	0.06562	0.06266	0.06041	0.05800	0.05415	0.05093	0.04825	0.04595	0.04393	0.04222	0.04069	0.03940	0.03830	0.03719	0.03637	0.03546	0.03479
2.0	1.61	0.08222	0.07848	0.07444	0.07146	0.06826	0.06582	0.06321	0.05905	0.05556	0.05265	0.05016	0.04797	0.04611	0.04445	0.04305	0.04185	0.04065	0.03976	0.03877	0.03804
2.1	1.69	0.08909	0.08506	0.08071	0.07750	0.07405	0.07142	0.06861	0.06412	0.06035	0.05722	0.05452	0.05215	0.05015	0.04835	0.04684	0.04554	0.04425	0.04328	0.04220	0.04142
2.2	1.77	0.09618	0.09186	0.08719	0.08374	0.08004	0.07722	0.07420	0.06937	0.06532	0.06194	0.05904	0.05649	0.05433	0.05240	0.05077	0.04937	0.04797	0.04693	0.04577	0.04492
2.3	1.86	0.10349	0.09887	0.09388	0.09019	0.08622	0.08320	0.07997	0.07479	0.07045	0.06683	0.06372	0.06098	0.05865	0.05658	0.05483	0.05333	0.05182	0.05071	0.04946	0.04854
2.4	1.94	0.11103	0.10609	0.10077	0.09683	0.09260	0.08937	0.08592	0.08038	0.07574	0.07187	0.06854	0.06561	0.06312	0.06090	0.05903	0.05742	0.05581	0.05461	0.05327	0.05229
2.5	2.02	0.11878	0.11353	0.10787	0.10367	0.09916	0.09572	0.09204	0.08615	0.08120	0.07707	0.07352	0.07039	0.06773	0.06536	0.06336	0.06164	0.05992	0.05864	0.05721	0.05616
2.6	2.10	0.12674	0.12117	0.11516	0.11070	0.10592	0.10226	0.09835	0.09208	0.08682	0.08242	0.07864	0.07531	0.07248	0.06996	0.06783	0.06599	0.06416	0.06280	0.06127	0.06015
2.7	2.18	0.13492	0.12902	0.12265	0.11793	0.11285	0.10898	0.10483	0.09818	0.09259	0.08792	0.08391	0.08038	0.07737	0.07469	0.07242	0.07047	0.06852	0.06708	0.06545	0.06427
2.8	2.26	0.14331	0.13707	0.13034	0.12534	0.11998	0.11587	0.11149	0.10444	0.09853	0.09358	0.08933	0.08558	0.08240	0.07955	0.07715	0.07508	0.07301	0.07148	0.06975	0.06849
2.9	2.34	0.15191	0.14533	0.13822	0.13295	0.12728	0.12295	0.11831	0.11087	0.10462	0.09939	0.09490	0.09093	0.08756	0.08455	0.08201	0.07982	0.07763	0.07600	0.07417	0.07284
3.0	2.42	0.16071	0.15378	0.14630	0.14074	0.13477	0.13020	0.12531	0.11746	0.11087	0.10535	0.10060	0.09642	0.09286	0.08968	0.08699	0.08468	0.08236	0.08064	0.07871	0.07731
3.1	2.50	0.16972	0.16244	0.15456	0.14872	0.14243	0.13763	0.13248	0.12422	0.11727	0.11146	0.10646	0.10204	0.09829	0.09493	0.09210	0.08966	0.08722	0.08541	0.08337	0.08189
3.2	2.58	0.17893	0.17128	0.16302	0.15688	0.15027	0.14523	0.13982	0.13113	0.12382	0.11771	0.11245	0.10780	0.10385	0.10032	0.09734	0.09477	0.09220	0.09029	0.08815	0.08658
3.3	2.66	0.18834	0.18033	0.17166	0.16522	0.15829	0.15300	0.14732	0.13820	0.13053	0.12411	0.11858	0.11370	0.10955	0.10584	0.10271	0.10000	0.09730	0.09530	0.09304	0.09139
3.4	2.74	0.19796	0.18957	0.18049	0.17375	0.16649	0.16094	0.15499	0.14543	0.13739	0.13066	0.12486	0.11974	0.11538	0.11149	0.10820	0.10536	0.10252	0.10042	0.09805	0.09632
3.5	2.82	0.20777	0.19900	0.18951	0.18245	0.17486	0.16905	0.16283	0.15282	0.14440	0.13735	0.13127	0.12591	0.12134	0.11726	0.11381	0.11084	0.10786	0.10565	0.10317	0.10136
3.6	2.90	0.21778	0.20862	0.19870	0.19134	0.18340	0.17733	0.17083	0.16037	0.15156	0.14418	0.13783	0.13221	0.12743	0.12316	0.11955	0.11644	0.11332	0.11101	0.10841	0.10651
3.7	2.98	0.22799	0.21843	0.20809	0.20040	0.19212	0.18578	0.17899	0.16806	0.15886	0.15116	0.14452	0.13865	0.13365	0.12919	0.12541	0.12216	0.11890	0.11648	0.11376	0.11177
3.8	3.07	0.23839	0.22843	0.21765	0.20963	0.20100	0.19440	0.18731	0.17592	0.16632	0.15827	0.15134	0.14522	0.14000	0.13534	0.13140	0.12799	0.12459	0.12206	0.11922	0.11714

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" **Uponor PEX-a** — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.9	3.15	0.24898	0.23862	0.22739	0.21905	0.21006	0.20318	0.19580	0.18392	0.17392	0.16553	0.15831	0.15192	0.14648	0.14161	0.13750	0.13395	0.13040	0.12776	0.12480	0.12263
4.0	3.23	0.25977	0.24899	0.23732	0.22864	0.21928	0.21212	0.20444	0.19208	0.18167	0.17293	0.16541	0.15875	0.15308	0.14801	0.14373	0.14003	0.13633	0.13358	0.13049	0.12823
4.1	3.31	0.27074	0.25955	0.24742	0.23840	0.22867	0.22123	0.21324	0.20039	0.18956	0.18047	0.17264	0.16571	0.15982	0.15454	0.15008	0.14622	0.14237	0.13951	0.13629	0.13393
4.2	3.39	0.28191	0.27029	0.25770	0.24833	0.23823	0.23050	0.22221	0.20885	0.19759	0.18815	0.18001	0.17281	0.16667	0.16118	0.15654	0.15254	0.14853	0.14555	0.14220	0.13975
4.3	3.47	0.29327	0.28121	0.26815	0.25843	0.24796	0.23993	0.23132	0.21746	0.20577	0.19596	0.18751	0.18003	0.17365	0.16795	0.16313	0.15897	0.15480	0.15170	0.14822	0.14568
4.4	3.55	0.30481	0.29232	0.27878	0.26871	0.25785	0.24953	0.24060	0.22622	0.21409	0.20392	0.19514	0.18738	0.18076	0.17484	0.16983	0.16551	0.16119	0.15797	0.15435	0.15171
4.5	3.63	0.31654	0.30361	0.28959	0.27915	0.26790	0.25928	0.25003	0.23513	0.22256	0.21201	0.20291	0.19485	0.18799	0.18185	0.17666	0.17217	0.16768	0.16435	0.16059	0.15785
4.6	3.71	0.32845	0.31507	0.30056	0.28976	0.27812	0.26919	0.25961	0.24418	0.23116	0.22023	0.21080	0.20246	0.19535	0.18898	0.18360	0.17895	0.17430	0.17084	0.16694	0.16410
4.7	3.79	0.29169	0.28219	0.27198	0.26404	0.25554	0.24867	0.24134	0.22940	0.21910	0.21020	0.20238	0.19572	0.18975	0.18430	0.17993	0.17564	0.17169	0.16840	0.16515	0.16274

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" Uponor PEX-a — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.40	0.01058	0.00995	0.00928	0.00878	0.00826	0.00786	0.00745	0.00680	0.00626	0.00582	0.00545	0.00514	0.00487	0.00464	0.00444	0.00427	0.00411	0.00397	0.00385	0.00374
0.6	0.48	0.01402	0.01320	0.01233	0.01169	0.01101	0.01050	0.00996	0.00911	0.00841	0.00784	0.00735	0.00694	0.00659	0.00628	0.00602	0.00579	0.00558	0.00539	0.00524	0.00509
0.7	0.56	0.01781	0.01679	0.01571	0.01491	0.01407	0.01343	0.01275	0.01169	0.01081	0.01009	0.00948	0.00896	0.00852	0.00813	0.00779	0.00750	0.00723	0.00700	0.00680	0.00661
0.8	0.65	0.02194	0.02071	0.01940	0.01844	0.01741	0.01664	0.01582	0.01452	0.01346	0.01257	0.01182	0.01119	0.01064	0.01017	0.00975	0.00940	0.00907	0.00877	0.00853	0.00830
0.9	0.73	0.02640	0.02495	0.02340	0.02225	0.02104	0.02012	0.01914	0.01760	0.01633	0.01527	0.01438	0.01362	0.01296	0.01239	0.01190	0.01147	0.01107	0.01072	0.01043	0.01015
1.0	0.81	0.03118	0.02949	0.02768	0.02635	0.02493	0.02386	0.02272	0.02092	0.01942	0.01818	0.01714	0.01624	0.01547	0.01480	0.01422	0.01371	0.01324	0.01283	0.01249	0.01215
1.1	0.89	0.03626	0.03432	0.03225	0.03072	0.02909	0.02785	0.02654	0.02446	0.02274	0.02130	0.02010	0.01906	0.01817	0.01739	0.01671	0.01612	0.01558	0.01509	0.01470	0.01431
1.2	0.97	0.04164	0.03944	0.03709	0.03535	0.03350	0.03209	0.03060	0.02823	0.02627	0.02463	0.02325	0.02206	0.02104	0.02015	0.01937	0.01870	0.01808	0.01752	0.01706	0.01662
1.3	1.05	0.04731	0.04484	0.04220	0.04025	0.03816	0.03657	0.03489	0.03222	0.03000	0.02815	0.02659	0.02525	0.02409	0.02308	0.02220	0.02143	0.02073	0.02009	0.01958	0.01907
1.4	1.13	0.05327	0.05052	0.04758	0.04539	0.04306	0.04129	0.03941	0.03643	0.03394	0.03187	0.03012	0.02861	0.02731	0.02617	0.02519	0.02433	0.02353	0.02282	0.02224	0.02167
1.5	1.21	0.05950	0.05646	0.05320	0.05079	0.04820	0.04624	0.04415	0.04084	0.03809	0.03578	0.03383	0.03215	0.03070	0.02944	0.02834	0.02738	0.02649	0.02570	0.02505	0.02441
1.6	1.29	0.06601	0.06267	0.05908	0.05642	0.05358	0.05142	0.04912	0.04547	0.04242	0.03988	0.03772	0.03587	0.03426	0.03286	0.03164	0.03058	0.02960	0.02872	0.02800	0.02729
1.7	1.37	0.07278	0.06913	0.06521	0.06230	0.05919	0.05682	0.05430	0.05030	0.04696	0.04416	0.04179	0.03975	0.03799	0.03645	0.03511	0.03393	0.03285	0.03188	0.03109	0.03031
1.8	1.45	0.07982	0.07585	0.07158	0.06842	0.06502	0.06244	0.05969	0.05533	0.05168	0.04862	0.04603	0.04380	0.04188	0.04019	0.03872	0.03744	0.03625	0.03519	0.03432	0.03347
1.9	1.53	0.08712	0.08282	0.07820	0.07476	0.07108	0.06828	0.06530	0.06055	0.05659	0.05327	0.05045	0.04802	0.04592	0.04408	0.04248	0.04109	0.03979	0.03863	0.03768	0.03676
2.0	1.61	0.09467	0.09003	0.08504	0.08133	0.07736	0.07434	0.07111	0.06598	0.06169	0.05809	0.05504	0.05241	0.05013	0.04813	0.04640	0.04488	0.04348	0.04222	0.04119	0.04018
2.1	1.69	0.10248	0.09749	0.09213	0.08813	0.08385	0.08060	0.07712	0.07159	0.06697	0.06308	0.05979	0.05695	0.05449	0.05234	0.05046	0.04882	0.04730	0.04594	0.04482	0.04373
2.2	1.77	0.11053	0.10519	0.09944	0.09516	0.09056	0.08707	0.08334	0.07740	0.07243	0.06825	0.06471	0.06166	0.05901	0.05669	0.05467	0.05290	0.05126	0.04980	0.04859	0.04742
2.3	1.86	0.11883	0.11312	0.10698	0.10240	0.09749	0.09375	0.08976	0.08340	0.07807	0.07360	0.06980	0.06652	0.06368	0.06119	0.05902	0.05712	0.05536	0.05379	0.05249	0.05123
2.4	1.94	0.12737	0.12129	0.11474	0.10986	0.10462	0.10064	0.09637	0.08958	0.08389	0.07911	0.07505	0.07154	0.06850	0.06583	0.06351	0.06148	0.05960	0.05791	0.05653	0.05517
2.5	2.02	0.13616	0.12969	0.12273	0.11754	0.11196	0.10772	0.10318	0.09595	0.08989	0.08479	0.08046	0.07672	0.07348	0.07063	0.06815	0.06598	0.06397	0.06217	0.06069	0.05924
2.6	2.10	0.14518	0.13832	0.13093	0.12543	0.11951	0.11500	0.11018	0.10250	0.09605	0.09063	0.08603	0.08205	0.07860	0.07556	0.07293	0.07061	0.06847	0.06655	0.06498	0.06344
2.7	2.18	0.15443	0.14718	0.13936	0.13353	0.12726	0.12249	0.11738	0.10923	0.10240	0.09664	0.09175	0.08753	0.08387	0.08065	0.07784	0.07538	0.07311	0.07107	0.06939	0.06776
2.8	2.26	0.16392	0.15626	0.14800	0.14183	0.13521	0.13016	0.12476	0.11614	0.10891	0.10282	0.09764	0.09316	0.08928	0.08587	0.08290	0.08029	0.07788	0.07571	0.07393	0.07220
2.9	2.34	0.17364	0.16556	0.15685	0.15035	0.14336	0.13804	0.13233	0.12323	0.11559	0.10915	0.10368	0.09895	0.09484	0.09123	0.08809	0.08533	0.08278	0.08048	0.07860	0.07676
3.0	2.42	0.18358	0.17509	0.16592	0.15907	0.15171	0.14610	0.14009	0.13050	0.12244	0.11565	0.10988	0.10488	0.10055	0.09673	0.09341	0.09050	0.08781	0.08538	0.08339	0.08145
3.1	2.50	0.19376	0.18483	0.17519	0.16800	0.16025	0.15436	0.14803	0.13794	0.12946	0.12231	0.11623	0.11096	0.10640	0.10238	0.09888	0.09581	0.09296	0.09040	0.08831	0.08626
3.2	2.58	0.20416	0.19479	0.18468	0.17712	0.16899	0.16280	0.15616	0.14556	0.13664	0.12912	0.12273	0.11719	0.11239	0.10816	0.10447	0.10124	0.09825	0.09555	0.09335	0.09119
3.3	2.66	0.21478	0.20496	0.19437	0.18645	0.17793	0.17143	0.16447	0.15334	0.14399	0.13610	0.12938	0.12357	0.11852	0.11407	0.11020	0.10680	0.10366	0.10083	0.09851	0.09624
3.4	2.74	0.22562	0.21535	0.20426	0.19597	0.18705	0.18025	0.17296	0.16130	0.15150	0.14323	0.13618	0.13008	0.12479	0.12013	0.11606	0.11250	0.10920	0.10622	0.10379	0.10140
3.5	2.82	0.23668	0.22595	0.21436	0.20570	0.19637	0.18926	0.18163	0.16943	0.15917	0.15051	0.14314	0.13675	0.13120	0.12632	0.12206	0.11832	0.11486	0.11174	0.10919	0.10669
3.6	2.90	0.24795	0.23676	0.22466	0.21562	0.20587	0.19845	0.19047	0.17773	0.16700	0.15795	0.15024	0.14355	0.13775	0.13264	0.12818	0.12427	0.12065	0.11738	0.11471	0.11209
3.7	2.98	0.25945	0.24778	0.23516	0.22573	0.21557	0.20782	0.19950	0.18620	0.17500	0.16554	0.15748	0.15050	0.14444	0.13909	0.13444	0.13035	0.12656	0.12315	0.12035	0.11761

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

⅝" **Uponor PEX-a** — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.8	3.07	0.27115	0.25900	0.24586	0.23603	0.22545	0.21737	0.20870	0.19483	0.18315	0.17328	0.16488	0.15759	0.15126	0.14568	0.14082	0.13655	0.13259	0.12903	0.12611	0.12325
3.9	3.15	0.28307	0.27043	0.25676	0.24653	0.23551	0.22710	0.21807	0.20363	0.19146	0.18118	0.17242	0.16482	0.15822	0.15241	0.14733	0.14288	0.13875	0.13503	0.13198	0.12900
4.0	3.23	0.29520	0.28207	0.26786	0.25722	0.24576	0.23701	0.22762	0.21259	0.19992	0.18922	0.18010	0.17219	0.16532	0.15926	0.15397	0.14933	0.14503	0.14116	0.13798	0.13487
4.1	3.31	0.30755	0.29391	0.27915	0.26810	0.25619	0.24710	0.23734	0.22172	0.20855	0.19742	0.18793	0.17970	0.17255	0.16624	0.16074	0.15591	0.15143	0.14740	0.14409	0.14085
4.2	3.39	0.32010	0.30595	0.29063	0.27917	0.26680	0.25737	0.24723	0.23101	0.21733	0.20576	0.19590	0.18735	0.17991	0.17335	0.16763	0.16261	0.15795	0.15376	0.15031	0.14695
4.3	3.47	0.33285	0.31819	0.30231	0.29042	0.27760	0.26781	0.25729	0.24046	0.22626	0.21426	0.20401	0.19513	0.18741	0.18060	0.17465	0.16943	0.16460	0.16023	0.15666	0.15316
4.4	3.55	0.34582	0.33063	0.31418	0.30186	0.28857	0.27843	0.26753	0.25007	0.23535	0.22290	0.21227	0.20305	0.19504	0.18797	0.18180	0.17638	0.17136	0.16683	0.16311	0.15948

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" Uponor PEX-a — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.55	0.00393	0.00370	0.00344	0.00336	0.00328	0.00321	0.00314	0.00302	0.00291	0.00282	0.00274	0.00266	0.00259	0.00253	0.00248	0.00243	0.00238	0.00234	0.00230	0.00226
0.6	0.66	0.00532	0.00502	0.00468	0.00457	0.00446	0.00437	0.00427	0.00411	0.00397	0.00385	0.00374	0.00364	0.00355	0.00347	0.00339	0.00332	0.00326	0.00320	0.00315	0.00310
0.7	0.77	0.00688	0.00650	0.00606	0.00593	0.00579	0.00567	0.00555	0.00535	0.00517	0.00501	0.00487	0.00474	0.00462	0.00452	0.00442	0.00434	0.00426	0.00418	0.00412	0.00405
0.8	0.88	0.00861	0.00813	0.00760	0.00744	0.00726	0.00712	0.00697	0.00672	0.00650	0.00630	0.00612	0.00597	0.00582	0.00570	0.00558	0.00547	0.00537	0.00528	0.00519	0.00511
0.9	0.99	0.01050	0.00993	0.00929	0.00909	0.00888	0.00871	0.00853	0.00822	0.00795	0.00772	0.00750	0.00731	0.00714	0.00699	0.00684	0.00671	0.00659	0.00648	0.00638	0.00628
1.0	1.10	0.01254	0.01187	0.01111	0.01088	0.01063	0.01043	0.01022	0.00985	0.00954	0.00925	0.00900	0.00878	0.00857	0.00839	0.00822	0.00806	0.00792	0.00779	0.00767	0.00755
1.1	1.21	0.01473	0.01395	0.01308	0.01280	0.01251	0.01228	0.01203	0.01161	0.01124	0.01091	0.01062	0.01036	0.01012	0.00990	0.00970	0.00952	0.00935	0.00920	0.00906	0.00893
1.2	1.32	0.01707	0.01618	0.01517	0.01486	0.01453	0.01426	0.01397	0.01349	0.01307	0.01269	0.01235	0.01205	0.01177	0.01152	0.01130	0.01109	0.01089	0.01072	0.01055	0.01040
1.3	1.43	0.01956	0.01854	0.01740	0.01704	0.01667	0.01636	0.01604	0.01549	0.01501	0.01458	0.01419	0.01385	0.01354	0.01325	0.01299	0.01276	0.01253	0.01233	0.01215	0.01197
1.4	1.54	0.02218	0.02104	0.01976	0.01936	0.01894	0.01859	0.01823	0.01761	0.01706	0.01658	0.01615	0.01576	0.01541	0.01509	0.01479	0.01452	0.01427	0.01405	0.01384	0.01364
1.5	1.65	0.02495	0.02368	0.02225	0.02180	0.02133	0.02094	0.02054	0.01984	0.01924	0.01869	0.01821	0.01777	0.01738	0.01702	0.01669	0.01639	0.01611	0.01586	0.01562	0.01540
1.6	1.76	0.02786	0.02645	0.02486	0.02436	0.02384	0.02341	0.02296	0.02219	0.02152	0.02092	0.02038	0.01990	0.01946	0.01906	0.01869	0.01836	0.01805	0.01777	0.01751	0.01726
1.7	1.87	0.03090	0.02934	0.02760	0.02705	0.02647	0.02600	0.02550	0.02466	0.02391	0.02325	0.02266	0.02212	0.02164	0.02120	0.02079	0.02043	0.02008	0.01977	0.01948	0.01921
1.8	1.98	0.03407	0.03237	0.03046	0.02985	0.02922	0.02870	0.02816	0.02723	0.02642	0.02569	0.02504	0.02445	0.02392	0.02344	0.02299	0.02259	0.02221	0.02187	0.02155	0.02125
1.9	2.09	0.03737	0.03552	0.03344	0.03278	0.03209	0.03152	0.03093	0.02992	0.02903	0.02823	0.02752	0.02688	0.02630	0.02577	0.02529	0.02485	0.02443	0.02406	0.02371	0.02338
2.0	2.20	0.04081	0.03880	0.03654	0.03582	0.03507	0.03446	0.03382	0.03271	0.03174	0.03088	0.03011	0.02941	0.02878	0.02821	0.02768	0.02720	0.02674	0.02634	0.02596	0.02561
2.1	2.31	0.04437	0.04220	0.03975	0.03898	0.03817	0.03751	0.03681	0.03562	0.03457	0.03363	0.03280	0.03204	0.03135	0.03073	0.03016	0.02964	0.02915	0.02871	0.02830	0.02792
2.2	2.43	0.04807	0.04573	0.04309	0.04225	0.04138	0.04066	0.03991	0.03863	0.03750	0.03648	0.03558	0.03477	0.03403	0.03336	0.03274	0.03218	0.03165	0.03117	0.03073	0.03032
2.3	2.54	0.05188	0.04937	0.04654	0.04564	0.04470	0.04393	0.04313	0.04174	0.04053	0.03944	0.03847	0.03759	0.03680	0.03608	0.03541	0.03481	0.03424	0.03373	0.03325	0.03280
2.4	2.65	0.05583	0.05314	0.05010	0.04914	0.04814	0.04731	0.04645	0.04497	0.04366	0.04250	0.04146	0.04051	0.03966	0.03889	0.03818	0.03753	0.03692	0.03637	0.03586	0.03538
2.5	2.76	0.05989	0.05702	0.05378	0.05276	0.05168	0.05080	0.04988	0.04829	0.04690	0.04565	0.04454	0.04353	0.04262	0.04180	0.04103	0.04034	0.03968	0.03910	0.03855	0.03804
2.6	2.87	0.06408	0.06102	0.05757	0.05648	0.05534	0.05439	0.05341	0.05172	0.05023	0.04891	0.04772	0.04665	0.04567	0.04479	0.04398	0.04324	0.04254	0.04191	0.04133	0.04078
2.7	2.98	0.06839	0.06514	0.06147	0.06031	0.05910	0.05810	0.05705	0.05525	0.05367	0.05226	0.05100	0.04985	0.04882	0.04788	0.04702	0.04623	0.04548	0.04482	0.04419	0.04361
2.8	3.09	0.07283	0.06938	0.06549	0.06426	0.06297	0.06190	0.06079	0.05889	0.05721	0.05571	0.05437	0.05316	0.05206	0.05106	0.05014	0.04930	0.04852	0.04781	0.04714	0.04653
2.9	3.20	0.07738	0.07373	0.06961	0.06831	0.06694	0.06582	0.06464	0.06262	0.06085	0.05926	0.05784	0.05655	0.05539	0.05433	0.05336	0.05247	0.05163	0.05088	0.05018	0.04953
3.0	3.31	0.08205	0.07820	0.07384	0.07247	0.07102	0.06983	0.06859	0.06646	0.06458	0.06290	0.06140	0.06004	0.05881	0.05769	0.05666	0.05572	0.05484	0.05404	0.05330	0.05261
3.1	3.42	0.08683	0.08277	0.07818	0.07673	0.07521	0.07396	0.07265	0.07040	0.06841	0.06664	0.06506	0.06362	0.06232	0.06114	0.06005	0.05906	0.05813	0.05729	0.05650	0.05577
3.2	3.53	0.09174	0.08747	0.08263	0.08110	0.07950	0.07818	0.07680	0.07443	0.07234	0.07047	0.06880	0.06729	0.06592	0.06468	0.06353	0.06248	0.06150	0.06061	0.05979	0.05902
3.3	3.64	0.09676	0.09227	0.08719	0.08558	0.08390	0.08251	0.08106	0.07856	0.07636	0.07440	0.07264	0.07105	0.06961	0.06830	0.06709	0.06600	0.06496	0.06403	0.06316	0.06235
3.4	3.75	0.10190	0.09718	0.09185	0.09016	0.08839	0.08694	0.08541	0.08279	0.08048	0.07842	0.07658	0.07490	0.07339	0.07202	0.07075	0.06959	0.06850	0.06752	0.06661	0.06576
3.5	3.86	0.10715	0.10221	0.09662	0.09485	0.09299	0.09147	0.08987	0.08712	0.08470	0.08253	0.08060	0.07884	0.07726	0.07582	0.07448	0.07327	0.07213	0.07110	0.07014	0.06925
3.6	3.97	0.11252	0.10734	0.10149	0.09964	0.09770	0.09610	0.09442	0.09155	0.08901	0.08674	0.08472	0.08288	0.08121	0.07970	0.07831	0.07704	0.07584	0.07476	0.07376	0.07282
3.7	4.08	0.11799	0.11259	0.10647	0.10453	0.10250	0.10083	0.09908	0.09607	0.09341	0.09104	0.08892	0.08700	0.08526	0.08368	0.08221	0.08089	0.07963	0.07850	0.07745	0.07647

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 100% Water — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.8	4.19	0.12359	0.11794	0.11155	0.10953	0.10741	0.10566	0.10383	0.10069	0.09791	0.09543	0.09322	0.09121	0.08939	0.08773	0.08621	0.08482	0.08351	0.08233	0.08123	0.08020
3.9	4.30	0.12929	0.12340	0.11674	0.11463	0.11241	0.11059	0.10868	0.10540	0.10250	0.09991	0.09760	0.09550	0.09360	0.09188	0.09028	0.08883	0.08746	0.08623	0.08509	0.08401
4.0	4.41	0.13511	0.12897	0.12203	0.11983	0.11752	0.11562	0.11363	0.11021	0.10719	0.10449	0.10208	0.09989	0.09791	0.09611	0.09444	0.09293	0.09150	0.09022	0.08902	0.08790
4.1	4.52	0.14103	0.13465	0.12742	0.12513	0.12272	0.12074	0.11867	0.11511	0.11196	0.10915	0.10664	0.10436	0.10230	0.10042	0.09869	0.09711	0.09562	0.09429	0.09304	0.09187
4.2	4.63	0.14707	0.14043	0.13291	0.13053	0.12803	0.12596	0.12381	0.12010	0.11683	0.11391	0.11129	0.10892	0.10677	0.10482	0.10302	0.10137	0.09983	0.09843	0.09713	0.09592
4.3	4.74	0.15322	0.14632	0.13850	0.13603	0.13343	0.13129	0.12904	0.12519	0.12179	0.11875	0.11603	0.11356	0.11133	0.10930	0.10743	0.10572	0.10411	0.10266	0.10131	0.10005
4.4	4.85	0.15947	0.15231	0.14420	0.14163	0.13893	0.13670	0.13438	0.13038	0.12684	0.12368	0.12086	0.11829	0.11597	0.11387	0.11192	0.11014	0.10847	0.10696	0.10556	0.10425
4.5	4.96	0.16584	0.15841	0.14999	0.14733	0.14452	0.14222	0.13980	0.13565	0.13198	0.12870	0.12578	0.12311	0.12070	0.11852	0.11649	0.11465	0.11291	0.11135	0.10989	0.10853
4.6	5.07	0.17231	0.16462	0.15589	0.15312	0.15022	0.14783	0.14532	0.14102	0.13722	0.13381	0.13078	0.12801	0.12552	0.12325	0.12115	0.11924	0.11744	0.11581	0.11430	0.11289
4.7	5.18	0.17890	0.17092	0.16188	0.15902	0.15601	0.15353	0.15094	0.14648	0.14254	0.13901	0.13587	0.13300	0.13041	0.12806	0.12589	0.12391	0.12204	0.12036	0.11879	0.11733
4.8	5.29	0.18558	0.17733	0.16798	0.16501	0.16190	0.15933	0.15664	0.15203	0.14795	0.14430	0.14104	0.13807	0.13539	0.13296	0.13070	0.12865	0.12672	0.12498	0.12336	0.12184
4.9	5.40	0.19238	0.18385	0.17417	0.17110	0.16788	0.16523	0.16245	0.15767	0.15345	0.14967	0.14630	0.14323	0.14046	0.13794	0.13560	0.13348	0.13148	0.12968	0.12800	0.12643
5.0	5.51	0.19928	0.19046	0.18046	0.17729	0.17396	0.17121	0.16834	0.16340	0.15904	0.15513	0.15165	0.14847	0.14560	0.14300	0.14058	0.13839	0.13632	0.13445	0.13272	0.13109
5.1	5.62	0.20629	0.19718	0.18685	0.18357	0.18013	0.17730	0.17433	0.16923	0.16472	0.16068	0.15708	0.15380	0.15083	0.14814	0.14564	0.14337	0.14123	0.13931	0.13751	0.13584
5.2	5.73	0.21340	0.20400	0.19334	0.18995	0.18640	0.18347	0.18041	0.17514	0.17048	0.16631	0.16259	0.15921	0.15614	0.15336	0.15078	0.14844	0.14623	0.14424	0.14239	0.14065
5.3	5.84	0.22062	0.21092	0.19992	0.19643	0.19276	0.18974	0.18658	0.18114	0.17634	0.17203	0.16819	0.16470	0.16154	0.15866	0.15600	0.15358	0.15130	0.14925	0.14733	0.14555
5.4	5.95	0.22795	0.21795	0.20660	0.20300	0.19922	0.19611	0.19284	0.18723	0.18228	0.17784	0.17388	0.17027	0.16701	0.16405	0.16130	0.15881	0.15645	0.15433	0.15236	0.15051
5.5	6.06	0.23538	0.22507	0.21338	0.20967	0.20577	0.20256	0.19920	0.19342	0.18831	0.18373	0.17965	0.17593	0.17257	0.16951	0.16668	0.16411	0.16168	0.15949	0.15746	0.15556
5.6	6.17	0.24291	0.23230	0.22025	0.21643	0.21242	0.20911	0.20564	0.19969	0.19442	0.18971	0.18550	0.18167	0.17820	0.17505	0.17214	0.16949	0.16699	0.16473	0.16263	0.16067
5.7	6.28	0.25054	0.23962	0.22722	0.22329	0.21915	0.21575	0.21218	0.20605	0.20063	0.19577	0.19144	0.18749	0.18392	0.18068	0.17768	0.17495	0.17237	0.17005	0.16789	0.16587
5.8	6.39	0.25828	0.24704	0.23428	0.23024	0.22598	0.22248	0.21881	0.21250	0.20692	0.20192	0.19746	0.19339	0.18972	0.18638	0.18329	0.18048	0.17783	0.17544	0.17321	0.17113
5.9	6.50	0.26613	0.25457	0.24144	0.23728	0.23291	0.22930	0.22553	0.21903	0.21329	0.20815	0.20356	0.19938	0.19560	0.19216	0.18899	0.18609	0.18336	0.18090	0.17861	0.17647

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.55	0.00578	0.00553	0.00526	0.00506	0.00485	0.00467	0.00449	0.00420	0.00396	0.00375	0.00357	0.00342	0.00328	0.00316	0.00307	0.00297	0.00289	0.00282	0.00275	0.00269
0.6	0.66	0.00775	0.00742	0.00707	0.00681	0.00653	0.00630	0.00606	0.00568	0.00536	0.00508	0.00485	0.00464	0.00447	0.00430	0.00418	0.00405	0.00394	0.00384	0.00375	0.00368
0.7	0.77	0.00994	0.00953	0.00910	0.00876	0.00841	0.00812	0.00782	0.00734	0.00693	0.00658	0.00628	0.00603	0.00580	0.00559	0.00543	0.00527	0.00512	0.00500	0.00488	0.00480
0.8	0.88	0.01235	0.01185	0.01132	0.01091	0.01048	0.01013	0.00977	0.00917	0.00867	0.00824	0.00787	0.00755	0.00727	0.00702	0.00682	0.00662	0.00644	0.00629	0.00615	0.00604
0.9	0.99	0.01497	0.01438	0.01374	0.01325	0.01274	0.01232	0.01188	0.01117	0.01057	0.01006	0.00961	0.00923	0.00889	0.00859	0.00834	0.00811	0.00789	0.00771	0.00753	0.00740
1.0	1.10	0.01779	0.01709	0.01635	0.01578	0.01517	0.01469	0.01417	0.01334	0.01263	0.01202	0.01149	0.01104	0.01064	0.01028	0.01000	0.00972	0.00946	0.00925	0.00904	0.00888
1.1	1.21	0.02081	0.02000	0.01915	0.01849	0.01778	0.01722	0.01662	0.01566	0.01483	0.01413	0.01351	0.01299	0.01253	0.01211	0.01178	0.01145	0.01115	0.01090	0.01066	0.01048
1.2	1.32	0.02402	0.02310	0.02212	0.02137	0.02056	0.01992	0.01924	0.01813	0.01719	0.01638	0.01568	0.01508	0.01455	0.01407	0.01368	0.01331	0.01296	0.01268	0.01239	0.01219
1.3	1.43	0.02741	0.02638	0.02527	0.02442	0.02351	0.02278	0.02201	0.02076	0.01969	0.01877	0.01797	0.01730	0.01669	0.01615	0.01571	0.01528	0.01489	0.01456	0.01424	0.01401
1.4	1.54	0.03099	0.02983	0.02860	0.02764	0.02662	0.02581	0.02494	0.02353	0.02233	0.02130	0.02040	0.01964	0.01896	0.01835	0.01785	0.01737	0.01693	0.01656	0.01620	0.01593
1.5	1.65	0.03475	0.03346	0.03209	0.03103	0.02990	0.02898	0.02802	0.02646	0.02512	0.02397	0.02296	0.02212	0.02136	0.02067	0.02012	0.01958	0.01909	0.01868	0.01827	0.01797
1.6	1.76	0.03869	0.03727	0.03575	0.03457	0.03333	0.03232	0.03125	0.02952	0.02804	0.02677	0.02566	0.02471	0.02387	0.02311	0.02250	0.02190	0.02135	0.02090	0.02045	0.02012
1.7	1.87	0.04280	0.04124	0.03957	0.03828	0.03691	0.03580	0.03463	0.03273	0.03110	0.02970	0.02847	0.02744	0.02651	0.02567	0.02499	0.02433	0.02373	0.02323	0.02273	0.02236
1.8	1.98	0.04708	0.04538	0.04356	0.04215	0.04065	0.03944	0.03815	0.03607	0.03429	0.03276	0.03142	0.03028	0.02926	0.02834	0.02760	0.02688	0.02621	0.02566	0.02512	0.02472
1.9	2.09	0.05153	0.04968	0.04770	0.04617	0.04454	0.04322	0.04182	0.03956	0.03761	0.03594	0.03448	0.03324	0.03213	0.03113	0.03032	0.02953	0.02881	0.02820	0.02761	0.02717
2.0	2.20	0.05615	0.05415	0.05200	0.05034	0.04858	0.04715	0.04564	0.04318	0.04107	0.03926	0.03767	0.03633	0.03512	0.03403	0.03315	0.03229	0.03151	0.03085	0.03020	0.02973
2.1	2.31	0.06093	0.05877	0.05646	0.05467	0.05276	0.05122	0.04959	0.04693	0.04466	0.04270	0.04098	0.03953	0.03822	0.03704	0.03609	0.03516	0.03431	0.03360	0.03290	0.03238
2.2	2.43	0.06587	0.06355	0.06107	0.05915	0.05709	0.05544	0.05368	0.05082	0.04837	0.04626	0.04441	0.04284	0.04144	0.04016	0.03914	0.03814	0.03722	0.03645	0.03570	0.03514
2.3	2.54	0.07098	0.06849	0.06583	0.06377	0.06157	0.05980	0.05791	0.05484	0.05221	0.04994	0.04796	0.04627	0.04476	0.04339	0.04229	0.04122	0.04023	0.03940	0.03859	0.03799
2.4	2.65	0.07624	0.07359	0.07075	0.06854	0.06619	0.06429	0.06227	0.05899	0.05618	0.05375	0.05162	0.04982	0.04820	0.04673	0.04555	0.04440	0.04334	0.04246	0.04159	0.04094
2.5	2.76	0.08166	0.07884	0.07581	0.07346	0.07095	0.06892	0.06677	0.06327	0.06027	0.05767	0.05540	0.05348	0.05175	0.05018	0.04892	0.04769	0.04655	0.04561	0.04468	0.04399
2.6	2.87	0.08724	0.08424	0.08102	0.07852	0.07585	0.07370	0.07140	0.06768	0.06448	0.06172	0.05930	0.05725	0.05541	0.05373	0.05239	0.05108	0.04987	0.04886	0.04787	0.04713
2.7	2.98	0.09297	0.08979	0.08637	0.08372	0.08089	0.07860	0.07617	0.07222	0.06881	0.06588	0.06331	0.06113	0.05917	0.05739	0.05597	0.05457	0.05328	0.05221	0.05115	0.05037
2.8	3.09	0.09886	0.09548	0.09187	0.08906	0.08606	0.08364	0.08106	0.07688	0.07327	0.07016	0.06744	0.06512	0.06305	0.06116	0.05964	0.05816	0.05680	0.05566	0.05454	0.05371
2.9	3.20	0.10489	0.10133	0.09751	0.09454	0.09138	0.08882	0.08609	0.08166	0.07785	0.07456	0.07168	0.06923	0.06703	0.06503	0.06342	0.06185	0.06041	0.05920	0.05801	0.05713
3.0	3.31	0.11108	0.10732	0.10330	0.10017	0.09682	0.09412	0.09125	0.08657	0.08254	0.07907	0.07603	0.07344	0.07111	0.06900	0.06731	0.06565	0.06412	0.06284	0.06159	0.06065
3.1	3.42	0.11742	0.11346	0.10922	0.10593	0.10241	0.09956	0.09653	0.09160	0.08736	0.08370	0.08049	0.07776	0.07531	0.07308	0.07129	0.06954	0.06792	0.06658	0.06525	0.06427
3.2	3.53	0.12390	0.11975	0.11529	0.11182	0.10812	0.10513	0.10194	0.09676	0.09229	0.08844	0.08506	0.08218	0.07960	0.07725	0.07537	0.07352	0.07183	0.07041	0.06901	0.06797
3.3	3.64	0.13053	0.12617	0.12149	0.11785	0.11397	0.11083	0.10748	0.10203	0.09734	0.09329	0.08974	0.08672	0.08400	0.08153	0.07955	0.07761	0.07582	0.07433	0.07286	0.07177
3.4	3.75	0.13731	0.13274	0.12784	0.12402	0.11995	0.11665	0.11314	0.10743	0.10251	0.09826	0.09453	0.09135	0.08851	0.08591	0.08383	0.08179	0.07992	0.07835	0.07681	0.07566
3.5	3.86	0.14423	0.13945	0.13432	0.13032	0.12606	0.12261	0.11893	0.11295	0.10779	0.10333	0.09942	0.09610	0.09311	0.09039	0.08821	0.08607	0.08410	0.08246	0.08084	0.07964
3.6	3.97	0.15130	0.14630	0.14093	0.13676	0.13230	0.12869	0.12484	0.11858	0.11318	0.10852	0.10443	0.10095	0.09782	0.09497	0.09269	0.09045	0.08839	0.08667	0.08497	0.08371
3.7	4.08	0.15851	0.15329	0.14768	0.14332	0.13866	0.13489	0.13088	0.12434	0.11869	0.11382	0.10954	0.10590	0.10263	0.09965	0.09726	0.09492	0.09276	0.09096	0.08918	0.08787
3.8	4.19	0.16586	0.16042	0.15457	0.15002	0.14516	0.14123	0.13703	0.13021	0.12432	0.11923	0.11476	0.11096	0.10754	0.10443	0.10193	0.09949	0.09723	0.09535	0.09349	0.09212

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 30% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
3.9	4.30	0.17335	0.16768	0.16159	0.15685	0.15178	0.14768	0.14331	0.13619	0.13005	0.12474	0.12008	0.11612	0.11255	0.10930	0.10670	0.10415	0.10179	0.09983	0.09789	0.09645
4.0	4.41	0.18099	0.17508	0.16874	0.16381	0.15853	0.15426	0.14971	0.14230	0.13590	0.13037	0.12551	0.12138	0.11766	0.11428	0.11156	0.10890	0.10645	0.10440	0.10238	0.10088
4.1	4.52	0.18876	0.18262	0.17603	0.17090	0.16541	0.16097	0.15623	0.14852	0.14186	0.13610	0.13105	0.12674	0.12287	0.11935	0.11652	0.11375	0.11119	0.10906	0.10695	0.10539
4.2	4.63	0.19667	0.19029	0.18345	0.17811	0.17241	0.16779	0.16287	0.15485	0.14793	0.14194	0.13668	0.13221	0.12818	0.12452	0.12157	0.11869	0.11603	0.11381	0.11162	0.10999
4.3	4.74	0.20472	0.19810	0.19099	0.18546	0.17954	0.17474	0.16963	0.16130	0.15411	0.14789	0.14243	0.13777	0.13359	0.12978	0.12672	0.12372	0.12096	0.11865	0.11637	0.11468
4.4	4.85	0.21291	0.20604	0.19867	0.19293	0.18679	0.18181	0.17651	0.16787	0.16040	0.15394	0.14827	0.14344	0.13910	0.13514	0.13196	0.12885	0.12597	0.12358	0.12121	0.11946
4.5	4.96	0.22123	0.21412	0.20648	0.20053	0.19416	0.18900	0.18350	0.17454	0.16680	0.16010	0.15422	0.14921	0.14470	0.14059	0.13730	0.13406	0.13108	0.12860	0.12614	0.12432
4.6	5.07	0.22969	0.22233	0.21441	0.20825	0.20165	0.19631	0.19062	0.18133	0.17331	0.16637	0.16027	0.15507	0.15040	0.14614	0.14273	0.13937	0.13628	0.13370	0.13115	0.12927
4.7	5.18	0.23828	0.23066	0.22248	0.21610	0.20927	0.20374	0.19785	0.18823	0.17992	0.17274	0.16642	0.16104	0.15620	0.15179	0.14825	0.14477	0.14157	0.13890	0.13625	0.13430
4.8	5.29	0.24701	0.23913	0.23067	0.22407	0.21701	0.21129	0.20519	0.19525	0.18665	0.17921	0.17267	0.16710	0.16209	0.15753	0.15386	0.15026	0.14695	0.14418	0.14144	0.13942
4.9	5.40	0.25587	0.24774	0.23899	0.23217	0.22487	0.21896	0.21265	0.20237	0.19348	0.18579	0.17903	0.17327	0.16808	0.16336	0.15957	0.15584	0.15241	0.14955	0.14672	0.14462
5.0	5.51	0.26487	0.25647	0.24743	0.24039	0.23285	0.22675	0.22023	0.20961	0.20042	0.19247	0.18548	0.17953	0.17417	0.16928	0.16536	0.16151	0.15797	0.15501	0.15208	0.14991
5.1	5.62	0.27400	0.26533	0.25600	0.24873	0.24095	0.23465	0.22792	0.21695	0.20747	0.19926	0.19204	0.18588	0.18035	0.17530	0.17125	0.16727	0.16361	0.16055	0.15752	0.15528
5.2	5.73	0.28326	0.27431	0.26470	0.25720	0.24917	0.24267	0.23573	0.22441	0.21462	0.20615	0.19869	0.19234	0.18663	0.18141	0.17723	0.17312	0.16934	0.16618	0.16305	0.16074
5.3	5.84	0.29265	0.28343	0.27352	0.26579	0.25751	0.25081	0.24365	0.23197	0.22188	0.21314	0.20544	0.19889	0.19300	0.18762	0.18330	0.17906	0.17515	0.17189	0.16867	0.16628

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" Uponor PEX-a — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.55	0.00711	0.00673	0.00632	0.00601	0.00569	0.00545	0.00520	0.00479	0.00446	0.00418	0.00395	0.00375	0.00358	0.00343	0.00330	0.00320	0.00309	0.00301	0.00292	0.00286
0.6	0.66	0.00948	0.00898	0.00845	0.00805	0.00764	0.00732	0.00699	0.00646	0.00602	0.00566	0.00535	0.00508	0.00486	0.00466	0.00449	0.00435	0.00421	0.00410	0.00399	0.00390
0.7	0.77	0.01211	0.01149	0.01082	0.01033	0.00980	0.00941	0.00899	0.00832	0.00777	0.00731	0.00692	0.00658	0.00630	0.00604	0.00583	0.00565	0.00547	0.00534	0.00519	0.00508
0.8	0.88	0.01499	0.01423	0.01342	0.01282	0.01218	0.01170	0.01119	0.01037	0.00969	0.00914	0.00866	0.00824	0.00789	0.00758	0.00732	0.00709	0.00687	0.00671	0.00652	0.00639
0.9	0.99	0.01811	0.01721	0.01624	0.01553	0.01477	0.01419	0.01358	0.01261	0.01180	0.01113	0.01056	0.01005	0.00963	0.00926	0.00894	0.00867	0.00840	0.00821	0.00798	0.00782
1.0	1.10	0.02146	0.02041	0.01928	0.01845	0.01756	0.01688	0.01616	0.01502	0.01407	0.01328	0.01261	0.01202	0.01152	0.01108	0.01071	0.01039	0.01007	0.00983	0.00957	0.00938
1.1	1.21	0.02504	0.02382	0.02252	0.02156	0.02054	0.01976	0.01893	0.01761	0.01651	0.01559	0.01481	0.01413	0.01355	0.01303	0.01260	0.01223	0.01186	0.01159	0.01128	0.01106
1.2	1.32	0.02883	0.02745	0.02597	0.02488	0.02371	0.02282	0.02187	0.02036	0.01910	0.01806	0.01716	0.01638	0.01572	0.01513	0.01463	0.01420	0.01378	0.01346	0.01311	0.01285
1.3	1.43	0.03284	0.03129	0.02962	0.02838	0.02706	0.02606	0.02499	0.02328	0.02186	0.02067	0.01966	0.01877	0.01802	0.01735	0.01678	0.01630	0.01582	0.01546	0.01506	0.01477
1.4	1.54	0.03706	0.03532	0.03346	0.03208	0.03060	0.02948	0.02828	0.02637	0.02477	0.02344	0.02230	0.02130	0.02045	0.01970	0.01907	0.01852	0.01798	0.01757	0.01712	0.01679
1.5	1.65	0.04148	0.03956	0.03749	0.03596	0.03432	0.03307	0.03174	0.02961	0.02783	0.02635	0.02508	0.02397	0.02302	0.02218	0.02147	0.02086	0.02026	0.01981	0.01930	0.01893
1.6	1.76	0.04611	0.04399	0.04171	0.04002	0.03821	0.03683	0.03536	0.03301	0.03104	0.02940	0.02800	0.02677	0.02572	0.02479	0.02400	0.02333	0.02265	0.02215	0.02159	0.02118
1.7	1.87	0.05093	0.04861	0.04611	0.04426	0.04227	0.04076	0.03915	0.03656	0.03440	0.03260	0.03105	0.02969	0.02854	0.02752	0.02665	0.02590	0.02516	0.02461	0.02399	0.02354
1.8	1.98	0.05595	0.05342	0.05069	0.04867	0.04651	0.04486	0.04309	0.04027	0.03790	0.03593	0.03424	0.03275	0.03149	0.03037	0.02942	0.02860	0.02779	0.02718	0.02650	0.02601
1.9	2.09	0.06116	0.05841	0.05545	0.05326	0.05091	0.04911	0.04720	0.04412	0.04155	0.03941	0.03756	0.03594	0.03457	0.03334	0.03230	0.03141	0.03052	0.02986	0.02912	0.02858
2.0	2.20	0.06656	0.06359	0.06039	0.05802	0.05547	0.05353	0.05145	0.04813	0.04534	0.04301	0.04102	0.03926	0.03776	0.03643	0.03530	0.03434	0.03337	0.03265	0.03185	0.03126
2.1	2.31	0.07214	0.06895	0.06550	0.06295	0.06020	0.05811	0.05587	0.05228	0.04927	0.04676	0.04460	0.04269	0.04108	0.03964	0.03842	0.03737	0.03633	0.03555	0.03468	0.03404
2.2	2.43	0.07791	0.07448	0.07078	0.06804	0.06509	0.06284	0.06043	0.05657	0.05334	0.05063	0.04831	0.04626	0.04452	0.04296	0.04165	0.04052	0.03939	0.03856	0.03762	0.03693
2.3	2.54	0.08387	0.08020	0.07624	0.07330	0.07014	0.06773	0.06515	0.06101	0.05754	0.05464	0.05214	0.04994	0.04807	0.04640	0.04499	0.04378	0.04257	0.04167	0.04066	0.03992
2.4	2.65	0.09000	0.08609	0.08186	0.07872	0.07535	0.07277	0.07002	0.06559	0.06188	0.05877	0.05610	0.05375	0.05174	0.04996	0.04845	0.04715	0.04585	0.04488	0.04380	0.04301
2.5	2.76	0.09631	0.09215	0.08764	0.08430	0.08071	0.07797	0.07503	0.07031	0.06635	0.06304	0.06019	0.05767	0.05553	0.05363	0.05201	0.05062	0.04924	0.04820	0.04705	0.04620
2.6	2.87	0.10280	0.09838	0.09359	0.09005	0.08623	0.08331	0.08019	0.07517	0.07096	0.06743	0.06440	0.06172	0.05944	0.05741	0.05569	0.05421	0.05273	0.05163	0.05039	0.04949
2.7	2.98	0.10946	0.10478	0.09971	0.09595	0.09190	0.08881	0.08549	0.08017	0.07569	0.07195	0.06873	0.06588	0.06346	0.06130	0.05947	0.05790	0.05632	0.05515	0.05384	0.05288
2.8	3.09	0.11630	0.11134	0.10598	0.10200	0.09772	0.09445	0.09094	0.08530	0.08056	0.07659	0.07318	0.07016	0.06759	0.06530	0.06336	0.06169	0.06002	0.05878	0.05739	0.05637
2.9	3.20	0.12331	0.11808	0.11242	0.10822	0.10369	0.10024	0.09653	0.09057	0.08556	0.08136	0.07775	0.07456	0.07184	0.06941	0.06736	0.06559	0.06383	0.06251	0.06103	0.05996
3.0	3.31	0.13048	0.12498	0.11901	0.11459	0.10982	0.10617	0.10226	0.09598	0.09069	0.08626	0.08244	0.07907	0.07620	0.07364	0.07147	0.06960	0.06773	0.06634	0.06478	0.06364
3.1	3.42	0.13783	0.13204	0.12577	0.12111	0.11609	0.11225	0.10813	0.10151	0.09594	0.09127	0.08725	0.08369	0.08067	0.07797	0.07568	0.07371	0.07174	0.07027	0.06862	0.06742
3.2	3.53	0.14535	0.13926	0.13267	0.12778	0.12250	0.11847	0.11414	0.10718	0.10132	0.09641	0.09218	0.08843	0.08525	0.08240	0.08000	0.07792	0.07584	0.07430	0.07256	0.07129
3.3	3.64	0.15302	0.14665	0.13974	0.13460	0.12907	0.12483	0.12029	0.11298	0.10683	0.10167	0.09722	0.09329	0.08994	0.08695	0.08442	0.08223	0.08005	0.07842	0.07660	0.07526
3.4	3.75	0.16087	0.15419	0.14695	0.14157	0.13577	0.13133	0.12657	0.11891	0.11246	0.10704	0.10238	0.09825	0.09474	0.09160	0.08894	0.08665	0.08435	0.08265	0.08073	0.07933
3.5	3.86	0.16888	0.16189	0.15432	0.14869	0.14262	0.13798	0.13300	0.12497	0.11821	0.11254	0.10765	0.10333	0.09965	0.09635	0.09357	0.09116	0.08876	0.08697	0.08496	0.08349
3.6	3.97	0.17705	0.16975	0.16184	0.15596	0.14962	0.14476	0.13955	0.13116	0.12409	0.11816	0.11304	0.10852	0.10466	0.10121	0.09830	0.09578	0.09326	0.09139	0.08928	0.08774
3.7	4.08	0.18538	0.17777	0.16951	0.16337	0.15675	0.15168	0.14624	0.13748	0.13009	0.12389	0.11855	0.11382	0.10979	0.10618	0.10313	0.10050	0.09786	0.09590	0.09370	0.09209
3.8	4.19	0.19387	0.18594	0.17733	0.17093	0.16403	0.15874	0.15307	0.14393	0.13621	0.12974	0.12416	0.11922	0.11502	0.11125	0.10806	0.10531	0.10256	0.10051	0.09821	0.09652

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 40% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
3.9	4.30	0.20252	0.19426	0.18530	0.17863	0.17144	0.16594	0.16002	0.15050	0.14246	0.13571	0.12989	0.12474	0.12035	0.11642	0.11310	0.11023	0.10735	0.10522	0.10281	0.10106
4.0	4.41	0.21133	0.20274	0.19342	0.18648	0.17900	0.17327	0.16711	0.15719	0.14882	0.14180	0.13573	0.13036	0.12579	0.12169	0.11823	0.11524	0.11224	0.11002	0.10751	0.10568
4.1	4.52	0.22030	0.21137	0.20168	0.19447	0.18669	0.18073	0.17433	0.16402	0.15531	0.14799	0.14168	0.13610	0.13134	0.12707	0.12346	0.12035	0.11723	0.11491	0.11230	0.11039
4.2	4.63	0.22942	0.22015	0.21009	0.20260	0.19452	0.18833	0.18168	0.17096	0.16191	0.15431	0.14775	0.14194	0.13699	0.13255	0.12880	0.12556	0.12231	0.11990	0.11718	0.11520
4.3	4.74	0.23870	0.22908	0.21865	0.21088	0.20249	0.19606	0.18916	0.17803	0.16863	0.16074	0.15392	0.14789	0.14274	0.13813	0.13423	0.13086	0.12749	0.12498	0.12215	0.12009
4.4	4.85	0.24813	0.23816	0.22735	0.21929	0.21060	0.20393	0.19677	0.18523	0.17547	0.16728	0.16020	0.15394	0.14860	0.14381	0.13976	0.13626	0.13276	0.13015	0.12722	0.12508
4.5	4.96	0.25771	0.24739	0.23619	0.22785	0.21884	0.21193	0.20451	0.19254	0.18243	0.17393	0.16660	0.16010	0.15456	0.14959	0.14539	0.14176	0.13812	0.13542	0.13237	0.13015
4.6	5.07	0.26745	0.25677	0.24518	0.23654	0.22721	0.22006	0.21237	0.19998	0.18950	0.18070	0.17310	0.16636	0.16062	0.15547	0.15112	0.14735	0.14358	0.14078	0.13762	0.13531
4.7	5.18	0.27734	0.26630	0.25431	0.24537	0.23572	0.22832	0.22037	0.20754	0.19669	0.18758	0.17971	0.17273	0.16678	0.16145	0.15694	0.15304	0.14913	0.14623	0.14296	0.14057
4.8	5.29	0.28739	0.27597	0.26358	0.25434	0.24436	0.23671	0.22849	0.21522	0.20400	0.19457	0.18642	0.17921	0.17305	0.16753	0.16286	0.15882	0.15478	0.15177	0.14838	0.14591
4.9	5.40	0.29758	0.28579	0.27299	0.26344	0.25313	0.24523	0.23673	0.22302	0.21142	0.20167	0.19325	0.18578	0.17942	0.17371	0.16887	0.16470	0.16052	0.15740	0.15390	0.15134
5.0	5.51	0.30792	0.29575	0.28254	0.27268	0.26204	0.25388	0.24510	0.23094	0.21896	0.20889	0.20018	0.19247	0.18588	0.17998	0.17499	0.17067	0.16634	0.16313	0.15950	0.15685
5.1	5.62	0.31841	0.30586	0.29223	0.28206	0.27108	0.26265	0.25360	0.23898	0.22661	0.21621	0.20722	0.19925	0.19245	0.18636	0.18120	0.17673	0.17227	0.16894	0.16520	0.16246

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
0.5	0.55	0.00843	0.00793	0.00741	0.00702	0.00661	0.00630	0.00598	0.00547	0.00505	0.00470	0.00441	0.00416	0.00395	0.00377	0.00361	0.00347	0.00334	0.00323	0.00314	0.00305
0.6	0.66	0.01118	0.01054	0.00987	0.00936	0.00883	0.00843	0.00801	0.00734	0.00679	0.00634	0.00595	0.00563	0.00535	0.00510	0.00489	0.00471	0.00454	0.00439	0.00427	0.00415
0.7	0.77	0.01423	0.01344	0.01259	0.01197	0.01130	0.01080	0.01027	0.00943	0.00874	0.00817	0.00768	0.00727	0.00692	0.00661	0.00634	0.00611	0.00590	0.00571	0.00555	0.00540
0.8	0.88	0.01756	0.01660	0.01557	0.01481	0.01401	0.01340	0.01275	0.01173	0.01089	0.01018	0.00959	0.00909	0.00865	0.00827	0.00795	0.00766	0.00740	0.00716	0.00697	0.00678
0.9	0.99	0.02115	0.02001	0.01880	0.01790	0.01694	0.01622	0.01545	0.01423	0.01322	0.01238	0.01168	0.01107	0.01055	0.01009	0.00970	0.00935	0.00904	0.00875	0.00852	0.00830
1.0	1.10	0.02500	0.02368	0.02226	0.02121	0.02009	0.01925	0.01835	0.01693	0.01574	0.01476	0.01393	0.01321	0.01260	0.01206	0.01160	0.01119	0.01082	0.01048	0.01021	0.00994
1.1	1.21	0.02910	0.02758	0.02596	0.02475	0.02346	0.02249	0.02145	0.01981	0.01844	0.01730	0.01634	0.01551	0.01480	0.01418	0.01364	0.01317	0.01273	0.01234	0.01203	0.01172
1.2	1.32	0.03345	0.03172	0.02988	0.02851	0.02704	0.02593	0.02475	0.02288	0.02132	0.02002	0.01891	0.01797	0.01715	0.01644	0.01582	0.01528	0.01478	0.01433	0.01397	0.01361
1.3	1.43	0.03803	0.03609	0.03402	0.03247	0.03082	0.02957	0.02824	0.02613	0.02436	0.02289	0.02165	0.02057	0.01965	0.01884	0.01814	0.01752	0.01696	0.01645	0.01603	0.01563
1.4	1.54	0.04285	0.04069	0.03837	0.03665	0.03481	0.03341	0.03192	0.02955	0.02758	0.02593	0.02453	0.02333	0.02229	0.02138	0.02059	0.01990	0.01926	0.01869	0.01822	0.01776
1.5	1.65	0.04789	0.04550	0.04294	0.04103	0.03898	0.03743	0.03578	0.03315	0.03096	0.02912	0.02756	0.02622	0.02507	0.02405	0.02317	0.02240	0.02169	0.02105	0.02053	0.02002
1.6	1.76	0.05316	0.05053	0.04771	0.04561	0.04335	0.04165	0.03982	0.03692	0.03450	0.03247	0.03075	0.02926	0.02798	0.02686	0.02588	0.02503	0.02424	0.02353	0.02295	0.02239
1.7	1.87	0.05865	0.05577	0.05268	0.05038	0.04791	0.04604	0.04404	0.04086	0.03820	0.03597	0.03408	0.03245	0.03104	0.02980	0.02872	0.02778	0.02691	0.02613	0.02549	0.02487
1.8	1.98	0.06435	0.06122	0.05786	0.05535	0.05266	0.05062	0.04844	0.04496	0.04206	0.03962	0.03755	0.03577	0.03422	0.03287	0.03169	0.03066	0.02971	0.02885	0.02815	0.02746
1.9	2.09	0.07027	0.06688	0.06323	0.06051	0.05759	0.05537	0.05300	0.04923	0.04607	0.04342	0.04117	0.03922	0.03754	0.03606	0.03478	0.03366	0.03262	0.03168	0.03092	0.03017
2.0	2.20	0.07640	0.07274	0.06879	0.06585	0.06270	0.06031	0.05774	0.05366	0.05024	0.04736	0.04492	0.04282	0.04099	0.03939	0.03800	0.03677	0.03565	0.03463	0.03380	0.03299
2.1	2.31	0.08273	0.07879	0.07455	0.07139	0.06799	0.06541	0.06265	0.05825	0.05455	0.05145	0.04882	0.04654	0.04457	0.04284	0.04133	0.04001	0.03879	0.03769	0.03679	0.03592
2.2	2.43	0.08927	0.08504	0.08049	0.07710	0.07346	0.07069	0.06772	0.06299	0.05902	0.05568	0.05285	0.05040	0.04828	0.04641	0.04479	0.04337	0.04205	0.04087	0.03990	0.03895
2.3	2.54	0.09600	0.09149	0.08663	0.08300	0.07910	0.07613	0.07295	0.06789	0.06364	0.06006	0.05702	0.05439	0.05211	0.05011	0.04836	0.04684	0.04542	0.04415	0.04311	0.04209
2.4	2.65	0.10294	0.09813	0.09295	0.08907	0.08491	0.08175	0.07835	0.07294	0.06840	0.06457	0.06132	0.05851	0.05607	0.05393	0.05206	0.05042	0.04891	0.04754	0.04643	0.04534
2.5	2.76	0.11008	0.10496	0.09945	0.09533	0.09090	0.08753	0.08391	0.07815	0.07330	0.06923	0.06576	0.06276	0.06015	0.05786	0.05587	0.05412	0.05250	0.05105	0.04985	0.04869
2.6	2.87	0.11741	0.11198	0.10613	0.10175	0.09705	0.09347	0.08963	0.08350	0.07835	0.07402	0.07032	0.06713	0.06436	0.06192	0.05980	0.05793	0.05621	0.05466	0.05339	0.05214
2.7	2.98	0.12493	0.11919	0.11299	0.10836	0.10337	0.09958	0.09551	0.08901	0.08355	0.07894	0.07502	0.07163	0.06869	0.06610	0.06384	0.06186	0.06003	0.05838	0.05702	0.05570
2.8	3.09	0.13264	0.12658	0.12002	0.11513	0.10986	0.10584	0.10154	0.09466	0.08888	0.08400	0.07985	0.07626	0.07314	0.07039	0.06800	0.06590	0.06395	0.06220	0.06077	0.05936
2.9	3.20	0.14054	0.13415	0.12724	0.12207	0.11651	0.11227	0.10773	0.10046	0.09435	0.08920	0.08481	0.08101	0.07771	0.07480	0.07227	0.07004	0.06799	0.06613	0.06461	0.06313
3.0	3.31	0.14863	0.14190	0.13462	0.12918	0.12333	0.11886	0.11407	0.10641	0.09996	0.09452	0.08989	0.08588	0.08239	0.07933	0.07665	0.07430	0.07213	0.07017	0.06856	0.06699
3.1	3.42	0.15691	0.14983	0.14218	0.13646	0.13030	0.12560	0.12056	0.11250	0.10571	0.09998	0.09510	0.09087	0.08720	0.08397	0.08114	0.07867	0.07637	0.07431	0.07261	0.07096
3.2	3.53	0.16537	0.15794	0.14991	0.14391	0.13744	0.13250	0.12720	0.11873	0.11160	0.10557	0.10044	0.09599	0.09212	0.08872	0.08575	0.08314	0.08073	0.07855	0.07677	0.07502
3.3	3.64	0.17401	0.16623	0.15781	0.15152	0.14473	0.13956	0.13400	0.12511	0.11762	0.11129	0.10590	0.10123	0.09717	0.09359	0.09047	0.08772	0.08519	0.08290	0.08102	0.07919
3.4	3.75	0.18284	0.17469	0.16588	0.15929	0.15219	0.14676	0.14094	0.13163	0.12377	0.11714	0.11149	0.10658	0.10232	0.09857	0.09529	0.09241	0.08975	0.08735	0.08538	0.08345
3.5	3.86	0.19184	0.18333	0.17412	0.16723	0.15980	0.15412	0.14803	0.13828	0.13006	0.12312	0.11720	0.11206	0.10759	0.10366	0.10023	0.09721	0.09441	0.09190	0.08983	0.08781
3.6	3.97	0.20103	0.19214	0.18252	0.17532	0.16756	0.16163	0.15527	0.14508	0.13649	0.12922	0.12303	0.11765	0.11298	0.10886	0.10527	0.10211	0.09918	0.09655	0.09438	0.09227
3.7	4.08	0.21039	0.20112	0.19109	0.18358	0.17548	0.16930	0.16265	0.15202	0.14304	0.13545	0.12898	0.12337	0.11848	0.11418	0.11042	0.10712	0.10406	0.10130	0.09903	0.09682
3.8	4.19	0.21992	0.21027	0.19982	0.19200	0.18356	0.17711	0.17018	0.15909	0.14973	0.14181	0.13506	0.12919	0.12410	0.11960	0.11568	0.11223	0.10903	0.10615	0.10378	0.10147

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Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

¾" **Uponor PEX-a** — 50% Propylene glycol — feet of head per foot of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
3.9	4.30	0.22963	0.21959	0.20872	0.20057	0.19178	0.18507	0.17785	0.16630	0.15654	0.14829	0.14125	0.13514	0.12982	0.12513	0.12104	0.11744	0.11411	0.11110	0.10863	0.10622
4.0	4.41	0.23952	0.22908	0.21777	0.20930	0.20016	0.19318	0.18567	0.17364	0.16349	0.15490	0.14756	0.14120	0.13566	0.13077	0.12651	0.12276	0.11928	0.11615	0.11358	0.11106
4.1	4.52	0.24958	0.23874	0.22699	0.21819	0.20869	0.20143	0.19363	0.18112	0.17056	0.16163	0.15400	0.14737	0.14161	0.13652	0.13208	0.12818	0.12456	0.12130	0.11862	0.11600
4.2	4.63	0.25981	0.24856	0.23637	0.22723	0.21737	0.20983	0.20173	0.18874	0.17777	0.16848	0.16055	0.15366	0.14767	0.14238	0.13776	0.13370	0.12994	0.12654	0.12376	0.12103
4.3	4.74	0.27021	0.25855	0.24590	0.23643	0.22620	0.21838	0.20997	0.19649	0.18510	0.17546	0.16722	0.16007	0.15384	0.14835	0.14355	0.13933	0.13542	0.13189	0.12899	0.12616
4.4	4.85	0.28078	0.26870	0.25560	0.24578	0.23517	0.22707	0.21835	0.20437	0.19255	0.18255	0.17401	0.16658	0.16012	0.15442	0.14943	0.14505	0.14099	0.13733	0.13432	0.13138
4.5	4.96	0.29152	0.27901	0.26545	0.25528	0.24430	0.23590	0.22687	0.21238	0.20014	0.18977	0.18091	0.17321	0.16651	0.16059	0.15543	0.15088	0.14667	0.14287	0.13974	0.13669
4.6	5.07	0.30242	0.28949	0.27545	0.26493	0.25357	0.24488	0.23553	0.22053	0.20785	0.19711	0.18793	0.17995	0.17301	0.16688	0.16152	0.15681	0.15244	0.14850	0.14526	0.14209
4.7	5.18	0.31350	0.30012	0.28562	0.27474	0.26298	0.25399	0.24432	0.22880	0.21568	0.20457	0.19506	0.18680	0.17961	0.17326	0.16772	0.16284	0.15831	0.15423	0.15087	0.14759
4.8	5.29	0.32474	0.31092	0.29593	0.28469	0.27254	0.26325	0.25325	0.23721	0.22364	0.21214	0.20231	0.19377	0.18633	0.17976	0.17401	0.16897	0.16428	0.16005	0.15658	0.15318
4.9	5.40	0.33614	0.32188	0.30641	0.29480	0.28225	0.27265	0.26232	0.24575	0.23172	0.21984	0.20968	0.20084	0.19315	0.18635	0.18041	0.17519	0.17034	0.16597	0.16238	0.15886

Recommended head loss design range

Sizing in this region will lead to excessive head loss conditions.

1" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	2.73	1.81	1.72	1.62	1.58	1.55	1.52	1.49	1.45	1.40	1.36	1.33	1.30	1.27	1.25	1.22	1.20	1.18	1.16	1.15	1.13
1.6	2.91	2.02	1.92	1.81	1.77	1.73	1.70	1.67	1.62	1.57	1.53	1.49	1.45	1.42	1.40	1.37	1.35	1.32	1.30	1.28	1.27
1.7	3.09	2.24	2.13	2.01	1.97	1.93	1.89	1.86	1.80	1.75	1.70	1.66	1.62	1.58	1.55	1.52	1.50	1.47	1.45	1.43	1.41
1.8	3.27	2.47	2.35	2.21	2.17	2.13	2.09	2.05	1.99	1.93	1.88	1.83	1.79	1.75	1.72	1.68	1.66	1.63	1.60	1.58	1.56
1.9	3.46	2.71	2.58	2.43	2.39	2.34	2.30	2.26	2.18	2.12	2.06	2.01	1.97	1.93	1.89	1.85	1.82	1.79	1.77	1.74	1.72
2.0	3.64	2.96	2.82	2.66	2.61	2.56	2.51	2.47	2.39	2.32	2.26	2.20	2.15	2.11	2.07	2.03	2.00	1.96	1.93	1.91	1.88
2.1	3.82	3.22	3.07	2.89	2.84	2.78	2.74	2.69	2.60	2.53	2.46	2.40	2.35	2.30	2.25	2.21	2.18	2.14	2.11	2.08	2.05
2.2	4.00	3.49	3.32	3.14	3.08	3.02	2.97	2.91	2.82	2.74	2.67	2.61	2.55	2.49	2.45	2.40	2.36	2.32	2.29	2.26	2.23
2.3	4.18	3.77	3.59	3.39	3.33	3.26	3.21	3.15	3.05	2.96	2.89	2.82	2.75	2.70	2.65	2.60	2.56	2.51	2.48	2.44	2.41
2.4	4.37	4.06	3.87	3.65	3.58	3.51	3.45	3.39	3.29	3.19	3.11	3.04	2.97	2.91	2.85	2.80	2.76	2.71	2.67	2.64	2.60
2.5	4.55	4.35	4.15	3.92	3.85	3.77	3.71	3.64	3.53	3.43	3.34	3.26	3.19	3.13	3.07	3.01	2.96	2.92	2.87	2.83	2.80
2.6	4.73	4.66	4.44	4.20	4.12	4.04	3.97	3.90	3.78	3.68	3.58	3.50	3.42	3.35	3.29	3.23	3.18	3.13	3.08	3.04	3.00
2.7	4.91	4.97	4.74	4.48	4.40	4.32	4.24	4.17	4.04	3.93	3.83	3.74	3.66	3.58	3.52	3.45	3.40	3.34	3.30	3.25	3.21
2.8	5.09	5.30	5.05	4.78	4.69	4.60	4.52	4.44	4.31	4.19	4.08	3.99	3.90	3.82	3.75	3.68	3.62	3.57	3.52	3.47	3.42
2.9	5.28	5.63	5.37	5.08	4.99	4.89	4.81	4.73	4.58	4.46	4.34	4.24	4.15	4.07	3.99	3.92	3.86	3.80	3.74	3.69	3.65
3.0	5.46	5.97	5.70	5.39	5.29	5.19	5.11	5.02	4.87	4.73	4.61	4.50	4.41	4.32	4.24	4.16	4.10	4.03	3.98	3.92	3.87
3.1	5.64	6.32	6.03	5.71	5.61	5.50	5.41	5.31	5.15	5.01	4.89	4.77	4.67	4.58	4.49	4.41	4.34	4.28	4.22	4.16	4.11
3.2	5.82	6.68	6.38	6.03	5.93	5.81	5.72	5.62	5.45	5.30	5.17	5.05	4.94	4.84	4.75	4.67	4.60	4.53	4.46	4.40	4.35
3.3	6.00	7.05	6.73	6.37	6.25	6.13	6.04	5.93	5.75	5.60	5.46	5.33	5.22	5.11	5.02	4.93	4.86	4.78	4.71	4.65	4.59
3.4	6.19	7.42	7.09	6.71	6.59	6.46	6.36	6.25	6.07	5.90	5.75	5.62	5.50	5.39	5.29	5.20	5.12	5.04	4.97	4.91	4.85
3.5	6.37	7.81	7.46	7.06	6.93	6.80	6.69	6.58	6.38	6.21	6.06	5.92	5.79	5.68	5.58	5.48	5.39	5.31	5.24	5.17	5.10
3.6	6.55	8.20	7.83	7.42	7.29	7.15	7.03	6.91	6.71	6.53	6.37	6.22	6.09	5.97	5.86	5.76	5.67	5.58	5.51	5.43	5.37
3.7	6.73	8.60	8.22	7.78	7.65	7.50	7.38	7.26	7.04	6.85	6.68	6.53	6.39	6.27	6.16	6.05	5.95	5.86	5.78	5.71	5.64
3.8	6.91	9.01	8.61	8.16	8.01	7.86	7.74	7.61	7.38	7.18	7.01	6.85	6.70	6.57	6.45	6.34	6.25	6.15	6.07	5.99	5.91
3.9	7.09	9.43	9.01	8.54	8.39	8.23	8.10	7.96	7.73	7.52	7.34	7.17	7.02	6.88	6.76	6.65	6.54	6.44	6.35	6.27	6.19
4.0	7.28	9.85	9.42	8.93	8.77	8.60	8.47	8.33	8.08	7.87	7.67	7.50	7.34	7.20	7.07	6.95	6.84	6.74	6.65	6.56	6.48
4.1	7.46	10.29	9.84	9.32	9.16	8.99	8.85	8.70	8.44	8.22	8.02	7.84	7.67	7.53	7.39	7.27	7.15	7.05	6.95	6.86	6.78
4.2	7.64	10.73	10.26	9.72	9.55	9.38	9.23	9.08	8.81	8.58	8.37	8.18	8.01	7.86	7.72	7.59	7.47	7.36	7.26	7.16	7.08
4.3	7.82	11.18	10.69	10.14	9.96	9.77	9.62	9.46	9.19	8.94	8.72	8.53	8.35	8.19	8.05	7.91	7.79	7.67	7.57	7.47	7.38
4.4	8.00	11.64	11.13	10.55	10.37	10.18	10.02	9.85	9.57	9.31	9.09	8.89	8.70	8.54	8.38	8.24	8.12	8.00	7.89	7.79	7.69
4.5	8.19	12.11	11.58	10.98	10.79	10.59	10.42	10.25	9.96	9.69	9.46	9.25	9.06	8.88	8.73	8.58	8.45	8.32	8.21	8.11	8.01
4.6	8.37	12.58	12.03	11.41	11.22	11.01	10.84	10.66	10.35	10.08	9.83	9.62	9.42	9.24	9.08	8.93	8.79	8.66	8.54	8.43	8.33
4.7	8.55	13.06	12.50	11.85	11.65	11.43	11.26	11.07	10.75	10.47	10.22	9.99	9.79	9.60	9.43	9.28	9.13	9.00	8.88	8.76	8.66

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	8.73	13.55	12.97	12.30	12.09	11.87	11.68	11.49	11.16	10.87	10.61	10.37	10.16	9.97	9.79	9.63	9.48	9.34	9.22	9.10	8.99
4.9	8.91	14.05	13.45	12.76	12.54	12.31	12.12	11.92	11.58	11.28	11.00	10.76	10.54	10.34	10.16	9.99	9.84	9.70	9.57	9.45	9.33
5.0	9.10	14.56	13.93	13.22	12.99	12.75	12.56	12.35	12.00	11.69	11.41	11.16	10.93	10.72	10.54	10.36	10.20	10.05	9.92	9.80	9.68
5.1	9.28	15.07	14.42	13.69	13.45	13.21	13.01	12.79	12.43	12.11	11.82	11.56	11.32	11.11	10.92	10.74	10.57	10.42	10.28	10.15	10.03
5.2	9.46	15.59	14.93	14.17	13.92	13.67	13.46	13.24	12.86	12.53	12.23	11.96	11.72	11.50	11.30	11.12	10.95	10.79	10.64	10.51	10.39
5.3	9.64	16.12	15.43	14.65	14.40	14.14	13.92	13.70	13.31	12.96	12.65	12.38	12.13	11.90	11.69	11.50	11.33	11.16	11.01	10.88	10.75
5.4	9.82	16.66	15.95	15.14	14.88	14.61	14.39	14.16	13.76	13.40	13.08	12.80	12.54	12.30	12.09	11.89	11.71	11.54	11.39	11.25	11.12
5.5	10.01	17.21	16.47	15.64	15.37	15.10	14.87	14.63	14.21	13.85	13.52	13.22	12.96	12.71	12.49	12.29	12.11	11.93	11.77	11.63	11.49
5.6	10.19	17.76	17.00	16.14	15.87	15.59	15.35	15.10	14.67	14.30	13.96	13.66	13.38	13.13	12.90	12.69	12.50	12.32	12.16	12.01	11.87
5.7	10.37	18.32	17.54	16.66	16.38	16.08	15.84	15.58	15.14	14.75	14.41	14.09	13.81	13.55	13.32	13.10	12.91	12.72	12.55	12.40	12.25
5.8	10.55	18.89	18.09	17.18	16.89	16.58	16.33	16.07	15.62	15.22	14.86	14.54	14.25	13.98	13.74	13.52	13.32	13.13	12.95	12.79	12.64
5.9	10.73	19.46	18.64	17.70	17.41	17.09	16.84	16.57	16.10	15.69	15.32	14.99	14.69	14.42	14.17	13.94	13.73	13.54	13.36	13.19	13.04
6.0	10.92	20.05	19.20	18.24	17.93	17.61	17.35	17.07	16.59	16.17	15.79	15.45	15.14	14.86	14.60	14.37	14.15	13.95	13.77	13.60	13.44
6.1	11.10	20.64	19.77	18.78	18.46	18.13	17.86	17.58	17.08	16.65	16.26	15.91	15.59	15.30	15.04	14.80	14.58	14.37	14.18	14.01	13.85
6.2	11.28	21.24	20.34	19.33	19.00	18.66	18.38	18.09	17.58	17.14	16.74	16.38	16.05	15.76	15.49	15.24	15.01	14.80	14.61	14.43	14.26
6.3	11.46	21.84	20.93	19.88	19.55	19.20	18.91	18.61	18.09	17.63	17.22	16.85	16.52	16.21	15.94	15.68	15.45	15.23	15.03	14.85	14.68
6.4	11.64	22.46	21.51	20.44	20.10	19.74	19.45	19.14	18.61	18.14	17.71	17.34	16.99	16.68	16.40	16.13	15.89	15.67	15.47	15.28	15.10
6.5	11.82	23.08	22.11	21.01	20.66	20.30	19.99	19.67	19.13	18.64	18.21	17.82	17.47	17.15	16.86	16.59	16.34	16.11	15.90	15.71	15.53
6.6	12.01	23.71	22.71	21.59	21.23	20.85	20.54	20.22	19.66	19.16	18.71	18.32	17.95	17.63	17.33	17.05	16.80	16.56	16.35	16.15	15.96
6.7	12.19	24.34	23.33	22.17	21.80	21.42	21.10	20.76	20.19	19.68	19.22	18.82	18.44	18.11	17.80	17.52	17.26	17.02	16.80	16.59	16.40
6.8	12.37	24.98	23.94	22.76	22.38	21.99	21.66	21.32	20.73	20.21	19.74	19.32	18.94	18.59	18.28	17.99	17.73	17.48	17.25	17.04	16.84
6.9	12.55	25.63	24.57	23.36	22.97	22.56	22.23	21.88	21.27	20.74	20.26	19.83	19.44	19.09	18.77	18.47	18.20	17.94	17.71	17.50	17.29
7.0	12.73	26.29	25.20	23.96	23.56	23.15	22.81	22.45	21.83	21.28	20.79	20.35	19.95	19.59	19.26	18.95	18.68	18.41	18.18	17.96	17.75
7.1	12.92	26.96	25.84	24.57	24.16	23.74	23.39	23.02	22.39	21.83	21.32	20.87	20.46	20.09	19.76	19.44	19.16	18.89	18.65	18.42	18.21
7.2	13.10	27.63	26.49	25.18	24.77	24.34	23.98	23.60	22.95	22.38	21.86	21.40	20.98	20.60	20.26	19.94	19.65	19.37	19.12	18.89	18.68
7.3	13.28	28.31	27.14	25.81	25.38	24.94	24.57	24.19	23.52	22.94	22.41	21.94	21.51	21.12	20.77	20.44	20.14	19.86	19.61	19.37	19.15
7.4	13.46	29.00	27.80	26.44	26.01	25.55	25.17	24.78	24.10	23.50	22.96	22.48	22.04	21.64	21.28	20.95	20.64	20.35	20.09	19.85	19.63
7.5	13.64	29.69	28.47	27.08	26.63	26.17	25.78	25.38	24.68	24.07	23.52	23.03	22.58	22.17	21.80	21.46	21.15	20.85	20.59	20.34	20.11
7.6	13.83	30.39	29.14	27.72	27.27	26.79	26.40	25.98	25.28	24.65	24.08	23.58	23.12	22.70	22.33	21.98	21.66	21.36	21.08	20.83	20.60
7.7	14.01	31.10	29.82	28.37	27.91	27.42	27.02	26.60	25.87	25.23	24.65	24.14	23.67	23.24	22.86	22.50	22.17	21.87	21.59	21.33	21.09
7.8	14.19	31.82	30.51	29.03	28.55	28.06	27.65	27.22	26.47	25.82	25.23	24.70	24.22	23.79	23.39	23.03	22.70	22.38	22.10	21.83	21.59
7.9	14.37	32.54	31.21	29.69	29.21	28.70	28.28	27.84	27.08	26.41	25.81	25.27	24.78	24.34	23.94	23.56	23.22	22.90	22.61	22.34	22.09
8.0	14.55	33.27	31.91	30.36	29.87	29.35	28.92	28.47	27.70	27.01	26.40	25.85	25.35	24.90	24.49	24.10	23.76	23.43	23.13	22.86	22.60

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	2.73	2.49	2.40	2.30	2.23	2.15	2.09	2.02	1.91	1.82	1.74	1.67	1.61	1.55	1.50	1.47	1.43	1.39	1.36	1.33	1.31
1.6	2.91	2.77	2.67	2.57	2.49	2.40	2.33	2.25	2.13	2.03	1.94	1.86	1.80	1.74	1.68	1.64	1.60	1.56	1.53	1.49	1.47
1.7	3.09	3.07	2.96	2.84	2.75	2.66	2.58	2.50	2.37	2.25	2.15	2.07	1.99	1.93	1.87	1.82	1.78	1.73	1.70	1.66	1.64
1.8	3.27	3.38	3.26	3.13	3.03	2.93	2.85	2.76	2.61	2.48	2.38	2.28	2.20	2.13	2.07	2.01	1.96	1.91	1.88	1.84	1.81
1.9	3.46	3.70	3.57	3.43	3.33	3.21	3.12	3.02	2.86	2.73	2.61	2.51	2.42	2.34	2.27	2.21	2.16	2.10	2.06	2.02	1.99
2.0	3.64	4.03	3.89	3.74	3.63	3.51	3.41	3.30	3.13	2.98	2.85	2.74	2.64	2.56	2.48	2.42	2.36	2.30	2.26	2.21	2.18
2.1	3.82	4.38	4.23	4.07	3.94	3.81	3.70	3.59	3.40	3.24	3.10	2.98	2.88	2.79	2.70	2.63	2.57	2.51	2.46	2.41	2.37
2.2	4.00	4.74	4.57	4.40	4.27	4.12	4.01	3.88	3.68	3.51	3.36	3.23	3.12	3.02	2.93	2.86	2.79	2.72	2.67	2.61	2.57
2.3	4.18	5.11	4.93	4.75	4.60	4.45	4.32	4.19	3.98	3.79	3.63	3.49	3.37	3.26	3.17	3.09	3.01	2.94	2.88	2.83	2.78
2.4	4.37	5.49	5.30	5.10	4.95	4.78	4.65	4.51	4.28	4.08	3.91	3.76	3.63	3.52	3.41	3.33	3.25	3.17	3.11	3.05	3.00
2.5	4.55	5.88	5.68	5.47	5.31	5.13	4.99	4.84	4.59	4.38	4.20	4.04	3.90	3.78	3.67	3.58	3.49	3.41	3.34	3.27	3.22
2.6	4.73	6.28	6.07	5.85	5.67	5.49	5.34	5.17	4.91	4.69	4.49	4.32	4.18	4.04	3.93	3.83	3.74	3.65	3.58	3.51	3.46
2.7	4.91	6.70	6.48	6.24	6.05	5.85	5.69	5.52	5.24	5.00	4.80	4.61	4.46	4.32	4.19	4.09	3.99	3.90	3.83	3.75	3.69
2.8	5.09	7.13	6.89	6.64	6.44	6.23	6.06	5.88	5.58	5.33	5.11	4.92	4.75	4.60	4.47	4.36	4.26	4.16	4.08	4.00	3.94
2.9	5.28	7.56	7.31	7.05	6.84	6.62	6.44	6.24	5.93	5.66	5.43	5.23	5.05	4.90	4.75	4.64	4.53	4.43	4.34	4.25	4.19
3.0	5.46	8.01	7.75	7.47	7.25	7.01	6.82	6.62	6.29	6.01	5.76	5.55	5.36	5.20	5.05	4.93	4.81	4.70	4.61	4.52	4.45
3.1	5.64	8.47	8.19	7.90	7.67	7.42	7.22	7.01	6.66	6.36	6.10	5.87	5.68	5.50	5.35	5.22	5.09	4.98	4.88	4.79	4.72
3.2	5.82	8.94	8.65	8.34	8.10	7.84	7.63	7.40	7.04	6.72	6.45	6.21	6.00	5.82	5.65	5.52	5.39	5.27	5.16	5.06	4.99
3.3	6.00	9.42	9.12	8.79	8.53	8.26	8.04	7.80	7.42	7.09	6.80	6.55	6.34	6.14	5.97	5.83	5.69	5.56	5.45	5.35	5.27
3.4	6.19	9.92	9.60	9.25	8.98	8.70	8.47	8.22	7.81	7.47	7.17	6.90	6.68	6.47	6.29	6.14	5.99	5.86	5.75	5.64	5.56
3.5	6.37	10.42	10.08	9.72	9.44	9.14	8.90	8.64	8.22	7.85	7.54	7.26	7.02	6.81	6.62	6.46	6.31	6.17	6.05	5.94	5.85
3.6	6.55	10.93	10.58	10.20	9.91	9.60	9.34	9.07	8.63	8.25	7.92	7.63	7.38	7.16	6.95	6.79	6.63	6.48	6.36	6.24	6.15
3.7	6.73	11.46	11.09	10.70	10.39	10.06	9.80	9.51	9.05	8.65	8.31	8.00	7.74	7.51	7.30	7.13	6.96	6.81	6.68	6.55	6.46
3.8	6.91	11.99	11.61	11.20	10.88	10.54	10.26	9.96	9.48	9.06	8.70	8.38	8.11	7.87	7.65	7.47	7.30	7.13	7.00	6.87	6.77
3.9	7.09	12.53	12.14	11.71	11.38	11.02	10.73	10.42	9.92	9.48	9.11	8.78	8.49	8.24	8.01	7.82	7.64	7.47	7.33	7.19	7.09
4.0	7.28	13.09	12.67	12.23	11.88	11.51	11.21	10.89	10.36	9.91	9.52	9.17	8.88	8.61	8.37	8.18	7.99	7.81	7.67	7.52	7.41
4.1	7.46	13.65	13.22	12.76	12.40	12.01	11.70	11.36	10.82	10.35	9.94	9.58	9.27	9.00	8.75	8.54	8.35	8.16	8.01	7.86	7.75
4.2	7.64	14.23	13.78	13.30	12.93	12.52	12.20	11.85	11.28	10.79	10.37	9.99	9.67	9.39	9.13	8.92	8.71	8.52	8.36	8.20	8.09
4.3	7.82	14.81	14.35	13.85	13.46	13.04	12.71	12.34	11.75	11.24	10.80	10.41	10.08	9.79	9.51	9.29	9.08	8.88	8.72	8.55	8.43
4.4	8.00	15.41	14.93	14.41	14.01	13.57	13.22	12.85	12.24	11.71	11.25	10.84	10.50	10.19	9.91	9.68	9.46	9.25	9.08	8.91	8.79
4.5	8.19	16.02	15.52	14.98	14.56	14.11	13.75	13.36	12.72	12.17	11.70	11.28	10.92	10.60	10.31	10.07	9.84	9.63	9.45	9.27	9.14
4.6	8.37	16.63	16.11	15.56	15.12	14.66	14.28	13.88	13.22	12.65	12.16	11.72	11.35	11.02	10.72	10.47	10.23	10.01	9.83	9.64	9.51
4.7	8.55	17.26	16.72	16.15	15.70	15.21	14.82	14.41	13.73	13.14	12.63	12.18	11.79	11.45	11.13	10.88	10.63	10.40	10.21	10.02	9.88

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	8.73	17.89	17.34	16.74	16.28	15.78	15.38	14.94	14.24	13.63	13.10	12.64	12.24	11.88	11.55	11.29	11.04	10.80	10.60	10.40	10.26
4.9	8.91	18.54	17.97	17.35	16.87	16.35	15.94	15.49	14.76	14.13	13.58	13.10	12.69	12.32	11.98	11.71	11.45	11.20	11.00	10.79	10.64
5.0	9.10	19.19	18.60	17.97	17.47	16.94	16.51	16.04	15.29	14.64	14.07	13.58	13.15	12.77	12.42	12.14	11.86	11.61	11.40	11.19	11.03
5.1	9.28	19.86	19.25	18.59	18.08	17.53	17.08	16.61	15.83	15.16	14.57	14.06	13.62	13.22	12.86	12.57	12.29	12.03	11.81	11.59	11.43
5.2	9.46	20.53	19.90	19.23	18.70	18.13	17.67	17.18	16.38	15.68	15.08	14.55	14.09	13.69	13.31	13.01	12.72	12.45	12.22	12.00	11.83
5.3	9.64	21.22	20.57	19.87	19.32	18.74	18.27	17.76	16.93	16.21	15.59	15.04	14.58	14.16	13.77	13.46	13.16	12.88	12.64	12.41	12.24
5.4	9.82	21.91	21.24	20.52	19.96	19.36	18.87	18.35	17.49	16.75	16.11	15.55	15.07	14.63	14.23	13.92	13.60	13.31	13.07	12.83	12.66
5.5	10.01	22.61	21.93	21.18	20.61	19.98	19.48	18.94	18.06	17.30	16.64	16.06	15.56	15.11	14.70	14.38	14.05	13.76	13.51	13.26	13.08
5.6	10.19	23.33	22.62	21.86	21.26	20.62	20.10	19.55	18.64	17.86	17.18	16.58	16.06	15.60	15.18	14.84	14.51	14.20	13.95	13.69	13.51
5.7	10.37	24.05	23.32	22.54	21.92	21.26	20.73	20.16	19.23	18.42	17.72	17.10	16.57	16.10	15.67	15.32	14.97	14.66	14.39	14.13	13.94
5.8	10.55	24.78	24.03	23.22	22.59	21.92	21.37	20.78	19.82	18.99	18.27	17.63	17.09	16.60	16.16	15.80	15.45	15.12	14.85	14.58	14.38
5.9	10.73	25.52	24.75	23.92	23.27	22.58	22.01	21.41	20.43	19.57	18.83	18.17	17.62	17.11	16.65	16.28	15.92	15.59	15.31	15.03	14.83
6.0	10.92	26.27	25.48	24.63	23.96	23.25	22.67	22.05	21.04	20.16	19.39	18.72	18.15	17.63	17.16	16.78	16.41	16.06	15.77	15.49	15.28
6.1	11.10	27.04	26.22	25.35	24.66	23.93	23.33	22.69	21.65	20.75	19.97	19.28	18.69	18.15	17.67	17.28	16.90	16.54	16.25	15.95	15.74
6.2	11.28	27.80	26.97	26.07	25.37	24.61	24.00	23.35	22.28	21.35	20.55	19.84	19.23	18.69	18.19	17.79	17.39	17.03	16.72	16.42	16.20
6.3	11.46	28.58	27.73	26.80	26.08	25.31	24.68	24.01	22.91	21.96	21.13	20.41	19.78	19.22	18.71	18.30	17.89	17.52	17.21	16.90	16.67
6.4	11.64	29.37	28.49	27.55	26.81	26.01	25.37	24.68	23.55	22.58	21.73	20.98	20.34	19.77	19.24	18.82	18.40	18.02	17.70	17.38	17.15
6.5	11.82	30.17	29.27	28.30	27.54	26.73	26.07	25.36	24.20	23.20	22.33	21.56	20.91	20.32	19.78	19.35	18.92	18.52	18.20	17.87	17.63
6.6	12.01	30.98	30.05	29.06	28.28	27.45	26.77	26.04	24.86	23.83	22.94	22.15	21.48	20.88	20.32	19.88	19.44	19.04	18.70	18.37	18.12
6.7	12.19	31.79	30.85	29.83	29.03	28.18	27.48	26.74	25.53	24.47	23.56	22.75	22.06	21.44	20.87	20.42	19.97	19.55	19.21	18.87	18.61
6.8	12.37	32.62	31.65	30.60	29.79	28.91	28.20	27.44	26.20	25.12	24.18	23.35	22.65	22.01	21.43	20.96	20.50	20.08	19.72	19.37	19.11
6.9	12.55	33.45	32.46	31.39	30.56	29.66	28.93	28.15	26.88	25.77	24.81	23.97	23.24	22.59	21.99	21.51	21.04	20.61	20.25	19.89	19.62
7.0	12.73	34.29	33.28	32.19	31.33	30.41	29.67	28.87	27.57	26.43	25.45	24.58	23.84	23.17	22.56	22.07	21.59	21.14	20.77	20.40	20.13
7.1	12.92	35.15	34.11	32.99	32.11	31.17	30.41	29.60	28.26	27.10	26.10	25.21	24.45	23.77	23.14	22.64	22.14	21.69	21.31	20.93	20.65
7.2	13.10	36.01	34.95	33.80	32.91	31.94	31.16	30.33	28.96	27.78	26.75	25.84	25.06	24.36	23.72	23.21	22.70	22.24	21.85	21.46	21.17
7.3	13.28	36.88	35.79	34.62	33.71	32.72	31.93	31.07	29.67	28.46	27.41	26.48	25.68	24.97	24.31	23.79	23.27	22.79	22.39	22.00	21.70
7.4	13.46	37.76	36.65	35.45	34.51	33.51	32.69	31.82	30.39	29.15	28.07	27.12	26.31	25.58	24.91	24.37	23.84	23.35	22.94	22.54	22.24
7.5	13.64	38.65	37.51	36.29	35.33	34.30	33.47	32.58	31.12	29.85	28.75	27.78	26.94	26.20	25.51	24.96	24.42	23.92	23.50	23.09	22.78
7.6	13.83	39.54	38.39	37.13	36.16	35.11	34.26	33.34	31.85	30.55	29.43	28.43	27.59	26.82	26.12	25.56	25.00	24.49	24.07	23.64	23.33
7.7	14.01	40.45	39.27	37.99	36.99	35.92	35.05	34.12	32.59	31.27	30.12	29.10	28.23	27.45	26.74	26.16	25.59	25.07	24.63	24.20	23.88
7.8	14.19	41.37	40.16	38.85	37.83	36.74	35.85	34.90	33.34	31.99	30.81	29.77	28.89	28.09	27.36	26.77	26.19	25.66	25.21	24.77	24.44
7.9	14.37	42.29	41.06	39.72	38.68	37.57	36.66	35.69	34.09	32.71	31.51	30.45	29.55	28.73	27.98	27.38	26.79	26.25	25.79	25.34	25.01
8.0	14.55	43.22	41.96	40.60	39.54	38.40	37.47	36.48	34.86	33.45	32.22	31.14	30.22	29.38	28.62	28.01	27.40	26.85	26.38	25.92	25.58

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	2.73	2.95	2.82	2.68	2.57	2.46	2.37	2.28	2.13	2.01	1.90	1.81	1.74	1.67	1.61	1.56	1.52	1.47	1.44	1.41	1.38
1.6	2.91	3.28	3.14	2.98	2.86	2.74	2.64	2.54	2.38	2.24	2.13	2.03	1.94	1.87	1.80	1.75	1.70	1.65	1.61	1.57	1.55
1.7	3.09	3.63	3.47	3.30	3.17	3.03	2.93	2.82	2.63	2.48	2.36	2.25	2.15	2.07	2.00	1.94	1.89	1.83	1.79	1.75	1.72
1.8	3.27	3.99	3.82	3.63	3.49	3.34	3.22	3.10	2.90	2.74	2.60	2.48	2.38	2.29	2.21	2.14	2.08	2.03	1.98	1.93	1.90
1.9	3.46	4.37	4.18	3.97	3.82	3.66	3.53	3.40	3.18	3.00	2.85	2.72	2.61	2.51	2.43	2.35	2.29	2.23	2.18	2.13	2.09
2.0	3.64	4.75	4.55	4.33	4.16	3.99	3.85	3.71	3.47	3.28	3.12	2.98	2.85	2.75	2.65	2.57	2.50	2.43	2.38	2.33	2.28
2.1	3.82	5.16	4.93	4.70	4.52	4.33	4.18	4.03	3.78	3.56	3.39	3.24	3.10	2.99	2.89	2.80	2.73	2.65	2.60	2.53	2.49
2.2	4.00	5.57	5.33	5.08	4.89	4.68	4.53	4.36	4.09	3.86	3.67	3.51	3.36	3.24	3.13	3.04	2.96	2.88	2.82	2.75	2.70
2.3	4.18	6.00	5.75	5.47	5.27	5.05	4.88	4.70	4.41	4.17	3.96	3.79	3.63	3.50	3.38	3.28	3.20	3.11	3.05	2.97	2.92
2.4	4.37	6.44	6.17	5.88	5.66	5.42	5.24	5.05	4.74	4.48	4.26	4.08	3.91	3.77	3.64	3.53	3.44	3.35	3.28	3.20	3.15
2.5	4.55	6.90	6.61	6.30	6.06	5.81	5.62	5.42	5.09	4.81	4.57	4.37	4.20	4.04	3.91	3.80	3.70	3.60	3.52	3.44	3.38
2.6	4.73	7.36	7.06	6.73	6.48	6.21	6.01	5.79	5.44	5.14	4.89	4.68	4.49	4.33	4.19	4.06	3.96	3.85	3.78	3.69	3.62
2.7	4.91	7.85	7.52	7.17	6.91	6.62	6.41	6.18	5.80	5.49	5.22	5.00	4.80	4.62	4.47	4.34	4.23	4.12	4.04	3.94	3.87
2.8	5.09	8.34	7.99	7.62	7.34	7.05	6.82	6.57	6.18	5.84	5.56	5.32	5.11	4.93	4.76	4.63	4.51	4.39	4.30	4.20	4.13
2.9	5.28	8.84	8.48	8.09	7.79	7.48	7.24	6.98	6.56	6.21	5.91	5.66	5.43	5.24	5.07	4.92	4.79	4.67	4.58	4.47	4.39
3.0	5.46	9.36	8.98	8.57	8.26	7.92	7.67	7.39	6.95	6.58	6.27	6.00	5.76	5.56	5.38	5.22	5.09	4.96	4.86	4.75	4.66
3.1	5.64	9.89	9.49	9.05	8.73	8.38	8.11	7.82	7.36	6.96	6.64	6.35	6.10	5.89	5.69	5.53	5.39	5.25	5.15	5.03	4.94
3.2	5.82	10.44	10.01	9.55	9.21	8.84	8.56	8.26	7.77	7.36	7.01	6.71	6.45	6.22	6.02	5.85	5.70	5.55	5.44	5.32	5.23
3.3	6.00	10.99	10.55	10.07	9.71	9.32	9.02	8.71	8.19	7.76	7.39	7.08	6.80	6.56	6.35	6.17	6.02	5.86	5.74	5.61	5.52
3.4	6.19	11.56	11.09	10.59	10.21	9.81	9.50	9.16	8.62	8.17	7.79	7.46	7.17	6.92	6.69	6.50	6.34	6.18	6.06	5.92	5.82
3.5	6.37	12.14	11.65	11.12	10.73	10.31	9.98	9.63	9.07	8.59	8.19	7.84	7.54	7.28	7.04	6.84	6.67	6.50	6.37	6.23	6.12
3.6	6.55	12.73	12.22	11.67	11.26	10.81	10.47	10.11	9.52	9.02	8.60	8.24	7.92	7.64	7.40	7.19	7.01	6.83	6.70	6.55	6.44
3.7	6.73	13.33	12.80	12.22	11.80	11.33	10.98	10.59	9.98	9.46	9.02	8.64	8.31	8.02	7.76	7.55	7.36	7.17	7.03	6.87	6.76
3.8	6.91	13.95	13.39	12.79	12.34	11.86	11.49	11.09	10.45	9.90	9.45	9.05	8.70	8.40	8.13	7.91	7.71	7.52	7.37	7.20	7.08
3.9	7.09	14.57	14.00	13.37	12.90	12.40	12.01	11.60	10.93	10.36	9.88	9.47	9.11	8.79	8.51	8.28	8.07	7.87	7.72	7.54	7.42
4.0	7.28	15.21	14.61	13.96	13.47	12.95	12.55	12.11	11.42	10.83	10.33	9.90	9.52	9.19	8.90	8.65	8.44	8.23	8.07	7.89	7.76
4.1	7.46	15.86	15.24	14.56	14.05	13.51	13.09	12.64	11.91	11.30	10.78	10.34	9.94	9.60	9.30	9.04	8.82	8.59	8.43	8.24	8.11
4.2	7.64	16.52	15.87	15.17	14.65	14.08	13.64	13.18	12.42	11.78	11.24	10.78	10.37	10.01	9.70	9.43	9.20	8.97	8.80	8.60	8.46
4.3	7.82	17.19	16.52	15.79	15.25	14.66	14.21	13.72	12.94	12.27	11.71	11.23	10.80	10.44	10.11	9.83	9.59	9.35	9.17	8.97	8.82
4.4	8.00	17.87	17.18	16.42	15.86	15.25	14.78	14.28	13.46	12.77	12.19	11.69	11.25	10.87	10.53	10.24	9.99	9.74	9.55	9.34	9.19
4.5	8.19	18.57	17.85	17.07	16.48	15.85	15.36	14.84	14.00	13.28	12.68	12.16	11.70	11.30	10.95	10.65	10.39	10.13	9.94	9.72	9.56
4.6	8.37	19.28	18.53	17.72	17.11	16.46	15.96	15.41	14.54	13.80	13.18	12.64	12.16	11.75	11.38	11.07	10.80	10.53	10.33	10.11	9.94
4.7	8.55	19.99	19.22	18.38	17.75	17.08	16.56	16.00	15.09	14.33	13.68	13.12	12.63	12.20	11.82	11.50	11.22	10.94	10.74	10.50	10.33

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	8.73	20.72	19.92	19.06	18.41	17.71	17.17	16.59	15.65	14.86	14.19	13.61	13.10	12.66	12.27	11.94	11.65	11.36	11.14	10.90	10.72
4.9	8.91	21.46	20.64	19.74	19.07	18.35	17.79	17.19	16.22	15.40	14.71	14.11	13.58	13.13	12.72	12.38	12.08	11.78	11.56	11.31	11.12
5.0	9.10	22.21	21.36	20.43	19.74	18.99	18.42	17.80	16.80	15.95	15.24	14.62	14.07	13.61	13.18	12.83	12.52	12.21	11.98	11.72	11.53
5.1	9.28	22.97	22.09	21.14	20.42	19.65	19.06	18.42	17.39	16.51	15.78	15.14	14.57	14.09	13.65	13.28	12.97	12.65	12.41	12.14	11.94
5.2	9.46	23.74	22.84	21.85	21.12	20.32	19.71	19.05	17.99	17.08	16.32	15.66	15.08	14.58	14.13	13.75	13.42	13.09	12.84	12.57	12.36
5.3	9.64	24.53	23.59	22.58	21.82	21.00	20.37	19.69	18.59	17.66	16.87	16.19	15.59	15.08	14.61	14.22	13.88	13.54	13.29	13.00	12.79
5.4	9.82	25.32	24.36	23.31	22.53	21.69	21.04	20.34	19.20	18.24	17.44	16.73	16.11	15.58	15.10	14.70	14.35	14.00	13.73	13.44	13.22
5.5	10.01	26.12	25.14	24.06	23.25	22.38	21.71	20.99	19.83	18.84	18.00	17.28	16.64	16.09	15.60	15.18	14.82	14.46	14.19	13.88	13.66
5.6	10.19	26.94	25.92	24.81	23.99	23.09	22.40	21.66	20.46	19.44	18.58	17.84	17.18	16.61	16.10	15.67	15.30	14.93	14.65	14.34	14.11
5.7	10.37	27.76	26.72	25.58	24.73	23.81	23.10	22.33	21.10	20.05	19.17	18.40	17.72	17.14	16.62	16.17	15.79	15.40	15.12	14.80	14.56
5.8	10.55	28.60	27.53	26.35	25.48	24.53	23.80	23.02	21.75	20.67	19.76	18.97	18.27	17.67	17.13	16.68	16.28	15.89	15.59	15.26	15.02
5.9	10.73	29.45	28.34	27.14	26.24	25.26	24.52	23.71	22.40	21.29	20.36	19.55	18.83	18.21	17.66	17.19	16.78	16.38	16.07	15.73	15.48
6.0	10.92	30.31	29.17	27.93	27.01	26.01	25.24	24.41	23.07	21.93	20.97	20.13	19.39	18.76	18.19	17.71	17.29	16.87	16.56	16.21	15.95
6.1	11.10	31.17	30.01	28.74	27.79	26.76	25.97	25.12	23.74	22.57	21.58	20.73	19.97	19.32	18.73	18.24	17.81	17.38	17.06	16.69	16.43
6.2	11.28	32.05	30.86	29.55	28.58	27.52	26.71	25.84	24.42	23.22	22.21	21.33	20.55	19.88	19.28	18.77	18.33	17.89	17.56	17.19	16.91
6.3	11.46	32.94	31.71	30.38	29.38	28.30	27.46	26.57	25.11	23.88	22.84	21.94	21.13	20.45	19.83	19.31	18.86	18.40	18.06	17.68	17.40
6.4	11.64	33.84	32.58	31.21	30.19	29.08	28.22	27.30	25.81	24.55	23.48	22.55	21.73	21.02	20.39	19.86	19.39	18.92	18.58	18.19	17.90
6.5	11.82	34.75	33.46	32.06	31.01	29.87	28.99	28.05	26.52	25.22	24.12	23.17	22.33	21.61	20.96	20.41	19.93	19.45	19.10	18.70	18.40
6.6	12.01	35.67	34.35	32.91	31.83	30.67	29.77	28.80	27.23	25.90	24.78	23.81	22.94	22.20	21.53	20.97	20.48	19.99	19.62	19.21	18.91
6.7	12.19	36.60	35.25	33.77	32.67	31.47	30.55	29.56	27.96	26.59	25.44	24.44	23.56	22.80	22.11	21.54	21.03	20.53	20.16	19.73	19.42
6.8	12.37	37.54	36.15	34.65	33.52	32.29	31.35	30.33	28.69	27.29	26.11	25.09	24.18	23.40	22.70	22.11	21.60	21.08	20.70	20.26	19.95
6.9	12.55	38.49	37.07	35.53	34.37	33.12	32.15	31.11	29.43	28.00	26.79	25.74	24.81	24.01	23.30	22.69	22.16	21.63	21.24	20.80	20.47
7.0	12.73	39.45	38.00	36.42	35.24	33.95	32.97	31.90	30.18	28.71	27.48	26.40	25.45	24.63	23.90	23.28	22.74	22.20	21.79	21.34	21.01
7.1	12.92	40.42	38.94	37.32	36.11	34.80	33.79	32.70	30.94	29.44	28.17	27.07	26.09	25.26	24.51	23.87	23.32	22.76	22.35	21.89	21.54
7.2	13.10	41.40	39.89	38.23	36.99	35.65	34.62	33.51	31.70	30.17	28.87	27.75	26.75	25.89	25.12	24.47	23.91	23.34	22.92	22.44	22.09
7.3	13.28	42.39	40.84	39.15	37.89	36.51	35.46	34.32	32.47	30.90	29.58	28.43	27.41	26.53	25.74	25.08	24.50	23.92	23.49	23.00	22.64
7.4	13.46	43.39	41.81	40.08	38.79	37.39	36.31	35.14	33.25	31.65	30.29	29.12	28.07	27.18	26.37	25.69	25.10	24.51	24.06	23.56	23.20
7.5	13.64	44.40	42.79	41.02	39.70	38.27	37.16	35.97	34.04	32.40	31.02	29.82	28.75	27.83	27.01	26.31	25.71	25.10	24.65	24.14	23.76
7.6	13.83	45.43	43.77	41.97	40.62	39.15	38.03	36.81	34.84	33.16	31.75	30.52	29.43	28.49	27.65	26.94	26.32	25.70	25.24	24.71	24.33
7.7	14.01	46.46	44.77	42.93	41.55	40.05	38.90	37.66	35.65	33.93	32.49	31.23	30.12	29.16	28.30	27.57	26.94	26.30	25.83	25.30	24.91
7.8	14.19	47.50	45.77	43.89	42.49	40.96	39.78	38.52	36.46	34.71	33.23	31.95	30.81	29.83	28.96	28.21	27.56	26.92	26.43	25.89	25.49
7.9	14.37	48.55	46.79	44.87	43.43	41.87	40.67	39.38	37.28	35.50	33.99	32.68	31.51	30.51	29.62	28.86	28.20	27.53	27.04	26.48	26.08
8.0	14.55	49.61	47.81	45.86	44.39	42.80	41.57	40.25	38.11	36.29	34.75	33.41	32.22	31.20	30.29	29.51	28.84	28.16	27.66	27.09	26.67

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	2.73	2.95	2.82	2.68	2.57	2.46	2.37	2.28	2.13	2.01	1.90	1.81	1.74	1.67	1.61	1.56	1.52	1.47	1.44	1.41	1.38
1.6	2.91	3.28	3.14	2.98	2.86	2.74	2.64	2.54	2.38	2.24	2.13	2.03	1.94	1.87	1.80	1.75	1.70	1.65	1.61	1.57	1.55
1.7	3.09	3.63	3.47	3.30	3.17	3.03	2.93	2.82	2.63	2.48	2.36	2.25	2.15	2.07	2.00	1.94	1.89	1.83	1.79	1.75	1.72
1.8	3.27	3.99	3.82	3.63	3.49	3.34	3.22	3.10	2.90	2.74	2.60	2.48	2.38	2.29	2.21	2.14	2.08	2.03	1.98	1.93	1.90
1.9	3.46	4.37	4.18	3.97	3.82	3.66	3.53	3.40	3.18	3.00	2.85	2.72	2.61	2.51	2.43	2.35	2.29	2.23	2.18	2.13	2.09
2.0	3.64	4.75	4.55	4.33	4.16	3.99	3.85	3.71	3.47	3.28	3.12	2.98	2.85	2.75	2.65	2.57	2.50	2.43	2.38	2.33	2.28
2.1	3.82	5.16	4.93	4.70	4.52	4.33	4.18	4.03	3.78	3.56	3.39	3.24	3.10	2.99	2.89	2.80	2.73	2.65	2.60	2.53	2.49
2.2	4.00	5.57	5.33	5.08	4.89	4.68	4.53	4.36	4.09	3.86	3.67	3.51	3.36	3.24	3.13	3.04	2.96	2.88	2.82	2.75	2.70
2.3	4.18	6.00	5.75	5.47	5.27	5.05	4.88	4.70	4.41	4.17	3.96	3.79	3.63	3.50	3.38	3.28	3.20	3.11	3.05	2.97	2.92
2.4	4.37	6.44	6.17	5.88	5.66	5.42	5.24	5.05	4.74	4.48	4.26	4.08	3.91	3.77	3.64	3.53	3.44	3.35	3.28	3.20	3.15
2.5	4.55	6.90	6.61	6.30	6.06	5.81	5.62	5.42	5.09	4.81	4.57	4.37	4.20	4.04	3.91	3.80	3.70	3.60	3.52	3.44	3.38
2.6	4.73	7.36	7.06	6.73	6.48	6.21	6.01	5.79	5.44	5.14	4.89	4.68	4.49	4.33	4.19	4.06	3.96	3.85	3.78	3.69	3.62
2.7	4.91	7.85	7.52	7.17	6.91	6.62	6.41	6.18	5.80	5.49	5.22	5.00	4.80	4.62	4.47	4.34	4.23	4.12	4.04	3.94	3.87
2.8	5.09	8.34	7.99	7.62	7.34	7.05	6.82	6.57	6.18	5.84	5.56	5.32	5.11	4.93	4.76	4.63	4.51	4.39	4.30	4.20	4.13
2.9	5.28	8.84	8.48	8.09	7.79	7.48	7.24	6.98	6.56	6.21	5.91	5.66	5.43	5.24	5.07	4.92	4.79	4.67	4.58	4.47	4.39
3.0	5.46	9.36	8.98	8.57	8.26	7.92	7.67	7.39	6.95	6.58	6.27	6.00	5.76	5.56	5.38	5.22	5.09	4.96	4.86	4.75	4.66
3.1	5.64	9.89	9.49	9.05	8.73	8.38	8.11	7.82	7.36	6.96	6.64	6.35	6.10	5.89	5.69	5.53	5.39	5.25	5.15	5.03	4.94
3.2	5.82	10.44	10.01	9.55	9.21	8.84	8.56	8.26	7.77	7.36	7.01	6.71	6.45	6.22	6.02	5.85	5.70	5.55	5.44	5.32	5.23
3.3	6.00	10.99	10.55	10.07	9.71	9.32	9.02	8.71	8.19	7.76	7.39	7.08	6.80	6.56	6.35	6.17	6.02	5.86	5.74	5.61	5.52
3.4	6.19	11.56	11.09	10.59	10.21	9.81	9.50	9.16	8.62	8.17	7.79	7.46	7.17	6.92	6.69	6.50	6.34	6.18	6.06	5.92	5.82
3.5	6.37	12.14	11.65	11.12	10.73	10.31	9.98	9.63	9.07	8.59	8.19	7.84	7.54	7.28	7.04	6.84	6.67	6.50	6.37	6.23	6.12
3.6	6.55	12.73	12.22	11.67	11.26	10.81	10.47	10.11	9.52	9.02	8.60	8.24	7.92	7.64	7.40	7.19	7.01	6.83	6.70	6.55	6.44
3.7	6.73	13.33	12.80	12.22	11.80	11.33	10.98	10.59	9.98	9.46	9.02	8.64	8.31	8.02	7.76	7.55	7.36	7.17	7.03	6.87	6.76
3.8	6.91	13.95	13.39	12.79	12.34	11.86	11.49	11.09	10.45	9.90	9.45	9.05	8.70	8.40	8.13	7.91	7.71	7.52	7.37	7.20	7.08
3.9	7.09	14.57	14.00	13.37	12.90	12.40	12.01	11.60	10.93	10.36	9.88	9.47	9.11	8.79	8.51	8.28	8.07	7.87	7.72	7.54	7.42
4.0	7.28	15.21	14.61	13.96	13.47	12.95	12.55	12.11	11.42	10.83	10.33	9.90	9.52	9.19	8.90	8.65	8.44	8.23	8.07	7.89	7.76
4.1	7.46	15.86	15.24	14.56	14.05	13.51	13.09	12.64	11.91	11.30	10.78	10.34	9.94	9.60	9.30	9.04	8.82	8.59	8.43	8.24	8.11
4.2	7.64	16.52	15.87	15.17	14.65	14.08	13.64	13.18	12.42	11.78	11.24	10.78	10.37	10.01	9.70	9.43	9.20	8.97	8.80	8.60	8.46
4.3	7.82	17.19	16.52	15.79	15.25	14.66	14.21	13.72	12.94	12.27	11.71	11.23	10.80	10.44	10.11	9.83	9.59	9.35	9.17	8.97	8.82
4.4	8.00	17.87	17.18	16.42	15.86	15.25	14.78	14.28	13.46	12.77	12.19	11.69	11.25	10.87	10.53	10.24	9.99	9.74	9.55	9.34	9.19
4.5	8.19	18.57	17.85	17.07	16.48	15.85	15.36	14.84	14.00	13.28	12.68	12.16	11.70	11.30	10.95	10.65	10.39	10.13	9.94	9.72	9.56
4.6	8.37	19.28	18.53	17.72	17.11	16.46	15.96	15.41	14.54	13.80	13.18	12.64	12.16	11.75	11.38	11.07	10.80	10.53	10.33	10.11	9.94
4.7	8.55	19.99	19.22	18.38	17.75	17.08	16.56	16.00	15.09	14.33	13.68	13.12	12.63	12.20	11.82	11.50	11.22	10.94	10.74	10.50	10.33

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	8.73	20.72	19.92	19.06	18.41	17.71	17.17	16.59	15.65	14.86	14.19	13.61	13.10	12.66	12.27	11.94	11.65	11.36	11.14	10.90	10.72
4.9	8.91	21.46	20.64	19.74	19.07	18.35	17.79	17.19	16.22	15.40	14.71	14.11	13.58	13.13	12.72	12.38	12.08	11.78	11.56	11.31	11.12
5.0	9.10	22.21	21.36	20.43	19.74	18.99	18.42	17.80	16.80	15.95	15.24	14.62	14.07	13.61	13.18	12.83	12.52	12.21	11.98	11.72	11.53
5.1	9.28	22.97	22.09	21.14	20.42	19.65	19.06	18.42	17.39	16.51	15.78	15.14	14.57	14.09	13.65	13.28	12.97	12.65	12.41	12.14	11.94
5.2	9.46	23.74	22.84	21.85	21.12	20.32	19.71	19.05	17.99	17.08	16.32	15.66	15.08	14.58	14.13	13.75	13.42	13.09	12.84	12.57	12.36
5.3	9.64	24.53	23.59	22.58	21.82	21.00	20.37	19.69	18.59	17.66	16.87	16.19	15.59	15.08	14.61	14.22	13.88	13.54	13.29	13.00	12.79
5.4	9.82	25.32	24.36	23.31	22.53	21.69	21.04	20.34	19.20	18.24	17.44	16.73	16.11	15.58	15.10	14.70	14.35	14.00	13.73	13.44	13.22
5.5	10.01	26.12	25.14	24.06	23.25	22.38	21.71	20.99	19.83	18.84	18.00	17.28	16.64	16.09	15.60	15.18	14.82	14.46	14.19	13.88	13.66
5.6	10.19	26.94	25.92	24.81	23.99	23.09	22.40	21.66	20.46	19.44	18.58	17.84	17.18	16.61	16.10	15.67	15.30	14.93	14.65	14.34	14.11
5.7	10.37	27.76	26.72	25.58	24.73	23.81	23.10	22.33	21.10	20.05	19.17	18.40	17.72	17.14	16.62	16.17	15.79	15.40	15.12	14.80	14.56
5.8	10.55	28.60	27.53	26.35	25.48	24.53	23.80	23.02	21.75	20.67	19.76	18.97	18.27	17.67	17.13	16.68	16.28	15.89	15.59	15.26	15.02
5.9	10.73	29.45	28.34	27.14	26.24	25.26	24.52	23.71	22.40	21.29	20.36	19.55	18.83	18.21	17.66	17.19	16.78	16.38	16.07	15.73	15.48
6.0	10.92	30.31	29.17	27.93	27.01	26.01	25.24	24.41	23.07	21.93	20.97	20.13	19.39	18.76	18.19	17.71	17.29	16.87	16.56	16.21	15.95
6.1	11.10	31.17	30.01	28.74	27.79	26.76	25.97	25.12	23.74	22.57	21.58	20.73	19.97	19.32	18.73	18.24	17.81	17.38	17.06	16.69	16.43
6.2	11.28	32.05	30.86	29.55	28.58	27.52	26.71	25.84	24.42	23.22	22.21	21.33	20.55	19.88	19.28	18.77	18.33	17.89	17.56	17.19	16.91
6.3	11.46	32.94	31.71	30.38	29.38	28.30	27.46	26.57	25.11	23.88	22.84	21.94	21.13	20.45	19.83	19.31	18.86	18.40	18.06	17.68	17.40
6.4	11.64	33.84	32.58	31.21	30.19	29.08	28.22	27.30	25.81	24.55	23.48	22.55	21.73	21.02	20.39	19.86	19.39	18.92	18.58	18.19	17.90
6.5	11.82	34.75	33.46	32.06	31.01	29.87	28.99	28.05	26.52	25.22	24.12	23.17	22.33	21.61	20.96	20.41	19.93	19.45	19.10	18.70	18.40
6.6	12.01	35.67	34.35	32.91	31.83	30.67	29.77	28.80	27.23	25.90	24.78	23.81	22.94	22.20	21.53	20.97	20.48	19.99	19.62	19.21	18.91
6.7	12.19	36.60	35.25	33.77	32.67	31.47	30.55	29.56	27.96	26.59	25.44	24.44	23.56	22.80	22.11	21.54	21.03	20.53	20.16	19.73	19.42
6.8	12.37	37.54	36.15	34.65	33.52	32.29	31.35	30.33	28.69	27.29	26.11	25.09	24.18	23.40	22.70	22.11	21.60	21.08	20.70	20.26	19.95
6.9	12.55	38.49	37.07	35.53	34.37	33.12	32.15	31.11	29.43	28.00	26.79	25.74	24.81	24.01	23.30	22.69	22.16	21.63	21.24	20.80	20.47
7.0	12.73	39.45	38.00	36.42	35.24	33.95	32.97	31.90	30.18	28.71	27.48	26.40	25.45	24.63	23.90	23.28	22.74	22.20	21.79	21.34	21.01
7.1	12.92	40.42	38.94	37.32	36.11	34.80	33.79	32.70	30.94	29.44	28.17	27.07	26.09	25.26	24.51	23.87	23.32	22.76	22.35	21.89	21.54
7.2	13.10	41.40	39.89	38.23	36.99	35.65	34.62	33.51	31.70	30.17	28.87	27.75	26.75	25.89	25.12	24.47	23.91	23.34	22.92	22.44	22.09
7.3	13.28	42.39	40.84	39.15	37.89	36.51	35.46	34.32	32.47	30.90	29.58	28.43	27.41	26.53	25.74	25.08	24.50	23.92	23.49	23.00	22.64
7.4	13.46	43.39	41.81	40.08	38.79	37.39	36.31	35.14	33.25	31.65	30.29	29.12	28.07	27.18	26.37	25.69	25.10	24.51	24.06	23.56	23.20
7.5	13.64	44.40	42.79	41.02	39.70	38.27	37.16	35.97	34.04	32.40	31.02	29.82	28.75	27.83	27.01	26.31	25.71	25.10	24.65	24.14	23.76
7.6	13.83	45.43	43.77	41.97	40.62	39.15	38.03	36.81	34.84	33.16	31.75	30.52	29.43	28.49	27.65	26.94	26.32	25.70	25.24	24.71	24.33
7.7	14.01	46.46	44.77	42.93	41.55	40.05	38.90	37.66	35.65	33.93	32.49	31.23	30.12	29.16	28.30	27.57	26.94	26.30	25.83	25.30	24.91
7.8	14.19	47.50	45.77	43.89	42.49	40.96	39.78	38.52	36.46	34.71	33.23	31.95	30.81	29.83	28.96	28.21	27.56	26.92	26.43	25.89	25.49
7.9	14.37	48.55	46.79	44.87	43.43	41.87	40.67	39.38	37.28	35.50	33.99	32.68	31.51	30.51	29.62	28.86	28.20	27.53	27.04	26.48	26.08
8.0	14.55	49.61	47.81	45.86	44.39	42.80	41.57	40.25	38.11	36.29	34.75	33.41	32.22	31.20	30.29	29.51	28.84	28.16	27.66	27.09	26.67
8.1	14.74	56.61	54.43	52.05	50.25	48.30	46.81	45.19	42.57	40.35	38.45	36.82	35.39	34.15	33.04	32.08	31.22	30.43	29.71	29.12	28.54

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	4.08	1.39	1.33	1.25	1.23	1.20	1.18	1.16	1.12	1.09	1.06	1.03	1.01	0.99	0.97	0.95	0.94	0.92	0.91	0.89	0.88
1.6	4.35	1.56	1.48	1.40	1.37	1.34	1.32	1.30	1.26	1.22	1.19	1.16	1.13	1.11	1.09	1.07	1.05	1.03	1.02	1.00	0.99
1.7	4.62	1.73	1.65	1.55	1.53	1.49	1.47	1.44	1.40	1.36	1.32	1.29	1.26	1.23	1.21	1.19	1.17	1.15	1.13	1.12	1.10
1.8	4.90	1.91	1.82	1.72	1.69	1.65	1.62	1.59	1.54	1.50	1.46	1.43	1.39	1.36	1.34	1.31	1.29	1.27	1.25	1.24	1.22
1.9	5.17	2.10	2.00	1.89	1.85	1.81	1.78	1.75	1.70	1.65	1.61	1.57	1.53	1.50	1.47	1.45	1.42	1.40	1.38	1.36	1.34
2.0	5.44	2.29	2.18	2.06	2.02	1.98	1.95	1.92	1.86	1.81	1.76	1.72	1.68	1.64	1.61	1.58	1.56	1.53	1.51	1.49	1.47
2.1	5.71	2.49	2.38	2.25	2.20	2.16	2.13	2.09	2.02	1.97	1.92	1.87	1.83	1.79	1.76	1.73	1.70	1.67	1.65	1.63	1.60
2.2	5.98	2.70	2.58	2.44	2.39	2.34	2.31	2.27	2.20	2.13	2.08	2.03	1.99	1.95	1.91	1.88	1.84	1.82	1.79	1.77	1.74
2.3	6.26	2.92	2.79	2.63	2.58	2.53	2.49	2.45	2.37	2.31	2.25	2.20	2.15	2.11	2.07	2.03	2.00	1.97	1.94	1.91	1.89
2.4	6.53	3.14	3.00	2.84	2.78	2.73	2.69	2.64	2.56	2.49	2.42	2.37	2.32	2.27	2.23	2.19	2.15	2.12	2.09	2.06	2.04
2.5	6.80	3.37	3.22	3.05	2.99	2.93	2.89	2.84	2.75	2.67	2.61	2.55	2.49	2.44	2.40	2.35	2.32	2.28	2.25	2.22	2.19
2.6	7.07	3.61	3.45	3.26	3.20	3.14	3.09	3.04	2.95	2.87	2.79	2.73	2.67	2.62	2.57	2.52	2.48	2.44	2.41	2.38	2.35
2.7	7.34	3.86	3.68	3.49	3.42	3.36	3.30	3.25	3.15	3.06	2.99	2.92	2.85	2.80	2.75	2.70	2.66	2.62	2.58	2.54	2.51
2.8	7.62	4.11	3.92	3.71	3.65	3.58	3.52	3.46	3.36	3.27	3.18	3.11	3.04	2.98	2.93	2.88	2.83	2.79	2.75	2.71	2.68
2.9	7.89	4.37	4.17	3.95	3.88	3.81	3.75	3.68	3.57	3.47	3.39	3.31	3.24	3.18	3.12	3.07	3.02	2.97	2.93	2.89	2.85
3.0	8.16	4.63	4.43	4.19	4.12	4.04	3.98	3.91	3.79	3.69	3.60	3.52	3.44	3.37	3.31	3.26	3.20	3.16	3.11	3.07	3.03
3.1	8.43	4.91	4.69	4.44	4.36	4.28	4.21	4.14	4.02	3.91	3.81	3.73	3.65	3.58	3.51	3.45	3.40	3.35	3.30	3.26	3.22
3.2	8.70	5.19	4.96	4.69	4.61	4.53	4.45	4.38	4.25	4.14	4.03	3.94	3.86	3.78	3.72	3.65	3.60	3.54	3.49	3.45	3.40
3.3	8.98	5.47	5.23	4.96	4.87	4.78	4.70	4.62	4.49	4.37	4.26	4.16	4.08	4.00	3.93	3.86	3.80	3.74	3.69	3.64	3.60
3.4	9.25	5.76	5.51	5.22	5.13	5.04	4.96	4.87	4.73	4.60	4.49	4.39	4.30	4.22	4.14	4.07	4.01	3.95	3.89	3.84	3.80
3.5	9.52	6.06	5.80	5.50	5.40	5.30	5.22	5.13	4.98	4.85	4.73	4.62	4.53	4.44	4.36	4.29	4.22	4.16	4.10	4.05	4.00
3.6	9.79	6.37	6.09	5.77	5.67	5.57	5.48	5.39	5.23	5.10	4.97	4.86	4.76	4.67	4.59	4.51	4.44	4.37	4.31	4.26	4.21
3.7	10.06	6.68	6.39	6.06	5.96	5.84	5.75	5.66	5.49	5.35	5.22	5.10	5.00	4.90	4.82	4.73	4.66	4.59	4.53	4.47	4.42
3.8	10.34	7.00	6.70	6.35	6.24	6.13	6.03	5.93	5.76	5.61	5.47	5.35	5.24	5.14	5.05	4.97	4.89	4.82	4.75	4.69	4.63
3.9	10.61	7.33	7.01	6.65	6.53	6.41	6.31	6.21	6.03	5.87	5.73	5.60	5.49	5.38	5.29	5.20	5.12	5.05	4.98	4.91	4.86
4.0	10.88	7.66	7.33	6.95	6.83	6.71	6.60	6.49	6.31	6.14	6.00	5.86	5.74	5.63	5.53	5.44	5.36	5.28	5.21	5.14	5.08
4.1	11.15	8.00	7.65	7.26	7.14	7.01	6.90	6.79	6.59	6.42	6.26	6.13	6.00	5.89	5.78	5.69	5.60	5.52	5.45	5.38	5.31
4.2	11.42	8.34	7.98	7.58	7.45	7.31	7.20	7.08	6.88	6.70	6.54	6.40	6.26	6.15	6.04	5.94	5.85	5.76	5.69	5.61	5.55
4.3	11.70	8.69	8.32	7.90	7.76	7.62	7.50	7.38	7.17	6.99	6.82	6.67	6.53	6.41	6.30	6.20	6.10	6.01	5.93	5.86	5.79
4.4	11.97	9.05	8.66	8.22	8.08	7.94	7.82	7.69	7.47	7.28	7.10	6.95	6.81	6.68	6.56	6.46	6.36	6.27	6.18	6.10	6.03
4.5	12.24	9.42	9.01	8.56	8.41	8.26	8.13	8.00	7.77	7.57	7.39	7.23	7.09	6.95	6.83	6.72	6.62	6.52	6.44	6.36	6.28
4.6	12.51	9.79	9.37	8.90	8.75	8.59	8.46	8.32	8.08	7.88	7.69	7.52	7.37	7.23	7.11	6.99	6.89	6.79	6.70	6.61	6.53
4.7	12.78	10.16	9.73	9.24	9.08	8.92	8.78	8.64	8.40	8.18	7.99	7.82	7.66	7.52	7.39	7.27	7.16	7.05	6.96	6.87	6.79

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" **Uponor PEX-a** — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	13.06	10.55	10.10	9.59	9.43	9.26	9.12	8.97	8.72	8.50	8.29	8.12	7.95	7.80	7.67	7.55	7.43	7.32	7.23	7.14	7.05
4.9	13.33	10.93	10.47	9.95	9.78	9.60	9.46	9.31	9.04	8.81	8.61	8.42	8.25	8.10	7.96	7.83	7.71	7.60	7.50	7.41	7.32
5.0	13.60	11.33	10.85	10.31	10.13	9.95	9.80	9.65	9.38	9.14	8.92	8.73	8.55	8.40	8.25	8.12	8.00	7.88	7.78	7.68	7.59
5.1	13.87	11.73	11.24	10.67	10.50	10.31	10.15	9.99	9.71	9.46	9.24	9.04	8.86	8.70	8.55	8.41	8.29	8.17	8.06	7.96	7.87
5.2	14.14	12.14	11.63	11.05	10.86	10.67	10.51	10.34	10.05	9.80	9.57	9.36	9.18	9.01	8.85	8.71	8.58	8.46	8.35	8.24	8.15
5.3	14.42	12.55	12.03	11.43	11.24	11.04	10.87	10.70	10.40	10.14	9.90	9.69	9.49	9.32	9.16	9.01	8.88	8.75	8.64	8.53	8.43
5.4	14.69	12.97	12.43	11.81	11.61	11.41	11.24	11.06	10.75	10.48	10.23	10.02	9.82	9.64	9.47	9.32	9.18	9.05	8.93	8.83	8.72
5.5	14.96	13.40	12.84	12.20	12.00	11.79	11.61	11.43	11.11	10.83	10.58	10.35	10.15	9.96	9.79	9.63	9.49	9.36	9.24	9.12	9.02
5.6	15.23	13.83	13.25	12.60	12.39	12.17	11.99	11.80	11.47	11.18	10.92	10.69	10.48	10.29	10.11	9.95	9.80	9.67	9.54	9.42	9.31
5.7	15.50	14.27	13.67	13.00	12.78	12.56	12.37	12.17	11.84	11.54	11.27	11.03	10.82	10.62	10.44	10.27	10.12	9.98	9.85	9.73	9.62
5.8	15.78	14.71	14.10	13.40	13.18	12.95	12.76	12.56	12.21	11.90	11.63	11.38	11.16	10.95	10.77	10.60	10.44	10.30	10.16	10.04	9.92
5.9	16.05	15.16	14.53	13.82	13.59	13.35	13.15	12.94	12.59	12.27	11.99	11.74	11.51	11.30	11.11	10.93	10.77	10.62	10.48	10.35	10.23
6.0	16.32	15.62	14.97	14.23	14.00	13.75	13.55	13.34	12.97	12.65	12.36	12.09	11.86	11.64	11.45	11.27	11.10	10.94	10.80	10.67	10.55
6.1	16.59	16.08	15.41	14.66	14.42	14.16	13.95	13.74	13.36	13.03	12.73	12.46	12.21	11.99	11.79	11.61	11.44	11.27	11.13	11.00	10.87
6.2	16.86	16.54	15.86	15.09	14.84	14.58	14.36	14.14	13.75	13.41	13.10	12.83	12.58	12.35	12.14	11.95	11.78	11.61	11.46	11.32	11.19
6.3	17.13	17.02	16.32	15.52	15.27	15.00	14.78	14.55	14.15	13.80	13.48	13.20	12.94	12.71	12.50	12.30	12.12	11.95	11.80	11.66	11.52
6.4	17.41	17.50	16.78	15.96	15.70	15.43	15.20	14.96	14.55	14.19	13.87	13.58	13.31	13.07	12.85	12.65	12.47	12.29	12.14	11.99	11.85
6.5	17.68	17.98	17.25	16.40	16.14	15.86	15.62	15.38	14.96	14.59	14.26	13.96	13.69	13.44	13.22	13.01	12.82	12.64	12.48	12.33	12.19
6.6	17.95	18.47	17.72	16.86	16.58	16.29	16.05	15.81	15.38	14.99	14.65	14.35	14.07	13.82	13.59	13.37	13.18	13.00	12.83	12.68	12.53
6.7	18.22	18.97	18.20	17.31	17.03	16.73	16.49	16.23	15.79	15.40	15.05	14.74	14.45	14.19	13.96	13.74	13.54	13.35	13.18	13.03	12.88
6.8	18.49	19.47	18.68	17.77	17.48	17.18	16.93	16.67	16.22	15.82	15.46	15.14	14.84	14.58	14.34	14.11	13.91	13.72	13.54	13.38	13.23
6.9	18.77	19.98	19.17	18.24	17.94	17.63	17.38	17.11	16.65	16.24	15.87	15.54	15.24	14.97	14.72	14.49	14.28	14.08	13.90	13.74	13.58
7.0	19.04	20.50	19.66	18.71	18.41	18.09	17.83	17.55	17.08	16.66	16.28	15.94	15.64	15.36	15.10	14.87	14.65	14.45	14.27	14.10	13.94
7.1	19.31	21.02	20.16	19.19	18.88	18.55	18.28	18.00	17.52	17.09	16.70	16.35	16.04	15.75	15.49	15.25	15.03	14.83	14.64	14.47	14.30
7.2	19.58	21.54	20.67	19.67	19.36	19.02	18.75	18.46	17.96	17.52	17.12	16.77	16.45	16.16	15.89	15.64	15.42	15.21	15.02	14.84	14.67
7.3	19.85	22.07	21.18	20.16	19.84	19.49	19.21	18.92	18.41	17.96	17.55	17.19	16.86	16.56	16.29	16.04	15.81	15.59	15.39	15.21	15.04
7.4	20.13	22.61	21.70	20.65	20.32	19.97	19.68	19.38	18.86	18.40	17.99	17.62	17.28	16.97	16.69	16.44	16.20	15.98	15.78	15.59	15.42
7.5	20.40	23.15	22.22	21.15	20.81	20.46	20.16	19.85	19.32	18.85	18.42	18.05	17.70	17.39	17.10	16.84	16.60	16.37	16.17	15.97	15.80
7.6	20.67	23.70	22.75	21.66	21.31	20.95	20.64	20.33	19.78	19.30	18.87	18.48	18.13	17.81	17.52	17.25	17.00	16.77	16.56	16.36	16.18
7.7	20.94	24.26	23.28	22.17	21.81	21.44	21.13	20.81	20.25	19.76	19.32	18.92	18.56	18.23	17.93	17.66	17.41	17.17	16.95	16.75	16.57
7.8	21.21	24.82	23.82	22.68	22.32	21.94	21.62	21.29	20.72	20.22	19.77	19.36	18.99	18.66	18.36	18.07	17.82	17.57	17.35	17.15	16.96
7.9	21.49	25.38	24.36	23.20	22.83	22.44	22.12	21.78	21.20	20.69	20.22	19.81	19.43	19.09	18.78	18.49	18.23	17.98	17.76	17.55	17.36
8.0	21.76	25.95	24.91	23.73	23.35	22.95	22.62	22.28	21.68	21.16	20.69	20.26	19.88	19.53	19.21	18.92	18.65	18.40	18.17	17.96	17.76

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	4.08	1.91	1.84	1.77	1.71	1.65	1.61	1.56	1.47	1.40	1.34	1.29	1.24	1.20	1.17	1.14	1.11	1.08	1.06	1.04	1.02
1.6	4.35	2.13	2.05	1.97	1.91	1.85	1.79	1.74	1.65	1.57	1.50	1.44	1.39	1.35	1.31	1.27	1.24	1.21	1.19	1.16	1.14
1.7	4.62	2.35	2.27	2.19	2.12	2.05	1.99	1.93	1.83	1.74	1.67	1.60	1.55	1.50	1.45	1.42	1.38	1.35	1.32	1.29	1.27
1.8	4.90	2.59	2.50	2.41	2.34	2.26	2.19	2.13	2.02	1.92	1.84	1.77	1.71	1.65	1.60	1.56	1.53	1.49	1.46	1.43	1.41
1.9	5.17	2.84	2.74	2.64	2.56	2.48	2.41	2.33	2.21	2.11	2.02	1.94	1.88	1.82	1.76	1.72	1.68	1.64	1.61	1.57	1.55
2.0	5.44	3.10	2.99	2.88	2.80	2.70	2.63	2.55	2.42	2.31	2.21	2.12	2.05	1.99	1.93	1.88	1.83	1.79	1.76	1.72	1.70
2.1	5.71	3.36	3.25	3.13	3.04	2.94	2.86	2.77	2.63	2.51	2.40	2.31	2.23	2.16	2.10	2.05	2.00	1.95	1.91	1.88	1.85
2.2	5.98	3.64	3.52	3.39	3.29	3.18	3.09	3.00	2.85	2.72	2.61	2.51	2.42	2.35	2.28	2.22	2.17	2.12	2.08	2.04	2.01
2.3	6.26	3.93	3.80	3.66	3.55	3.43	3.34	3.24	3.08	2.94	2.82	2.71	2.62	2.54	2.46	2.40	2.35	2.29	2.25	2.20	2.17
2.4	6.53	4.22	4.08	3.93	3.82	3.69	3.59	3.49	3.31	3.16	3.03	2.92	2.82	2.73	2.65	2.59	2.53	2.47	2.42	2.38	2.34
2.5	6.80	4.52	4.38	4.22	4.09	3.96	3.85	3.74	3.55	3.39	3.26	3.13	3.03	2.94	2.85	2.78	2.72	2.66	2.60	2.55	2.52
2.6	7.07	4.84	4.68	4.51	4.38	4.24	4.12	4.00	3.80	3.63	3.49	3.36	3.25	3.15	3.06	2.98	2.91	2.85	2.79	2.74	2.70
2.7	7.34	5.16	4.99	4.81	4.67	4.52	4.40	4.27	4.06	3.88	3.72	3.58	3.47	3.36	3.26	3.19	3.11	3.04	2.98	2.93	2.88
2.8	7.62	5.49	5.31	5.12	4.97	4.81	4.69	4.55	4.33	4.13	3.97	3.82	3.69	3.58	3.48	3.40	3.32	3.24	3.18	3.12	3.07
2.9	7.89	5.83	5.64	5.44	5.28	5.11	4.98	4.83	4.60	4.39	4.22	4.06	3.93	3.81	3.70	3.62	3.53	3.45	3.39	3.32	3.27
3.0	8.16	6.17	5.98	5.76	5.60	5.42	5.28	5.13	4.88	4.66	4.47	4.31	4.17	4.04	3.93	3.84	3.75	3.66	3.59	3.53	3.48
3.1	8.43	6.53	6.32	6.10	5.92	5.74	5.59	5.42	5.16	4.93	4.74	4.56	4.42	4.28	4.16	4.07	3.97	3.88	3.81	3.74	3.68
3.2	8.70	6.89	6.68	6.44	6.26	6.06	5.90	5.73	5.45	5.22	5.01	4.83	4.67	4.53	4.40	4.30	4.20	4.11	4.03	3.95	3.90
3.3	8.98	7.27	7.04	6.79	6.60	6.39	6.22	6.05	5.75	5.50	5.29	5.09	4.93	4.78	4.65	4.54	4.44	4.34	4.26	4.18	4.12
3.4	9.25	7.65	7.41	7.15	6.95	6.73	6.55	6.37	6.06	5.80	5.57	5.37	5.20	5.04	4.90	4.79	4.68	4.57	4.49	4.40	4.34
3.5	9.52	8.04	7.78	7.51	7.30	7.08	6.89	6.70	6.38	6.10	5.86	5.65	5.47	5.31	5.16	5.04	4.92	4.81	4.73	4.64	4.57
3.6	9.79	8.43	8.17	7.89	7.67	7.43	7.24	7.03	6.70	6.41	6.15	5.93	5.75	5.58	5.42	5.30	5.17	5.06	4.97	4.87	4.81
3.7	10.06	8.84	8.56	8.27	8.04	7.79	7.59	7.37	7.02	6.72	6.46	6.23	6.03	5.85	5.69	5.56	5.43	5.31	5.22	5.12	5.05
3.8	10.34	9.25	8.97	8.66	8.42	8.16	7.95	7.72	7.36	7.04	6.77	6.53	6.32	6.13	5.96	5.83	5.69	5.57	5.47	5.37	5.29
3.9	10.61	9.68	9.38	9.05	8.80	8.53	8.31	8.08	7.70	7.37	7.08	6.83	6.61	6.42	6.24	6.10	5.96	5.83	5.73	5.62	5.54
4.0	10.88	10.11	9.79	9.46	9.20	8.92	8.69	8.44	8.05	7.70	7.40	7.14	6.92	6.71	6.53	6.38	6.24	6.10	5.99	5.88	5.80
4.1	11.15	10.55	10.22	9.87	9.60	9.31	9.07	8.81	8.40	8.04	7.73	7.46	7.22	7.01	6.82	6.67	6.52	6.38	6.26	6.14	6.06
4.2	11.42	10.99	10.65	10.29	10.01	9.70	9.46	9.19	8.76	8.39	8.07	7.78	7.54	7.32	7.12	6.96	6.80	6.66	6.53	6.41	6.32
4.3	11.70	11.45	11.10	10.72	10.42	10.11	9.85	9.58	9.13	8.74	8.41	8.11	7.86	7.63	7.42	7.26	7.09	6.94	6.81	6.69	6.60
4.4	11.97	11.91	11.54	11.15	10.85	10.52	10.25	9.97	9.50	9.10	8.75	8.45	8.18	7.95	7.73	7.56	7.39	7.23	7.10	6.97	6.87
4.5	12.24	12.38	12.00	11.59	11.28	10.94	10.66	10.37	9.89	9.47	9.11	8.79	8.51	8.27	8.04	7.86	7.69	7.52	7.39	7.25	7.15
4.6	12.51	12.86	12.46	12.04	11.72	11.36	11.08	10.77	10.27	9.84	9.46	9.13	8.85	8.60	8.36	8.18	7.99	7.82	7.68	7.54	7.44
4.7	12.78	13.34	12.94	12.50	12.16	11.80	11.50	11.18	10.67	10.22	9.83	9.49	9.19	8.93	8.69	8.50	8.31	8.13	7.98	7.84	7.73

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	13.06	13.83	13.42	12.97	12.61	12.24	11.93	11.60	11.07	10.60	10.20	9.85	9.54	9.27	9.02	8.82	8.62	8.44	8.29	8.14	8.03
4.9	13.33	14.33	13.90	13.44	13.07	12.68	12.37	12.03	11.47	10.99	10.58	10.21	9.90	9.61	9.36	9.15	8.94	8.76	8.60	8.44	8.33
5.0	13.60	14.84	14.40	13.92	13.54	13.14	12.81	12.46	11.89	11.39	10.96	10.58	10.26	9.96	9.70	9.48	9.27	9.08	8.91	8.75	8.63
5.1	13.87	15.36	14.90	14.40	14.01	13.60	13.26	12.90	12.31	11.79	11.35	10.96	10.62	10.32	10.04	9.82	9.60	9.40	9.23	9.07	8.94
5.2	14.14	15.88	15.41	14.89	14.49	14.06	13.72	13.34	12.73	12.20	11.74	11.34	10.99	10.68	10.40	10.17	9.94	9.73	9.56	9.39	9.26
5.3	14.42	16.41	15.92	15.40	14.98	14.54	14.18	13.79	13.17	12.62	12.15	11.73	11.37	11.05	10.75	10.52	10.29	10.07	9.89	9.71	9.58
5.4	14.69	16.95	16.45	15.90	15.48	15.02	14.65	14.25	13.60	13.04	12.55	12.12	11.75	11.42	11.12	10.87	10.63	10.41	10.23	10.04	9.91
5.5	14.96	17.50	16.98	16.42	15.98	15.51	15.13	14.72	14.05	13.47	12.97	12.52	12.14	11.80	11.49	11.23	10.99	10.76	10.57	10.38	10.24
5.6	15.23	18.05	17.52	16.94	16.49	16.00	15.61	15.19	14.50	13.90	13.38	12.93	12.53	12.18	11.86	11.60	11.35	11.11	10.91	10.72	10.57
5.7	15.50	18.62	18.06	17.47	17.00	16.51	16.10	15.67	14.96	14.34	13.81	13.34	12.93	12.57	12.24	11.97	11.71	11.47	11.26	11.06	10.91
5.8	15.78	19.18	18.62	18.01	17.53	17.01	16.60	16.15	15.42	14.79	14.24	13.75	13.34	12.96	12.62	12.35	12.08	11.83	11.62	11.41	11.26
5.9	16.05	19.76	19.18	18.55	18.06	17.53	17.10	16.64	15.89	15.24	14.67	14.18	13.75	13.36	13.01	12.73	12.45	12.19	11.98	11.77	11.61
6.0	16.32	20.34	19.74	19.10	18.59	18.05	17.61	17.14	16.37	15.70	15.12	14.60	14.16	13.77	13.41	13.12	12.83	12.57	12.35	12.13	11.96
6.1	16.59	20.93	20.32	19.66	19.14	18.58	18.13	17.64	16.85	16.16	15.56	15.04	14.59	14.18	13.81	13.51	13.21	12.94	12.72	12.49	12.32
6.2	16.86	21.53	20.90	20.22	19.69	19.11	18.65	18.15	17.34	16.63	16.02	15.48	15.01	14.60	14.21	13.91	13.60	13.32	13.09	12.86	12.69
6.3	17.13	22.14	21.49	20.79	20.24	19.66	19.18	18.67	17.83	17.11	16.48	15.92	15.45	15.02	14.62	14.31	14.00	13.71	13.47	13.23	13.06
6.4	17.41	22.75	22.09	21.37	20.81	20.21	19.72	19.19	18.33	17.59	16.94	16.37	15.88	15.44	15.04	14.72	14.40	14.10	13.86	13.61	13.43
6.5	17.68	23.37	22.69	21.95	21.38	20.76	20.26	19.72	18.84	18.08	17.41	16.83	16.33	15.87	15.46	15.13	14.80	14.50	14.25	14.00	13.81
6.6	17.95	24.00	23.30	22.55	21.96	21.32	20.81	20.26	19.35	18.57	17.89	17.29	16.77	16.31	15.89	15.55	15.21	14.90	14.64	14.38	14.19
6.7	18.22	24.63	23.92	23.14	22.54	21.89	21.36	20.80	19.87	19.07	18.37	17.76	17.23	16.75	16.32	15.97	15.62	15.31	15.04	14.78	14.58
6.8	18.49	25.27	24.54	23.75	23.13	22.46	21.92	21.35	20.40	19.58	18.86	18.23	17.69	17.20	16.76	16.40	16.04	15.72	15.45	15.18	14.98
6.9	18.77	25.92	25.17	24.36	23.73	23.05	22.49	21.90	20.93	20.09	19.35	18.71	18.15	17.65	17.20	16.83	16.47	16.13	15.85	15.58	15.37
7.0	19.04	26.58	25.81	24.98	24.33	23.63	23.07	22.46	21.47	20.60	19.85	19.19	18.62	18.11	17.64	17.27	16.90	16.55	16.27	15.99	15.78
7.1	19.31	27.24	26.46	25.61	24.94	24.23	23.65	23.03	22.01	21.13	20.36	19.68	19.10	18.57	18.10	17.71	17.33	16.98	16.69	16.40	16.18
7.2	19.58	27.91	27.11	26.24	25.56	24.83	24.24	23.60	22.56	21.65	20.87	20.17	19.58	19.04	18.55	18.16	17.77	17.41	17.11	16.81	16.59
7.3	19.85	28.59	27.77	26.88	26.18	25.44	24.83	24.18	23.11	22.19	21.38	20.67	20.06	19.52	19.01	18.61	18.21	17.85	17.54	17.24	17.01
7.4	20.13	29.27	28.43	27.52	26.81	26.05	25.43	24.76	23.67	22.73	21.91	21.18	20.56	20.00	19.48	19.07	18.66	18.29	17.97	17.66	17.43
7.5	20.40	29.96	29.10	28.18	27.45	26.67	26.03	25.35	24.24	23.27	22.43	21.69	21.05	20.48	19.95	19.53	19.12	18.73	18.41	18.09	17.86
7.6	20.67	30.66	29.78	28.84	28.09	27.30	26.65	25.95	24.81	23.83	22.96	22.20	21.55	20.97	20.43	20.00	19.57	19.18	18.85	18.53	18.29
7.7	20.94	31.37	30.47	29.50	28.74	27.93	27.27	26.56	25.39	24.38	23.50	22.73	22.06	21.46	20.91	20.47	20.04	19.64	19.30	18.97	18.72
7.8	21.21	32.08	31.16	30.17	29.40	28.57	27.89	27.17	25.98	24.94	24.05	23.25	22.57	21.96	21.40	20.95	20.51	20.10	19.75	19.41	19.16
7.9	21.49	32.80	31.86	30.85	30.06	29.21	28.52	27.78	26.57	25.51	24.60	23.79	23.09	22.47	21.89	21.43	20.98	20.56	20.21	19.86	19.60
8.0	21.76	33.53	32.57	31.54	30.73	29.86	29.16	28.40	27.16	26.09	25.15	24.32	23.61	22.98	22.39	21.92	21.46	21.03	20.67	20.32	20.05

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	4.08	2.25	2.15	2.05	1.97	1.88	1.82	1.75	1.64	1.55	1.47	1.40	1.34	1.29	1.25	1.21	1.18	1.14	1.12	1.09	1.07
1.6	4.35	2.51	2.40	2.28	2.19	2.10	2.03	1.95	1.83	1.73	1.64	1.57	1.50	1.45	1.40	1.35	1.32	1.28	1.25	1.22	1.20
1.7	4.62	2.77	2.65	2.52	2.43	2.33	2.25	2.16	2.03	1.92	1.82	1.74	1.67	1.61	1.55	1.50	1.46	1.42	1.39	1.36	1.34
1.8	4.90	3.05	2.92	2.78	2.67	2.56	2.48	2.38	2.24	2.11	2.01	1.92	1.84	1.77	1.71	1.66	1.62	1.57	1.54	1.50	1.48
1.9	5.17	3.34	3.20	3.04	2.93	2.81	2.71	2.61	2.45	2.32	2.20	2.11	2.02	1.95	1.88	1.83	1.78	1.73	1.69	1.65	1.63
2.0	5.44	3.64	3.48	3.32	3.20	3.06	2.96	2.85	2.68	2.53	2.41	2.30	2.21	2.13	2.06	2.00	1.95	1.89	1.85	1.81	1.78
2.1	5.71	3.94	3.78	3.60	3.47	3.33	3.22	3.10	2.91	2.75	2.62	2.51	2.40	2.32	2.24	2.17	2.12	2.06	2.02	1.97	1.94
2.2	5.98	4.26	4.09	3.90	3.75	3.60	3.48	3.36	3.15	2.98	2.84	2.72	2.61	2.51	2.43	2.36	2.30	2.24	2.19	2.14	2.10
2.3	6.26	4.59	4.41	4.20	4.05	3.88	3.76	3.62	3.40	3.22	3.07	2.93	2.82	2.72	2.63	2.55	2.48	2.42	2.37	2.32	2.28
2.4	6.53	4.93	4.73	4.51	4.35	4.17	4.04	3.89	3.66	3.47	3.30	3.16	3.03	2.92	2.83	2.75	2.68	2.61	2.55	2.50	2.45
2.5	6.80	5.29	5.07	4.84	4.66	4.47	4.33	4.18	3.93	3.72	3.54	3.39	3.26	3.14	3.04	2.95	2.88	2.80	2.74	2.68	2.64
2.6	7.07	5.65	5.42	5.17	4.98	4.78	4.63	4.47	4.20	3.98	3.79	3.63	3.49	3.36	3.25	3.16	3.08	3.00	2.94	2.87	2.82
2.7	7.34	6.02	5.77	5.51	5.31	5.10	4.94	4.76	4.48	4.25	4.05	3.87	3.72	3.59	3.48	3.38	3.29	3.21	3.14	3.07	3.02
2.8	7.62	6.40	6.14	5.86	5.65	5.43	5.26	5.07	4.77	4.52	4.31	4.13	3.97	3.83	3.70	3.60	3.51	3.42	3.35	3.28	3.22
2.9	7.89	6.79	6.51	6.22	6.00	5.76	5.58	5.39	5.07	4.80	4.58	4.39	4.22	4.07	3.94	3.83	3.73	3.64	3.57	3.49	3.43
3.0	8.16	7.19	6.90	6.59	6.36	6.11	5.92	5.71	5.38	5.10	4.86	4.65	4.47	4.32	4.18	4.06	3.96	3.86	3.79	3.70	3.64
3.1	8.43	7.60	7.29	6.97	6.72	6.46	6.26	6.04	5.69	5.39	5.14	4.93	4.74	4.57	4.43	4.30	4.20	4.09	4.01	3.92	3.86
3.2	8.70	8.01	7.70	7.35	7.10	6.82	6.61	6.38	6.01	5.70	5.44	5.21	5.01	4.84	4.68	4.55	4.44	4.33	4.24	4.15	4.08
3.3	8.98	8.44	8.11	7.75	7.48	7.19	6.97	6.73	6.34	6.01	5.73	5.50	5.28	5.10	4.94	4.81	4.69	4.57	4.48	4.38	4.31
3.4	9.25	8.88	8.53	8.15	7.87	7.57	7.33	7.08	6.67	6.33	6.04	5.79	5.57	5.38	5.21	5.06	4.94	4.82	4.72	4.62	4.54
3.5	9.52	9.33	8.96	8.57	8.27	7.95	7.71	7.44	7.02	6.66	6.35	6.09	5.86	5.66	5.48	5.33	5.20	5.07	4.97	4.86	4.78
3.6	9.79	9.78	9.40	8.99	8.68	8.35	8.09	7.81	7.37	6.99	6.67	6.40	6.15	5.95	5.76	5.60	5.46	5.33	5.23	5.11	5.03
3.7	10.06	10.25	9.85	9.42	9.10	8.75	8.48	8.19	7.73	7.33	7.00	6.71	6.46	6.24	6.04	5.88	5.74	5.59	5.49	5.36	5.28
3.8	10.34	10.72	10.31	9.86	9.52	9.16	8.88	8.58	8.09	7.68	7.33	7.03	6.77	6.54	6.33	6.16	6.01	5.86	5.75	5.62	5.53
3.9	10.61	11.21	10.78	10.31	9.96	9.58	9.28	8.97	8.46	8.03	7.67	7.36	7.08	6.84	6.63	6.45	6.29	6.14	6.02	5.89	5.79
4.0	10.88	11.70	11.25	10.76	10.40	10.00	9.70	9.37	8.84	8.40	8.02	7.69	7.40	7.16	6.93	6.75	6.58	6.42	6.30	6.16	6.06
4.1	11.15	12.20	11.74	11.23	10.85	10.44	10.12	9.78	9.23	8.77	8.37	8.03	7.73	7.47	7.24	7.05	6.88	6.71	6.58	6.44	6.33
4.2	11.42	12.71	12.23	11.70	11.30	10.88	10.55	10.20	9.63	9.14	8.73	8.38	8.07	7.80	7.56	7.35	7.18	7.00	6.87	6.72	6.61
4.3	11.70	13.23	12.73	12.18	11.77	11.33	10.99	10.62	10.03	9.52	9.10	8.73	8.41	8.13	7.88	7.66	7.48	7.30	7.16	7.01	6.89
4.4	11.97	13.76	13.24	12.67	12.25	11.79	11.43	11.05	10.44	9.91	9.47	9.09	8.75	8.46	8.20	7.98	7.79	7.60	7.46	7.30	7.18
4.5	12.24	14.30	13.76	13.17	12.73	12.25	11.88	11.49	10.85	10.31	9.85	9.46	9.11	8.80	8.54	8.31	8.11	7.91	7.76	7.60	7.47
4.6	12.51	14.84	14.28	13.67	13.22	12.72	12.34	11.94	11.27	10.71	10.24	9.83	9.46	9.15	8.87	8.64	8.43	8.22	8.07	7.90	7.77
4.7	12.78	15.40	14.82	14.19	13.72	13.20	12.81	12.39	11.70	11.12	10.63	10.21	9.83	9.51	9.22	8.97	8.76	8.54	8.39	8.21	8.07

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	13.06	15.96	15.36	14.71	14.22	13.69	13.29	12.85	12.14	11.54	11.03	10.59	10.20	9.87	9.57	9.31	9.09	8.87	8.70	8.52	8.38
4.9	13.33	16.53	15.92	15.24	14.74	14.19	13.77	13.32	12.58	11.96	11.44	10.98	10.58	10.23	9.92	9.66	9.43	9.20	9.03	8.84	8.70
5.0	13.60	17.12	16.48	15.78	15.26	14.69	14.26	13.79	13.03	12.39	11.85	11.38	10.96	10.60	10.28	10.01	9.77	9.54	9.36	9.16	9.02
5.1	13.87	17.70	17.04	16.33	15.79	15.20	14.76	14.27	13.49	12.83	12.27	11.78	11.35	10.98	10.65	10.37	10.12	9.88	9.70	9.49	9.34
5.2	14.14	18.30	17.62	16.88	16.32	15.72	15.26	14.76	13.96	13.27	12.69	12.19	11.74	11.36	11.02	10.73	10.48	10.22	10.04	9.82	9.67
5.3	14.42	18.91	18.21	17.44	16.87	16.25	15.77	15.26	14.43	13.72	13.12	12.61	12.15	11.75	11.40	11.10	10.84	10.58	10.38	10.16	10.00
5.4	14.69	19.52	18.80	18.01	17.42	16.78	16.29	15.76	14.90	14.18	13.56	13.03	12.55	12.15	11.78	11.47	11.20	10.93	10.73	10.51	10.34
5.5	14.96	20.15	19.40	18.59	17.98	17.32	16.82	16.27	15.39	14.64	14.00	13.45	12.96	12.55	12.17	11.85	11.57	11.30	11.09	10.86	10.69
5.6	15.23	20.78	20.01	19.18	18.55	17.87	17.35	16.79	15.88	15.11	14.45	13.89	13.38	12.95	12.56	12.24	11.95	11.67	11.45	11.21	11.04
5.7	15.50	21.42	20.63	19.77	19.13	18.43	17.89	17.32	16.38	15.58	14.91	14.33	13.81	13.36	12.96	12.63	12.33	12.04	11.82	11.57	11.39
5.8	15.78	22.06	21.25	20.37	19.71	18.99	18.44	17.85	16.88	16.06	15.37	14.77	14.24	13.78	13.37	13.02	12.72	12.42	12.19	11.94	11.75
5.9	16.05	22.72	21.89	20.98	20.30	19.56	19.00	18.39	17.39	16.55	15.84	15.22	14.67	14.20	13.78	13.42	13.11	12.80	12.57	12.31	12.11
6.0	16.32	23.38	22.53	21.60	20.90	20.14	19.56	18.93	17.91	17.05	16.32	15.68	15.12	14.63	14.20	13.83	13.51	13.19	12.95	12.68	12.48
6.1	16.59	24.06	23.18	22.22	21.51	20.73	20.13	19.48	18.44	17.55	16.80	16.14	15.56	15.07	14.62	14.24	13.91	13.58	13.34	13.06	12.86
6.2	16.86	24.74	23.84	22.85	22.12	21.32	20.71	20.04	18.97	18.06	17.28	16.61	16.02	15.51	15.05	14.66	14.32	13.98	13.73	13.45	13.24
6.3	17.13	25.43	24.50	23.49	22.74	21.92	21.29	20.61	19.51	18.57	17.78	17.09	16.48	15.95	15.48	15.08	14.74	14.39	14.13	13.84	13.62
6.4	17.41	26.12	25.18	24.14	23.37	22.53	21.88	21.18	20.05	19.09	18.28	17.57	16.94	16.40	15.92	15.51	15.15	14.80	14.53	14.23	14.01
6.5	17.68	26.83	25.86	24.80	24.00	23.14	22.48	21.76	20.60	19.62	18.78	18.06	17.41	16.86	16.36	15.94	15.58	15.21	14.94	14.63	14.40
6.6	17.95	27.54	26.55	25.46	24.65	23.76	23.08	22.35	21.16	20.15	19.29	18.55	17.89	17.32	16.81	16.38	16.01	15.63	15.35	15.03	14.80
6.7	18.22	28.26	27.24	26.13	25.30	24.39	23.70	22.94	21.72	20.69	19.81	19.05	18.37	17.79	17.27	16.83	16.44	16.06	15.77	15.44	15.21
6.8	18.49	28.99	27.95	26.81	25.95	25.03	24.31	23.54	22.30	21.23	20.33	19.55	18.86	18.26	17.73	17.28	16.88	16.49	16.19	15.86	15.62
6.9	18.77	29.73	28.66	27.49	26.62	25.67	24.94	24.15	22.87	21.78	20.86	20.06	19.35	18.74	18.20	17.73	17.33	16.92	16.62	16.28	16.03
7.0	19.04	30.47	29.38	28.19	27.29	26.32	25.57	24.77	23.46	22.34	21.40	20.58	19.85	19.23	18.67	18.19	17.78	17.36	17.05	16.70	16.45
7.1	19.31	31.23	30.11	28.89	27.97	26.98	26.21	25.39	24.05	22.91	21.94	21.10	20.36	19.72	19.14	18.65	18.23	17.81	17.49	17.13	16.87
7.2	19.58	31.99	30.84	29.59	28.66	27.64	26.86	26.01	24.64	23.48	22.49	21.63	20.87	20.21	19.62	19.12	18.69	18.26	17.93	17.57	17.30
7.3	19.85	32.76	31.59	30.31	29.35	28.31	27.51	26.65	25.25	24.05	23.04	22.16	21.38	20.71	20.11	19.60	19.16	18.71	18.38	18.01	17.73
7.4	20.13	33.53	32.34	31.03	30.05	28.99	28.17	27.29	25.85	24.63	23.60	22.70	21.90	21.22	20.60	20.08	19.63	19.17	18.83	18.45	18.17
7.5	20.40	34.32	33.10	31.76	30.76	29.68	28.84	27.94	26.47	25.22	24.17	23.25	22.43	21.73	21.10	20.57	20.10	19.64	19.29	18.90	18.61
7.6	20.67	35.11	33.86	32.50	31.48	30.37	29.51	28.59	27.09	25.82	24.74	23.80	22.96	22.25	21.60	21.06	20.58	20.11	19.75	19.35	19.06
7.7	20.94	35.91	34.64	33.24	32.20	31.07	30.19	29.25	27.72	26.42	25.31	24.36	23.50	22.77	22.11	21.55	21.07	20.58	20.22	19.81	19.51
7.8	21.21	36.72	35.42	33.99	32.93	31.77	30.88	29.92	28.35	27.02	25.90	24.92	24.05	23.30	22.63	22.06	21.56	21.06	20.69	20.27	19.97
7.9	21.49	37.53	36.20	34.75	33.67	32.48	31.57	30.59	29.00	27.64	26.49	25.49	24.60	23.83	23.15	22.56	22.06	21.55	21.17	20.74	20.43
8.0	21.76	38.36	37.00	35.52	34.41	33.20	32.28	31.27	29.64	28.25	27.08	26.06	25.15	24.37	23.67	23.07	22.56	22.04	21.65	21.21	20.89

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	4.08	2.58	2.46	2.33	2.23	2.12	2.04	1.96	1.82	1.71	1.61	1.53	1.46	1.40	1.35	1.30	1.26	1.22	1.19	1.16	1.13
1.6	4.35	2.86	2.73	2.59	2.48	2.37	2.28	2.18	2.03	1.91	1.80	1.71	1.63	1.57	1.51	1.45	1.41	1.37	1.33	1.30	1.27
1.7	4.62	3.16	3.02	2.86	2.74	2.62	2.52	2.42	2.25	2.11	2.00	1.90	1.81	1.74	1.67	1.62	1.56	1.52	1.48	1.44	1.41
1.8	4.90	3.48	3.32	3.15	3.02	2.88	2.78	2.66	2.48	2.33	2.20	2.09	2.00	1.92	1.85	1.78	1.73	1.68	1.63	1.59	1.56
1.9	5.17	3.80	3.63	3.44	3.30	3.15	3.04	2.92	2.72	2.56	2.42	2.30	2.20	2.11	2.03	1.96	1.90	1.84	1.79	1.75	1.71
2.0	5.44	4.14	3.95	3.75	3.60	3.44	3.31	3.18	2.97	2.79	2.64	2.51	2.40	2.30	2.22	2.14	2.08	2.02	1.96	1.92	1.87
2.1	5.71	4.49	4.29	4.07	3.91	3.73	3.60	3.45	3.22	3.03	2.87	2.73	2.61	2.50	2.41	2.33	2.26	2.19	2.14	2.09	2.04
2.2	5.98	4.85	4.63	4.40	4.22	4.03	3.89	3.74	3.49	3.28	3.11	2.96	2.83	2.71	2.61	2.53	2.45	2.38	2.32	2.26	2.21
2.3	6.26	5.22	4.99	4.74	4.55	4.35	4.19	4.03	3.76	3.54	3.35	3.19	3.05	2.93	2.82	2.73	2.65	2.57	2.50	2.45	2.39
2.4	6.53	5.60	5.35	5.09	4.89	4.67	4.51	4.33	4.05	3.81	3.61	3.44	3.29	3.16	3.04	2.94	2.85	2.77	2.70	2.64	2.58
2.5	6.80	5.99	5.73	5.45	5.23	5.01	4.83	4.64	4.34	4.09	3.87	3.69	3.53	3.39	3.27	3.16	3.06	2.98	2.90	2.83	2.77
2.6	7.07	6.40	6.12	5.82	5.59	5.35	5.16	4.96	4.64	4.37	4.14	3.94	3.77	3.63	3.50	3.38	3.28	3.19	3.11	3.04	2.97
2.7	7.34	6.81	6.52	6.20	5.96	5.70	5.50	5.29	4.95	4.66	4.42	4.21	4.03	3.87	3.73	3.61	3.51	3.41	3.32	3.24	3.17
2.8	7.62	7.24	6.93	6.59	6.34	6.06	5.85	5.63	5.27	4.96	4.70	4.48	4.29	4.13	3.98	3.85	3.74	3.63	3.54	3.46	3.38
2.9	7.89	7.68	7.35	6.99	6.72	6.43	6.21	5.97	5.59	5.27	5.00	4.76	4.56	4.39	4.23	4.09	3.97	3.86	3.76	3.68	3.60
3.0	8.16	8.12	7.78	7.40	7.12	6.81	6.58	6.33	5.93	5.59	5.30	5.05	4.84	4.65	4.49	4.34	4.22	4.10	3.99	3.91	3.82
3.1	8.43	8.58	8.22	7.82	7.52	7.20	6.96	6.69	6.27	5.91	5.61	5.35	5.12	4.93	4.75	4.60	4.47	4.34	4.23	4.14	4.05
3.2	8.70	9.05	8.67	8.25	7.94	7.60	7.34	7.07	6.62	6.24	5.92	5.65	5.41	5.21	5.02	4.86	4.72	4.59	4.47	4.38	4.28
3.3	8.98	9.53	9.13	8.69	8.36	8.01	7.74	7.45	6.98	6.58	6.25	5.96	5.71	5.49	5.30	5.13	4.98	4.85	4.72	4.62	4.52
3.4	9.25	10.02	9.60	9.14	8.80	8.43	8.14	7.84	7.35	6.93	6.58	6.28	6.02	5.79	5.59	5.41	5.25	5.11	4.98	4.87	4.77
3.5	9.52	10.52	10.08	9.60	9.24	8.85	8.56	8.24	7.72	7.29	6.92	6.60	6.33	6.09	5.88	5.69	5.53	5.38	5.24	5.13	5.02
3.6	9.79	11.03	10.57	10.07	9.69	9.29	8.98	8.64	8.11	7.65	7.26	6.93	6.65	6.40	6.17	5.98	5.81	5.65	5.51	5.39	5.27
3.7	10.06	11.55	11.07	10.55	10.16	9.73	9.41	9.06	8.50	8.02	7.62	7.27	6.97	6.71	6.48	6.27	6.10	5.93	5.78	5.66	5.54
3.8	10.34	12.08	11.58	11.03	10.63	10.18	9.85	9.48	8.90	8.40	7.98	7.62	7.30	7.03	6.79	6.57	6.39	6.21	6.06	5.93	5.80
3.9	10.61	12.62	12.10	11.53	11.11	10.65	10.29	9.91	9.30	8.79	8.35	7.97	7.64	7.36	7.10	6.88	6.69	6.51	6.34	6.21	6.08
4.0	10.88	13.17	12.63	12.04	11.59	11.12	10.75	10.35	9.72	9.18	8.72	8.33	7.99	7.69	7.43	7.19	6.99	6.80	6.63	6.49	6.36
4.1	11.15	13.73	13.16	12.55	12.09	11.59	11.21	10.80	10.14	9.58	9.10	8.70	8.34	8.03	7.75	7.51	7.30	7.11	6.93	6.78	6.64
4.2	11.42	14.30	13.71	13.08	12.60	12.08	11.69	11.26	10.57	9.99	9.49	9.07	8.70	8.38	8.09	7.84	7.62	7.41	7.23	7.08	6.93
4.3	11.70	14.87	14.27	13.61	13.11	12.58	12.17	11.72	11.01	10.40	9.89	9.45	9.06	8.73	8.43	8.17	7.94	7.73	7.54	7.38	7.22
4.4	11.97	15.46	14.84	14.15	13.64	13.08	12.66	12.20	11.46	10.83	10.29	9.83	9.44	9.09	8.78	8.51	8.27	8.05	7.85	7.69	7.53
4.5	12.24	16.06	15.41	14.70	14.17	13.59	13.15	12.68	11.91	11.26	10.70	10.23	9.81	9.45	9.13	8.85	8.61	8.38	8.17	8.00	7.83
4.6	12.51	16.67	16.00	15.26	14.71	14.12	13.66	13.16	12.37	11.69	11.12	10.63	10.20	9.82	9.49	9.20	8.95	8.71	8.49	8.32	8.14
4.7	12.78	17.29	16.59	15.83	15.26	14.65	14.17	13.66	12.84	12.14	11.54	11.03	10.59	10.20	9.86	9.56	9.29	9.05	8.82	8.64	8.46

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1¼" **Uponor PEX-a** — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	13.06	17.91	17.19	16.41	15.82	15.18	14.69	14.16	13.31	12.59	11.98	11.45	10.99	10.59	10.23	9.92	9.64	9.39	9.16	8.97	8.78
4.9	13.33	18.55	17.81	17.00	16.39	15.73	15.22	14.68	13.80	13.05	12.41	11.87	11.39	10.98	10.61	10.29	10.00	9.74	9.50	9.30	9.11
5.0	13.60	19.20	18.43	17.59	16.96	16.28	15.76	15.20	14.29	13.52	12.86	12.29	11.80	11.37	10.99	10.66	10.37	10.09	9.85	9.64	9.44
5.1	13.87	19.85	19.06	18.20	17.55	16.85	16.31	15.72	14.79	13.99	13.31	12.73	12.22	11.78	11.38	11.04	10.73	10.45	10.20	9.99	9.78
5.2	14.14	20.51	19.70	18.81	18.14	17.42	16.86	16.26	15.29	14.47	13.77	13.17	12.64	12.18	11.78	11.42	11.11	10.82	10.55	10.34	10.13
5.3	14.42	21.19	20.35	19.43	18.74	18.00	17.42	16.80	15.80	14.96	14.23	13.61	13.07	12.60	12.18	11.81	11.49	11.19	10.92	10.69	10.47
5.4	14.69	21.87	21.01	20.06	19.35	18.58	17.99	17.35	16.32	15.45	14.70	14.07	13.51	13.02	12.59	12.21	11.88	11.57	11.29	11.05	10.83
5.5	14.96	22.56	21.67	20.70	19.97	19.18	18.57	17.91	16.85	15.95	15.18	14.52	13.95	13.45	13.00	12.61	12.27	11.95	11.66	11.42	11.19
5.6	15.23	23.26	22.35	21.35	20.60	19.78	19.15	18.48	17.39	16.46	15.67	14.99	14.40	13.88	13.42	13.02	12.67	12.34	12.04	11.79	11.55
5.7	15.50	23.97	23.03	22.00	21.23	20.39	19.75	19.05	17.93	16.97	16.16	15.46	14.85	14.32	13.85	13.43	13.07	12.73	12.42	12.17	11.92
5.8	15.78	24.69	23.72	22.67	21.87	21.01	20.35	19.63	18.48	17.50	16.66	15.94	15.31	14.76	14.28	13.85	13.48	13.13	12.81	12.55	12.30
5.9	16.05	25.42	24.43	23.34	22.52	21.64	20.96	20.22	19.03	18.02	17.16	16.43	15.78	15.22	14.72	14.28	13.89	13.53	13.21	12.94	12.68
6.0	16.32	26.16	25.14	24.02	23.18	22.27	21.57	20.82	19.60	18.56	17.68	16.92	16.25	15.67	15.16	14.71	14.31	13.94	13.61	13.33	13.06
6.1	16.59	26.90	25.86	24.71	23.85	22.92	22.20	21.42	20.17	19.10	18.19	17.41	16.73	16.14	15.61	15.15	14.74	14.36	14.01	13.73	13.45
6.2	16.86	27.66	26.58	25.41	24.53	23.57	22.83	22.03	20.75	19.65	18.72	17.92	17.22	16.61	16.06	15.59	15.17	14.78	14.42	14.13	13.85
6.3	17.13	28.42	27.32	26.12	25.21	24.22	23.47	22.65	21.33	20.21	19.25	18.43	17.71	17.08	16.52	16.04	15.60	15.20	14.84	14.54	14.25
6.4	17.41	29.20	28.06	26.83	25.90	24.89	24.11	23.28	21.92	20.77	19.79	18.94	18.21	17.56	16.99	16.49	16.05	15.63	15.26	14.96	14.66
6.5	17.68	29.98	28.82	27.55	26.60	25.56	24.77	23.91	22.52	21.34	20.33	19.47	18.71	18.05	17.46	16.95	16.49	16.07	15.69	15.38	15.07
6.6	17.95	30.77	29.58	28.28	27.31	26.25	25.43	24.55	23.13	21.92	20.88	20.00	19.22	18.54	17.94	17.41	16.95	16.51	16.12	15.80	15.48
6.7	18.22	31.57	30.35	29.02	28.02	26.94	26.10	25.20	23.74	22.50	21.44	20.53	19.74	19.04	18.42	17.88	17.41	16.96	16.56	16.23	15.90
6.8	18.49	32.37	31.13	29.77	28.75	27.63	26.78	25.85	24.36	23.09	22.00	21.07	20.26	19.54	18.91	18.36	17.87	17.41	17.00	16.66	16.33
6.9	18.77	33.19	31.92	30.53	29.48	28.34	27.46	26.52	24.99	23.69	22.57	21.62	20.78	20.05	19.41	18.84	18.34	17.87	17.45	17.10	16.76
7.0	19.04	34.02	32.71	31.29	30.22	29.05	28.15	27.19	25.62	24.29	23.15	22.17	21.32	20.57	19.91	19.33	18.81	18.33	17.90	17.55	17.20
7.1	19.31	34.85	33.52	32.06	30.96	29.77	28.85	27.86	26.26	24.90	23.73	22.73	21.86	21.09	20.41	19.82	19.29	18.80	18.36	18.00	17.64
7.2	19.58	35.69	34.33	32.84	31.72	30.50	29.56	28.55	26.91	25.51	24.32	23.30	22.40	21.62	20.93	20.32	19.78	19.28	18.82	18.45	18.08
7.3	19.85	36.54	35.15	33.63	32.48	31.23	30.28	29.24	27.56	26.14	24.92	23.87	22.96	22.15	21.44	20.82	20.27	19.76	19.29	18.91	18.54
7.4	20.13	37.40	35.98	34.42	33.25	31.98	31.00	29.94	28.23	26.77	25.52	24.45	23.51	22.69	21.97	21.33	20.76	20.24	19.77	19.38	18.99
7.5	20.40	38.27	36.82	35.23	34.03	32.73	31.73	30.64	28.89	27.40	26.13	25.03	24.08	23.24	22.49	21.84	21.27	20.73	20.24	19.85	19.45
7.6	20.67	39.15	37.66	36.04	34.82	33.49	32.46	31.36	29.57	28.04	26.74	25.62	24.64	23.79	23.03	22.36	21.77	21.22	20.73	20.32	19.92
7.7	20.94	40.03	38.52	36.86	35.61	34.25	33.21	32.08	30.25	28.69	27.36	26.22	25.22	24.34	23.57	22.89	22.28	21.72	21.22	20.80	20.39
7.8	21.21	40.92	39.38	37.69	36.41	35.02	33.96	32.80	30.94	29.35	27.99	26.82	25.80	24.91	24.11	23.42	22.80	22.23	21.71	21.28	20.87
7.9	21.49	41.83	40.25	38.52	37.22	35.80	34.72	33.54	31.63	30.01	28.62	27.43	26.39	25.47	24.66	23.95	23.32	22.74	22.21	21.77	21.35
8.0	21.76	42.74	41.13	39.37	38.04	36.59	35.48	34.28	32.34	30.68	29.26	28.04	26.98	26.05	25.22	24.49	23.85	23.25	22.71	22.27	21.83

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	5.68	1.13	1.08	1.01	1.00	0.98	0.96	0.94	0.91	0.89	0.86	0.84	0.82	0.81	0.79	0.78	0.76	0.75	0.74	0.73	0.72
1.6	6.06	1.26	1.20	1.14	1.11	1.09	1.07	1.05	1.02	0.99	0.97	0.94	0.92	0.90	0.89	0.87	0.86	0.84	0.83	0.82	0.81
1.7	6.44	1.40	1.34	1.26	1.24	1.21	1.19	1.17	1.14	1.10	1.08	1.05	1.03	1.01	0.99	0.97	0.95	0.94	0.92	0.91	0.90
1.8	6.82	1.55	1.48	1.39	1.37	1.34	1.32	1.30	1.26	1.22	1.19	1.16	1.14	1.11	1.09	1.07	1.05	1.04	1.02	1.01	1.00
1.9	7.20	1.70	1.62	1.53	1.50	1.47	1.45	1.42	1.38	1.34	1.31	1.28	1.25	1.22	1.20	1.18	1.16	1.14	1.13	1.11	1.10
2.0	7.58	1.86	1.77	1.68	1.64	1.61	1.59	1.56	1.51	1.47	1.43	1.40	1.37	1.34	1.32	1.29	1.27	1.25	1.23	1.22	1.20
2.1	7.96	2.02	1.93	1.82	1.79	1.76	1.73	1.70	1.65	1.60	1.56	1.52	1.49	1.46	1.43	1.41	1.39	1.36	1.35	1.33	1.31
2.2	8.34	2.19	2.09	1.98	1.94	1.91	1.88	1.84	1.79	1.74	1.69	1.66	1.62	1.59	1.56	1.53	1.51	1.48	1.46	1.44	1.42
2.3	8.71	2.37	2.26	2.14	2.10	2.06	2.03	1.99	1.93	1.88	1.83	1.79	1.75	1.72	1.69	1.66	1.63	1.60	1.58	1.56	1.54
2.4	9.09	2.55	2.44	2.31	2.26	2.22	2.18	2.15	2.08	2.03	1.98	1.93	1.89	1.85	1.82	1.79	1.76	1.73	1.71	1.68	1.66
2.5	9.47	2.74	2.62	2.48	2.43	2.39	2.35	2.31	2.24	2.18	2.12	2.08	2.03	1.99	1.96	1.92	1.89	1.86	1.84	1.81	1.79
2.6	9.85	2.93	2.80	2.65	2.61	2.56	2.52	2.47	2.40	2.33	2.28	2.23	2.18	2.14	2.10	2.06	2.03	2.00	1.97	1.94	1.92
2.7	10.23	3.13	2.99	2.83	2.78	2.73	2.69	2.64	2.57	2.50	2.43	2.38	2.33	2.28	2.24	2.20	2.17	2.14	2.11	2.08	2.05
2.8	10.61	3.34	3.19	3.02	2.97	2.91	2.87	2.82	2.74	2.66	2.60	2.54	2.48	2.44	2.39	2.35	2.32	2.28	2.25	2.22	2.19
2.9	10.99	3.55	3.39	3.21	3.16	3.10	3.05	3.00	2.91	2.83	2.76	2.70	2.64	2.59	2.55	2.50	2.46	2.43	2.39	2.36	2.33
3.0	11.37	3.76	3.60	3.41	3.35	3.29	3.24	3.18	3.09	3.01	2.93	2.87	2.81	2.76	2.71	2.66	2.62	2.58	2.54	2.51	2.48
3.1	11.75	3.98	3.81	3.61	3.55	3.48	3.43	3.37	3.27	3.19	3.11	3.04	2.98	2.92	2.87	2.82	2.78	2.74	2.70	2.66	2.63
3.2	12.12	4.21	4.03	3.82	3.75	3.68	3.63	3.57	3.46	3.37	3.29	3.22	3.15	3.09	3.04	2.99	2.94	2.90	2.86	2.82	2.79
3.3	12.50	4.45	4.25	4.03	3.96	3.89	3.83	3.77	3.66	3.56	3.48	3.40	3.33	3.27	3.21	3.15	3.11	3.06	3.02	2.98	2.94
3.4	12.88	4.68	4.48	4.25	4.18	4.10	4.04	3.97	3.86	3.76	3.67	3.58	3.51	3.44	3.38	3.33	3.28	3.23	3.18	3.14	3.11
3.5	13.26	4.93	4.72	4.47	4.40	4.32	4.25	4.18	4.06	3.95	3.86	3.77	3.70	3.63	3.56	3.50	3.45	3.40	3.35	3.31	3.27
3.6	13.64	5.18	4.95	4.70	4.62	4.54	4.47	4.39	4.27	4.16	4.06	3.97	3.89	3.81	3.75	3.69	3.63	3.58	3.53	3.48	3.44
3.7	14.02	5.43	5.20	4.93	4.85	4.76	4.69	4.61	4.48	4.36	4.26	4.17	4.08	4.01	3.94	3.87	3.81	3.76	3.71	3.66	3.62
3.8	14.40	5.69	5.45	5.17	5.08	4.99	4.92	4.84	4.70	4.58	4.47	4.37	4.28	4.20	4.13	4.06	4.00	3.94	3.89	3.84	3.79
3.9	14.78	5.96	5.70	5.41	5.32	5.23	5.15	5.06	4.92	4.79	4.68	4.58	4.48	4.40	4.32	4.25	4.19	4.13	4.07	4.02	3.97
4.0	15.16	6.23	5.96	5.66	5.57	5.47	5.38	5.30	5.15	5.01	4.90	4.79	4.69	4.60	4.52	4.45	4.38	4.32	4.26	4.21	4.16
4.1	15.53	6.50	6.23	5.91	5.82	5.71	5.62	5.53	5.38	5.24	5.12	5.00	4.90	4.81	4.73	4.65	4.58	4.52	4.46	4.40	4.35
4.2	15.91	6.79	6.50	6.17	6.07	5.96	5.87	5.78	5.61	5.47	5.34	5.22	5.12	5.02	4.94	4.86	4.78	4.72	4.65	4.60	4.54
4.3	16.29	7.07	6.77	6.43	6.33	6.21	6.12	6.02	5.85	5.70	5.57	5.45	5.34	5.24	5.15	5.07	4.99	4.92	4.86	4.79	4.74
4.4	16.67	7.36	7.05	6.70	6.59	6.47	6.37	6.27	6.10	5.94	5.80	5.68	5.56	5.46	5.37	5.28	5.20	5.13	5.06	5.00	4.94
4.5	17.05	7.66	7.34	6.97	6.86	6.73	6.63	6.53	6.35	6.18	6.04	5.91	5.79	5.69	5.59	5.50	5.42	5.34	5.27	5.20	5.14
4.6	17.43	7.96	7.63	7.25	7.13	7.00	6.90	6.79	6.60	6.43	6.28	6.15	6.02	5.91	5.81	5.72	5.63	5.55	5.48	5.41	5.35
4.7	17.81	8.27	7.92	7.53	7.41	7.27	7.17	7.05	6.86	6.68	6.53	6.39	6.26	6.15	6.04	5.94	5.86	5.77	5.70	5.63	5.56

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" **Uponor PEX-a** — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	18.19	8.58	8.22	7.82	7.69	7.55	7.44	7.32	7.12	6.94	6.78	6.63	6.50	6.38	6.27	6.17	6.08	6.00	5.92	5.85	5.78
4.9	18.57	8.90	8.53	8.11	7.97	7.83	7.72	7.59	7.38	7.20	7.03	6.88	6.75	6.62	6.51	6.41	6.31	6.22	6.14	6.07	6.00
5.0	18.94	9.22	8.84	8.40	8.26	8.12	8.00	7.87	7.66	7.46	7.29	7.14	6.99	6.87	6.75	6.64	6.55	6.45	6.37	6.29	6.22
5.1	19.32	9.55	9.15	8.70	8.56	8.41	8.28	8.15	7.93	7.73	7.55	7.39	7.25	7.12	7.00	6.88	6.78	6.69	6.60	6.52	6.45
5.2	19.70	9.88	9.47	9.01	8.86	8.70	8.58	8.44	8.21	8.00	7.82	7.65	7.50	7.37	7.24	7.13	7.02	6.93	6.84	6.75	6.68
5.3	20.08	10.22	9.80	9.32	9.16	9.00	8.87	8.73	8.49	8.28	8.09	7.92	7.77	7.62	7.50	7.38	7.27	7.17	7.08	6.99	6.91
5.4	20.46	10.56	10.13	9.63	9.47	9.31	9.17	9.03	8.78	8.56	8.37	8.19	8.03	7.88	7.75	7.63	7.52	7.41	7.32	7.23	7.15
5.5	20.84	10.91	10.46	9.95	9.79	9.62	9.48	9.33	9.07	8.85	8.64	8.46	8.30	8.15	8.01	7.89	7.77	7.66	7.56	7.47	7.39
5.6	21.22	11.26	10.80	10.27	10.11	9.93	9.78	9.63	9.37	9.14	8.93	8.74	8.57	8.42	8.28	8.15	8.03	7.92	7.81	7.72	7.63
5.7	21.60	11.62	11.14	10.60	10.43	10.25	10.10	9.94	9.67	9.43	9.22	9.02	8.85	8.69	8.54	8.41	8.29	8.17	8.07	7.97	7.88
5.8	21.98	11.98	11.49	10.93	10.76	10.57	10.42	10.25	9.98	9.73	9.51	9.31	9.13	8.96	8.82	8.68	8.55	8.43	8.33	8.23	8.13
5.9	22.35	12.35	11.84	11.27	11.09	10.90	10.74	10.57	10.28	10.03	9.80	9.60	9.41	9.24	9.09	8.95	8.82	8.70	8.59	8.48	8.39
6.0	22.73	12.72	12.20	11.61	11.42	11.23	11.06	10.89	10.60	10.34	10.10	9.89	9.70	9.53	9.37	9.22	9.09	8.96	8.85	8.75	8.65
6.1	23.11	13.10	12.56	11.96	11.77	11.56	11.39	11.22	10.92	10.65	10.41	10.19	9.99	9.82	9.65	9.50	9.37	9.24	9.12	9.01	8.91
6.2	23.49	13.48	12.93	12.31	12.11	11.90	11.73	11.55	11.24	10.96	10.71	10.49	10.29	10.11	9.94	9.79	9.64	9.51	9.39	9.28	9.18
6.3	23.87	13.86	13.30	12.66	12.46	12.25	12.07	11.88	11.56	11.28	11.03	10.80	10.59	10.40	10.23	10.07	9.93	9.79	9.67	9.55	9.44
6.4	24.25	14.26	13.68	13.02	12.81	12.59	12.41	12.22	11.89	11.60	11.34	11.11	10.89	10.70	10.52	10.36	10.21	10.07	9.95	9.83	9.72
6.5	24.63	14.65	14.06	13.39	13.17	12.95	12.76	12.56	12.23	11.93	11.66	11.42	11.20	11.00	10.82	10.66	10.50	10.36	10.23	10.11	9.99
6.6	25.01	15.05	14.45	13.76	13.54	13.30	13.11	12.91	12.57	12.26	11.98	11.74	11.51	11.31	11.12	10.95	10.80	10.65	10.52	10.39	10.27
6.7	25.38	15.46	14.84	14.13	13.90	13.67	13.47	13.26	12.91	12.59	12.31	12.06	11.83	11.62	11.43	11.25	11.09	10.94	10.81	10.68	10.56
6.8	25.76	15.87	15.23	14.51	14.27	14.03	13.83	13.62	13.26	12.93	12.64	12.38	12.15	11.93	11.74	11.56	11.39	11.24	11.10	10.97	10.85
6.9	26.14	16.28	15.63	14.89	14.65	14.40	14.19	13.98	13.61	13.28	12.98	12.71	12.47	12.25	12.05	11.87	11.70	11.54	11.40	11.26	11.14
7.0	26.52	16.70	16.04	15.27	15.03	14.78	14.56	14.34	13.96	13.62	13.32	13.05	12.80	12.57	12.37	12.18	12.01	11.84	11.70	11.56	11.43
7.1	26.90	17.13	16.45	15.66	15.42	15.15	14.94	14.71	14.32	13.97	13.66	13.38	13.13	12.90	12.69	12.50	12.32	12.15	12.00	11.86	11.73
7.2	27.28	17.56	16.86	16.06	15.81	15.54	15.32	15.08	14.68	14.33	14.01	13.72	13.46	13.23	13.01	12.82	12.63	12.46	12.31	12.16	12.03
7.3	27.66	17.99	17.28	16.46	16.20	15.92	15.70	15.46	15.05	14.69	14.36	14.07	13.80	13.56	13.34	13.14	12.95	12.78	12.62	12.47	12.33
7.4	28.04	18.43	17.70	16.86	16.60	16.32	16.08	15.84	15.42	15.05	14.72	14.42	14.15	13.90	13.67	13.47	13.28	13.10	12.93	12.78	12.64
7.5	28.42	18.88	18.13	17.27	17.00	16.71	16.47	16.23	15.80	15.42	15.08	14.77	14.49	14.24	14.01	13.80	13.60	13.42	13.25	13.10	12.95
7.6	28.79	19.32	18.56	17.68	17.40	17.11	16.87	16.61	16.18	15.79	15.44	15.13	14.84	14.58	14.35	14.13	13.93	13.74	13.57	13.42	13.27
7.7	29.17	19.78	18.99	18.10	17.82	17.52	17.27	17.01	16.56	16.16	15.81	15.49	15.20	14.93	14.69	14.47	14.27	14.07	13.90	13.74	13.59
7.8	29.55	20.24	19.43	18.52	18.23	17.92	17.67	17.40	16.95	16.54	16.18	15.85	15.55	15.28	15.04	14.81	14.60	14.41	14.23	14.06	13.91
7.9	29.93	20.70	19.88	18.95	18.65	18.34	18.08	17.81	17.34	16.92	16.55	16.22	15.91	15.64	15.39	15.15	14.94	14.74	14.56	14.39	14.24
8.0	30.31	21.16	20.33	19.38	19.07	18.75	18.49	18.21	17.73	17.31	16.93	16.59	16.28	16.00	15.74	15.50	15.29	15.08	14.90	14.73	14.56

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	5.68	1.53	1.48	1.42	1.38	1.33	1.30	1.26	1.19	1.14	1.09	1.05	1.01	0.98	0.95	0.92	0.90	0.88	0.86	0.84	0.83
1.6	6.06	1.71	1.65	1.59	1.54	1.49	1.45	1.40	1.33	1.27	1.22	1.17	1.13	1.09	1.06	1.03	1.01	0.99	0.97	0.95	0.93
1.7	6.44	1.89	1.83	1.76	1.71	1.65	1.61	1.56	1.48	1.41	1.35	1.30	1.25	1.22	1.18	1.15	1.12	1.10	1.07	1.05	1.04
1.8	6.82	2.09	2.02	1.94	1.88	1.82	1.77	1.72	1.63	1.56	1.49	1.43	1.39	1.34	1.30	1.27	1.24	1.21	1.19	1.16	1.15
1.9	7.20	2.29	2.21	2.13	2.07	2.00	1.94	1.89	1.79	1.71	1.64	1.58	1.52	1.48	1.43	1.40	1.36	1.33	1.31	1.28	1.26
2.0	7.58	2.50	2.41	2.33	2.26	2.18	2.12	2.06	1.96	1.87	1.79	1.72	1.67	1.61	1.57	1.53	1.49	1.46	1.43	1.40	1.38
2.1	7.96	2.71	2.62	2.53	2.45	2.37	2.31	2.24	2.13	2.03	1.95	1.88	1.81	1.76	1.71	1.67	1.63	1.59	1.56	1.53	1.51
2.2	8.34	2.93	2.84	2.74	2.66	2.57	2.50	2.43	2.31	2.20	2.11	2.04	1.97	1.91	1.85	1.81	1.77	1.73	1.69	1.66	1.64
2.3	8.71	3.17	3.06	2.95	2.87	2.78	2.70	2.62	2.49	2.38	2.29	2.20	2.13	2.06	2.00	1.96	1.91	1.87	1.83	1.80	1.77
2.4	9.09	3.40	3.29	3.18	3.08	2.99	2.91	2.82	2.68	2.56	2.46	2.37	2.29	2.22	2.16	2.11	2.06	2.01	1.97	1.94	1.91
2.5	9.47	3.65	3.53	3.41	3.31	3.20	3.12	3.03	2.88	2.75	2.64	2.55	2.46	2.39	2.32	2.27	2.21	2.16	2.12	2.08	2.05
2.6	9.85	3.90	3.78	3.64	3.54	3.43	3.34	3.24	3.08	2.95	2.83	2.73	2.64	2.56	2.49	2.43	2.37	2.32	2.28	2.23	2.20
2.7	10.23	4.16	4.03	3.89	3.78	3.66	3.56	3.46	3.29	3.15	3.02	2.91	2.82	2.73	2.66	2.60	2.54	2.48	2.43	2.39	2.35
2.8	10.61	4.43	4.29	4.14	4.02	3.90	3.79	3.69	3.51	3.35	3.22	3.10	3.01	2.92	2.83	2.77	2.70	2.64	2.59	2.55	2.51
2.9	10.99	4.70	4.56	4.40	4.27	4.14	4.03	3.92	3.73	3.57	3.43	3.30	3.20	3.10	3.01	2.95	2.88	2.81	2.76	2.71	2.67
3.0	11.37	4.99	4.83	4.66	4.53	4.39	4.28	4.15	3.96	3.78	3.64	3.50	3.39	3.29	3.20	3.13	3.05	2.99	2.93	2.88	2.84
3.1	11.75	5.27	5.11	4.93	4.79	4.65	4.53	4.40	4.19	4.01	3.85	3.71	3.59	3.49	3.39	3.31	3.24	3.17	3.11	3.05	3.01
3.2	12.12	5.57	5.40	5.21	5.06	4.91	4.78	4.65	4.43	4.24	4.07	3.93	3.80	3.69	3.59	3.51	3.42	3.35	3.29	3.23	3.18
3.3	12.50	5.87	5.69	5.49	5.34	5.18	5.04	4.90	4.67	4.47	4.30	4.14	4.01	3.90	3.79	3.70	3.62	3.54	3.47	3.41	3.36
3.4	12.88	6.18	5.99	5.78	5.62	5.45	5.31	5.16	4.92	4.71	4.53	4.37	4.23	4.11	3.99	3.90	3.81	3.73	3.66	3.59	3.54
3.5	13.26	6.50	6.30	6.08	5.91	5.73	5.59	5.43	5.18	4.96	4.76	4.60	4.45	4.32	4.20	4.11	4.01	3.93	3.86	3.79	3.73
3.6	13.64	6.82	6.61	6.38	6.21	6.02	5.87	5.70	5.44	5.21	5.01	4.83	4.68	4.54	4.42	4.32	4.22	4.13	4.05	3.98	3.92
3.7	14.02	7.15	6.93	6.69	6.51	6.31	6.15	5.98	5.70	5.46	5.25	5.07	4.91	4.77	4.64	4.53	4.43	4.34	4.26	4.18	4.12
3.8	14.40	7.48	7.26	7.01	6.82	6.61	6.45	6.27	5.98	5.72	5.50	5.31	5.15	5.00	4.86	4.75	4.65	4.55	4.46	4.38	4.32
3.9	14.78	7.83	7.59	7.33	7.13	6.92	6.74	6.56	6.25	5.99	5.76	5.56	5.39	5.23	5.09	4.98	4.87	4.76	4.68	4.59	4.53
4.0	15.16	8.18	7.93	7.66	7.45	7.23	7.05	6.85	6.54	6.26	6.02	5.81	5.63	5.47	5.32	5.21	5.09	4.98	4.89	4.80	4.74
4.1	15.53	8.53	8.27	8.00	7.78	7.55	7.36	7.16	6.83	6.54	6.29	6.07	5.89	5.72	5.56	5.44	5.32	5.21	5.11	5.02	4.95
4.2	15.91	8.89	8.63	8.34	8.11	7.87	7.67	7.46	7.12	6.82	6.56	6.34	6.14	5.97	5.81	5.68	5.55	5.43	5.34	5.24	5.17
4.3	16.29	9.26	8.98	8.68	8.45	8.20	7.99	7.78	7.42	7.11	6.84	6.60	6.40	6.22	6.05	5.92	5.79	5.67	5.56	5.46	5.39
4.4	16.67	9.64	9.35	9.04	8.79	8.53	8.32	8.10	7.72	7.40	7.12	6.88	6.67	6.48	6.31	6.17	6.03	5.90	5.80	5.69	5.62
4.5	17.05	10.02	9.72	9.40	9.14	8.87	8.65	8.42	8.04	7.70	7.41	7.16	6.94	6.74	6.56	6.42	6.28	6.14	6.03	5.93	5.85
4.6	17.43	10.41	10.10	9.76	9.50	9.22	8.99	8.75	8.35	8.01	7.71	7.44	7.21	7.01	6.82	6.67	6.53	6.39	6.28	6.16	6.08
4.7	17.81	10.80	10.48	10.13	9.86	9.57	9.34	9.08	8.67	8.31	8.00	7.73	7.49	7.28	7.09	6.93	6.78	6.64	6.52	6.41	6.32

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" **Uponor PEX-a** — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	18.19	11.20	10.87	10.51	10.23	9.93	9.69	9.43	9.00	8.63	8.31	8.02	7.78	7.56	7.36	7.20	7.04	6.89	6.77	6.65	6.56
4.9	18.57	11.61	11.26	10.89	10.61	10.29	10.04	9.77	9.33	8.95	8.61	8.32	8.07	7.84	7.63	7.47	7.30	7.15	7.03	6.90	6.81
5.0	18.94	12.02	11.67	11.28	10.98	10.66	10.40	10.12	9.67	9.27	8.93	8.62	8.36	8.13	7.91	7.74	7.57	7.42	7.28	7.15	7.06
5.1	19.32	12.44	12.07	11.68	11.37	11.04	10.77	10.48	10.01	9.60	9.24	8.93	8.66	8.42	8.20	8.02	7.84	7.68	7.55	7.41	7.31
5.2	19.70	12.87	12.49	12.08	11.76	11.42	11.14	10.84	10.36	9.93	9.57	9.24	8.96	8.71	8.49	8.30	8.12	7.95	7.81	7.68	7.57
5.3	20.08	13.30	12.91	12.49	12.16	11.81	11.52	11.21	10.71	10.27	9.89	9.56	9.27	9.01	8.78	8.59	8.40	8.23	8.08	7.94	7.84
5.4	20.46	13.74	13.33	12.90	12.56	12.20	11.90	11.59	11.07	10.62	10.23	9.88	9.59	9.32	9.08	8.88	8.69	8.51	8.36	8.21	8.10
5.5	20.84	14.18	13.77	13.32	12.97	12.60	12.29	11.96	11.43	10.97	10.56	10.21	9.90	9.63	9.38	9.17	8.98	8.79	8.64	8.49	8.37
5.6	21.22	14.63	14.20	13.74	13.38	13.00	12.68	12.35	11.80	11.32	10.90	10.54	10.22	9.94	9.68	9.47	9.27	9.08	8.92	8.76	8.65
5.7	21.60	15.09	14.65	14.17	13.80	13.41	13.08	12.74	12.17	11.68	11.25	10.87	10.55	10.26	9.99	9.78	9.57	9.37	9.21	9.05	8.93
5.8	21.98	15.55	15.10	14.61	14.23	13.82	13.49	13.13	12.55	12.04	11.60	11.21	10.88	10.58	10.31	10.09	9.87	9.67	9.50	9.33	9.21
5.9	22.35	16.02	15.55	15.05	14.66	14.24	13.90	13.53	12.93	12.41	11.96	11.56	11.22	10.91	10.63	10.40	10.17	9.97	9.80	9.62	9.50
6.0	22.73	16.49	16.02	15.50	15.10	14.67	14.31	13.94	13.32	12.79	12.32	11.91	11.56	11.24	10.95	10.71	10.48	10.27	10.09	9.92	9.79
6.1	23.11	16.97	16.48	15.95	15.54	15.10	14.74	14.35	13.72	13.16	12.69	12.26	11.90	11.57	11.28	11.04	10.80	10.58	10.40	10.22	10.08
6.2	23.49	17.46	16.96	16.41	15.99	15.53	15.16	14.76	14.11	13.55	13.06	12.62	12.25	11.91	11.61	11.36	11.12	10.89	10.71	10.52	10.38
6.3	23.87	17.95	17.44	16.88	16.44	15.97	15.59	15.19	14.52	13.94	13.43	12.99	12.60	12.26	11.94	11.69	11.44	11.21	11.02	10.83	10.68
6.4	24.25	18.45	17.92	17.35	16.90	16.42	16.03	15.61	14.93	14.33	13.81	13.35	12.96	12.61	12.28	12.02	11.77	11.53	11.33	11.14	10.99
6.5	24.63	18.95	18.41	17.82	17.37	16.87	16.47	16.04	15.34	14.73	14.20	13.73	13.32	12.96	12.63	12.36	12.10	11.86	11.65	11.45	11.30
6.6	25.01	19.46	18.91	18.31	17.84	17.33	16.92	16.48	15.76	15.13	14.59	14.10	13.69	13.32	12.98	12.70	12.43	12.18	11.98	11.77	11.62
6.7	25.38	19.98	19.41	18.79	18.31	17.79	17.37	16.92	16.18	15.54	14.98	14.49	14.06	13.68	13.33	13.05	12.77	12.52	12.30	12.09	11.93
6.8	25.76	20.50	19.92	19.29	18.79	18.26	17.83	17.37	16.61	15.95	15.38	14.87	14.44	14.05	13.69	13.40	13.12	12.85	12.63	12.42	12.26
6.9	26.14	21.03	20.43	19.79	19.28	18.74	18.29	17.82	17.04	16.37	15.78	15.26	14.82	14.42	14.05	13.75	13.46	13.19	12.97	12.75	12.58
7.0	26.52	21.56	20.95	20.29	19.77	19.21	18.76	18.28	17.48	16.79	16.19	15.66	15.20	14.79	14.42	14.11	13.81	13.54	13.31	13.08	12.91
7.1	26.90	22.10	21.48	20.80	20.27	19.70	19.24	18.74	17.93	17.22	16.60	16.06	15.59	15.17	14.79	14.48	14.17	13.89	13.65	13.42	13.25
7.2	27.28	22.65	22.01	21.31	20.77	20.19	19.71	19.21	18.37	17.65	17.02	16.46	15.98	15.55	15.16	14.84	14.53	14.24	14.00	13.76	13.58
7.3	27.66	23.20	22.54	21.83	21.28	20.68	20.20	19.68	18.83	18.09	17.44	16.87	16.38	15.94	15.54	15.21	14.89	14.60	14.35	14.11	13.92
7.4	28.04	23.76	23.09	22.36	21.79	21.18	20.69	20.16	19.28	18.53	17.87	17.28	16.78	16.33	15.92	15.59	15.26	14.96	14.71	14.46	14.27
7.5	28.42	24.32	23.63	22.89	22.31	21.69	21.18	20.64	19.75	18.97	18.30	17.70	17.19	16.73	16.31	15.97	15.63	15.32	15.06	14.81	14.62
7.6	28.79	24.89	24.19	23.43	22.84	22.20	21.68	21.13	20.22	19.42	18.73	18.12	17.60	17.13	16.70	16.35	16.01	15.69	15.43	15.17	14.97
7.7	29.17	25.46	24.74	23.97	23.37	22.72	22.19	21.62	20.69	19.88	19.17	18.55	18.02	17.53	17.09	16.74	16.39	16.06	15.79	15.53	15.33
7.8	29.55	26.04	25.31	24.52	23.90	23.24	22.70	22.12	21.17	20.34	19.62	18.98	18.44	17.94	17.49	17.13	16.77	16.44	16.16	15.89	15.69
7.9	29.93	26.63	25.88	25.07	24.44	23.76	23.21	22.62	21.65	20.80	20.07	19.42	18.86	18.36	17.90	17.52	17.16	16.82	16.54	16.26	16.05
8.0	30.31	27.22	26.45	25.63	24.99	24.29	23.73	23.13	22.13	21.27	20.52	19.86	19.29	18.77	18.30	17.92	17.55	17.21	16.92	16.63	16.42

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" **Uponor PEX-a** — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	5.68	1.80	1.73	1.64	1.58	1.52	1.46	1.41	1.32	1.25	1.19	1.13	1.09	1.05	1.01	0.98	0.96	0.93	0.91	0.89	0.87
1.6	6.06	2.01	1.92	1.83	1.76	1.69	1.63	1.57	1.48	1.40	1.33	1.27	1.22	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98
1.7	6.44	2.22	2.13	2.03	1.95	1.87	1.81	1.74	1.64	1.55	1.47	1.41	1.35	1.30	1.26	1.22	1.19	1.16	1.13	1.11	1.09
1.8	6.82	2.45	2.34	2.23	2.15	2.06	2.00	1.92	1.81	1.71	1.63	1.55	1.49	1.44	1.39	1.35	1.31	1.28	1.25	1.22	1.20
1.9	7.20	2.68	2.57	2.45	2.36	2.26	2.19	2.11	1.98	1.87	1.78	1.71	1.64	1.58	1.53	1.48	1.45	1.41	1.38	1.35	1.32
2.0	7.58	2.92	2.80	2.67	2.57	2.47	2.39	2.30	2.16	2.05	1.95	1.87	1.79	1.73	1.67	1.62	1.58	1.54	1.51	1.47	1.45
2.1	7.96	3.17	3.04	2.90	2.79	2.68	2.60	2.50	2.35	2.23	2.12	2.03	1.95	1.88	1.82	1.77	1.72	1.68	1.64	1.61	1.58
2.2	8.34	3.43	3.29	3.14	3.02	2.90	2.81	2.71	2.55	2.41	2.30	2.20	2.11	2.04	1.97	1.92	1.87	1.82	1.78	1.74	1.71
2.3	8.71	3.69	3.54	3.38	3.26	3.13	3.03	2.92	2.75	2.61	2.48	2.38	2.28	2.21	2.13	2.07	2.02	1.97	1.93	1.89	1.85
2.4	9.09	3.97	3.81	3.63	3.51	3.37	3.26	3.15	2.96	2.81	2.67	2.56	2.46	2.38	2.30	2.23	2.18	2.12	2.08	2.03	2.00
2.5	9.47	4.25	4.08	3.90	3.76	3.61	3.50	3.37	3.18	3.01	2.87	2.75	2.64	2.55	2.47	2.40	2.34	2.28	2.24	2.18	2.15
2.6	9.85	4.54	4.36	4.16	4.02	3.86	3.74	3.61	3.40	3.22	3.07	2.94	2.83	2.73	2.65	2.57	2.51	2.44	2.40	2.34	2.30
2.7	10.23	4.84	4.65	4.44	4.29	4.12	3.99	3.85	3.63	3.44	3.28	3.14	3.02	2.92	2.83	2.75	2.68	2.61	2.56	2.50	2.46
2.8	10.61	5.15	4.94	4.72	4.56	4.38	4.25	4.10	3.86	3.66	3.50	3.35	3.22	3.11	3.01	2.93	2.86	2.78	2.73	2.67	2.63
2.9	10.99	5.46	5.25	5.02	4.84	4.65	4.51	4.36	4.11	3.89	3.72	3.56	3.43	3.31	3.20	3.12	3.04	2.96	2.91	2.84	2.79
3.0	11.37	5.79	5.56	5.31	5.13	4.93	4.78	4.62	4.35	4.13	3.94	3.78	3.64	3.51	3.40	3.31	3.23	3.15	3.09	3.02	2.97
3.1	11.75	6.12	5.88	5.62	5.43	5.22	5.06	4.89	4.61	4.37	4.17	4.00	3.85	3.72	3.60	3.50	3.42	3.33	3.27	3.20	3.14
3.2	12.12	6.45	6.21	5.93	5.73	5.51	5.34	5.16	4.87	4.62	4.41	4.23	4.07	3.93	3.81	3.71	3.62	3.53	3.46	3.38	3.33
3.3	12.50	6.80	6.54	6.25	6.04	5.81	5.63	5.44	5.14	4.87	4.66	4.47	4.30	4.15	4.02	3.91	3.82	3.72	3.65	3.57	3.51
3.4	12.88	7.16	6.88	6.58	6.36	6.12	5.93	5.73	5.41	5.13	4.90	4.70	4.53	4.38	4.24	4.12	4.03	3.93	3.85	3.77	3.71
3.5	13.26	7.52	7.23	6.92	6.68	6.43	6.23	6.03	5.69	5.40	5.16	4.95	4.76	4.60	4.46	4.34	4.24	4.13	4.05	3.97	3.90
3.6	13.64	7.89	7.59	7.26	7.01	6.75	6.55	6.33	5.97	5.67	5.42	5.20	5.01	4.84	4.69	4.56	4.45	4.34	4.26	4.17	4.10
3.7	14.02	8.26	7.95	7.61	7.35	7.07	6.86	6.63	6.26	5.95	5.68	5.46	5.25	5.08	4.92	4.79	4.67	4.56	4.47	4.38	4.31
3.8	14.40	8.65	8.32	7.96	7.70	7.41	7.19	6.95	6.56	6.23	5.96	5.72	5.50	5.32	5.16	5.02	4.90	4.78	4.69	4.59	4.52
3.9	14.78	9.04	8.70	8.33	8.05	7.75	7.52	7.27	6.86	6.52	6.23	5.98	5.76	5.57	5.40	5.26	5.13	5.01	4.91	4.81	4.73
4.0	15.16	9.44	9.08	8.69	8.41	8.09	7.85	7.59	7.17	6.82	6.52	6.26	6.02	5.83	5.65	5.50	5.37	5.24	5.14	5.03	4.95
4.1	15.53	9.84	9.47	9.07	8.77	8.44	8.19	7.92	7.49	7.12	6.80	6.53	6.29	6.09	5.90	5.74	5.61	5.47	5.37	5.25	5.17
4.2	15.91	10.26	9.87	9.45	9.14	8.80	8.54	8.26	7.81	7.42	7.10	6.81	6.56	6.35	6.16	5.99	5.85	5.71	5.60	5.48	5.40
4.3	16.29	10.68	10.28	9.85	9.52	9.17	8.90	8.61	8.13	7.73	7.40	7.10	6.84	6.62	6.42	6.25	6.10	5.95	5.84	5.72	5.63
4.4	16.67	11.11	10.69	10.24	9.91	9.54	9.26	8.96	8.47	8.05	7.70	7.39	7.12	6.89	6.68	6.51	6.35	6.20	6.09	5.96	5.86
4.5	17.05	11.54	11.11	10.65	10.30	9.92	9.63	9.31	8.81	8.37	8.01	7.69	7.41	7.17	6.96	6.77	6.61	6.45	6.34	6.20	6.10
4.6	17.43	11.98	11.54	11.06	10.69	10.30	10.00	9.68	9.15	8.70	8.32	8.00	7.70	7.46	7.23	7.04	6.88	6.71	6.59	6.45	6.35
4.7	17.81	12.43	11.97	11.47	11.10	10.69	10.38	10.04	9.50	9.04	8.64	8.30	8.00	7.74	7.51	7.31	7.14	6.97	6.85	6.70	6.60

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" **Uponor PEX-a** — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	18.19	12.89	12.41	11.90	11.51	11.09	10.77	10.42	9.85	9.37	8.97	8.62	8.31	8.04	7.80	7.59	7.42	7.24	7.11	6.96	6.85
4.9	18.57	13.35	12.86	12.33	11.93	11.49	11.16	10.80	10.22	9.72	9.30	8.94	8.61	8.34	8.09	7.88	7.69	7.51	7.37	7.22	7.11
5.0	18.94	13.82	13.32	12.76	12.35	11.90	11.56	11.19	10.58	10.07	9.64	9.26	8.93	8.64	8.38	8.16	7.97	7.78	7.64	7.48	7.37
5.1	19.32	14.30	13.78	13.21	12.78	12.32	11.96	11.58	10.95	10.42	9.98	9.59	9.24	8.95	8.68	8.46	8.26	8.06	7.92	7.75	7.63
5.2	19.70	14.78	14.25	13.66	13.22	12.74	12.37	11.98	11.33	10.79	10.32	9.92	9.57	9.26	8.99	8.75	8.55	8.35	8.20	8.03	7.90
5.3	20.08	15.28	14.72	14.11	13.66	13.17	12.79	12.38	11.72	11.15	10.68	10.26	9.89	9.58	9.29	9.05	8.85	8.64	8.48	8.30	8.17
5.4	20.46	15.77	15.20	14.58	14.11	13.60	13.21	12.79	12.10	11.52	11.03	10.61	10.23	9.90	9.61	9.36	9.14	8.93	8.77	8.59	8.45
5.5	20.84	16.28	15.69	15.05	14.56	14.04	13.64	13.20	12.50	11.90	11.39	10.95	10.56	10.23	9.93	9.67	9.45	9.22	9.06	8.87	8.73
5.6	21.22	16.79	16.18	15.52	15.03	14.49	14.07	13.63	12.90	12.28	11.76	11.31	10.90	10.56	10.25	9.98	9.76	9.53	9.35	9.16	9.02
5.7	21.60	17.31	16.69	16.00	15.49	14.94	14.51	14.05	13.31	12.67	12.13	11.67	11.25	10.90	10.58	10.30	10.07	9.83	9.66	9.46	9.31
5.8	21.98	17.84	17.19	16.49	15.97	15.40	14.96	14.49	13.72	13.06	12.51	12.03	11.60	11.24	10.91	10.63	10.38	10.14	9.96	9.75	9.60
5.9	22.35	18.37	17.71	16.99	16.45	15.86	15.41	14.92	14.13	13.46	12.89	12.40	11.96	11.58	11.24	10.96	10.71	10.46	10.27	10.06	9.90
6.0	22.73	18.91	18.23	17.49	16.93	16.33	15.87	15.37	14.56	13.86	13.28	12.77	12.32	11.93	11.58	11.29	11.03	10.77	10.58	10.36	10.21
6.1	23.11	19.45	18.76	18.00	17.43	16.81	16.33	15.82	14.98	14.27	13.67	13.15	12.69	12.29	11.93	11.62	11.36	11.10	10.90	10.68	10.51
6.2	23.49	20.00	19.29	18.51	17.92	17.29	16.80	16.27	15.42	14.69	14.07	13.53	13.06	12.65	12.28	11.97	11.70	11.42	11.22	10.99	10.82
6.3	23.87	20.56	19.83	19.03	18.43	17.78	17.28	16.73	15.85	15.11	14.47	13.92	13.43	13.01	12.63	12.31	12.03	11.75	11.55	11.31	11.14
6.4	24.25	21.13	20.38	19.56	18.94	18.27	17.76	17.20	16.30	15.53	14.88	14.31	13.81	13.38	12.99	12.66	12.38	12.09	11.88	11.63	11.46
6.5	24.63	21.70	20.93	20.09	19.46	18.77	18.24	17.67	16.75	15.96	15.29	14.71	14.20	13.75	13.35	13.02	12.72	12.43	12.21	11.96	11.78
6.6	25.01	22.28	21.49	20.63	19.98	19.28	18.74	18.15	17.20	16.39	15.71	15.11	14.58	14.13	13.72	13.38	13.07	12.77	12.55	12.29	12.11
6.7	25.38	22.86	22.06	21.17	20.51	19.79	19.23	18.63	17.66	16.83	16.13	15.52	14.98	14.51	14.09	13.74	13.43	13.12	12.89	12.63	12.44
6.8	25.76	23.46	22.63	21.72	21.04	20.31	19.74	19.12	18.13	17.28	16.56	15.93	15.38	14.90	14.47	14.11	13.79	13.47	13.24	12.97	12.77
6.9	26.14	24.05	23.21	22.28	21.58	20.83	20.25	19.62	18.60	17.73	16.99	16.35	15.78	15.29	14.85	14.48	14.15	13.83	13.59	13.31	13.11
7.0	26.52	24.66	23.79	22.84	22.13	21.36	20.76	20.12	19.07	18.18	17.43	16.77	16.19	15.69	15.24	14.85	14.52	14.19	13.94	13.66	13.45
7.1	26.90	25.27	24.38	23.41	22.68	21.89	21.28	20.62	19.55	18.64	17.87	17.20	16.60	16.09	15.63	15.23	14.89	14.55	14.30	14.01	13.80
7.2	27.28	25.89	24.98	23.99	23.24	22.43	21.81	21.13	20.04	19.11	18.32	17.63	17.02	16.49	16.02	15.62	15.27	14.92	14.66	14.37	14.15
7.3	27.66	26.51	25.58	24.57	23.81	22.98	22.34	21.65	20.53	19.58	18.77	18.07	17.44	16.90	16.42	16.01	15.65	15.29	15.03	14.73	14.51
7.4	28.04	27.14	26.19	25.15	24.38	23.53	22.88	22.17	21.03	20.05	19.23	18.51	17.87	17.32	16.82	16.40	16.04	15.67	15.40	15.09	14.86
7.5	28.42	27.78	26.81	25.75	24.95	24.09	23.42	22.70	21.53	20.53	19.69	18.95	18.30	17.74	17.23	16.80	16.43	16.05	15.77	15.46	15.23
7.6	28.79	28.42	27.43	26.35	25.53	24.65	23.97	23.23	22.04	21.02	20.15	19.40	18.73	18.16	17.64	17.20	16.82	16.44	16.15	15.83	15.59
7.7	29.17	29.07	28.06	26.95	26.12	25.22	24.52	23.77	22.55	21.51	20.62	19.86	19.17	18.59	18.06	17.61	17.22	16.83	16.53	16.20	15.96
7.8	29.55	29.73	28.69	27.56	26.72	25.79	25.08	24.32	23.07	22.00	21.10	20.32	19.62	19.02	18.48	18.02	17.62	17.22	16.92	16.58	16.34
7.9	29.93	30.39	29.34	28.18	27.32	26.37	25.65	24.86	23.59	22.50	21.58	20.78	20.07	19.45	18.90	18.43	18.03	17.62	17.31	16.97	16.72
8.0	30.31	31.06	29.98	28.80	27.92	26.96	26.22	25.42	24.12	23.01	22.07	21.25	20.52	19.89	19.33	18.85	18.44	18.02	17.71	17.36	17.10

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	5.68	2.06	1.96	1.86	1.79	1.70	1.64	1.57	1.47	1.38	1.30	1.24	1.18	1.13	1.09	1.05	1.02	0.99	0.96	0.94	0.92
1.6	6.06	2.29	2.19	2.07	1.99	1.90	1.83	1.76	1.64	1.54	1.45	1.38	1.32	1.27	1.22	1.18	1.14	1.11	1.08	1.05	1.03
1.7	6.44	2.53	2.42	2.29	2.20	2.10	2.03	1.94	1.82	1.71	1.61	1.53	1.47	1.41	1.36	1.31	1.27	1.23	1.20	1.17	1.14
1.8	6.82	2.78	2.66	2.52	2.42	2.31	2.23	2.14	2.00	1.88	1.78	1.69	1.62	1.55	1.50	1.45	1.40	1.36	1.33	1.30	1.27
1.9	7.20	3.04	2.91	2.76	2.65	2.53	2.44	2.35	2.19	2.06	1.95	1.86	1.78	1.71	1.64	1.59	1.54	1.50	1.46	1.42	1.39
2.0	7.58	3.31	3.17	3.01	2.89	2.76	2.67	2.56	2.39	2.25	2.13	2.03	1.94	1.86	1.80	1.74	1.69	1.64	1.59	1.56	1.52
2.1	7.96	3.59	3.44	3.27	3.14	3.00	2.89	2.78	2.60	2.45	2.32	2.21	2.11	2.03	1.96	1.89	1.84	1.78	1.74	1.70	1.66
2.2	8.34	3.88	3.71	3.53	3.39	3.25	3.13	3.01	2.82	2.65	2.51	2.39	2.29	2.20	2.12	2.05	1.99	1.93	1.88	1.84	1.80
2.3	8.71	4.18	4.00	3.80	3.66	3.50	3.38	3.25	3.04	2.86	2.71	2.58	2.47	2.38	2.29	2.22	2.15	2.09	2.04	1.99	1.95
2.4	9.09	4.49	4.30	4.09	3.93	3.76	3.63	3.49	3.27	3.08	2.92	2.78	2.66	2.56	2.47	2.39	2.32	2.25	2.19	2.15	2.10
2.5	9.47	4.81	4.60	4.38	4.21	4.03	3.89	3.74	3.50	3.30	3.13	2.99	2.86	2.75	2.65	2.57	2.49	2.42	2.36	2.31	2.26
2.6	9.85	5.13	4.91	4.68	4.50	4.31	4.16	4.00	3.75	3.53	3.35	3.20	3.06	2.94	2.84	2.75	2.67	2.59	2.53	2.47	2.42
2.7	10.23	5.47	5.23	4.98	4.79	4.59	4.44	4.27	4.00	3.77	3.58	3.41	3.27	3.14	3.03	2.94	2.85	2.77	2.70	2.64	2.58
2.8	10.61	5.81	5.56	5.30	5.10	4.88	4.72	4.54	4.26	4.01	3.81	3.63	3.48	3.35	3.23	3.13	3.04	2.95	2.88	2.82	2.76
2.9	10.99	6.16	5.90	5.62	5.41	5.18	5.01	4.82	4.52	4.26	4.05	3.86	3.70	3.56	3.44	3.33	3.23	3.14	3.06	3.00	2.93
3.0	11.37	6.52	6.25	5.95	5.73	5.49	5.31	5.11	4.79	4.52	4.29	4.10	3.93	3.78	3.65	3.53	3.43	3.34	3.25	3.18	3.11
3.1	11.75	6.89	6.61	6.29	6.06	5.81	5.61	5.40	5.07	4.79	4.54	4.34	4.16	4.00	3.86	3.74	3.63	3.53	3.45	3.37	3.30
3.2	12.12	7.27	6.97	6.64	6.40	6.13	5.93	5.71	5.35	5.05	4.80	4.58	4.39	4.23	4.08	3.96	3.84	3.74	3.64	3.57	3.49
3.3	12.50	7.66	7.34	7.00	6.74	6.46	6.25	6.02	5.65	5.33	5.06	4.84	4.64	4.46	4.31	4.17	4.06	3.95	3.85	3.77	3.69
3.4	12.88	8.05	7.72	7.36	7.09	6.80	6.57	6.33	5.94	5.61	5.33	5.09	4.88	4.70	4.54	4.40	4.28	4.16	4.06	3.97	3.89
3.5	13.26	8.45	8.11	7.73	7.45	7.14	6.91	6.65	6.25	5.90	5.61	5.36	5.14	4.95	4.78	4.63	4.50	4.38	4.27	4.18	4.09
3.6	13.64	8.87	8.50	8.11	7.82	7.49	7.25	6.98	6.56	6.20	5.89	5.63	5.40	5.20	5.02	4.87	4.73	4.60	4.49	4.39	4.30
3.7	14.02	9.29	8.91	8.50	8.19	7.85	7.60	7.32	6.88	6.50	6.18	5.90	5.66	5.45	5.27	5.11	4.96	4.83	4.71	4.61	4.51
3.8	14.40	9.71	9.32	8.89	8.57	8.22	7.95	7.66	7.20	6.81	6.47	6.18	5.93	5.71	5.52	5.35	5.20	5.06	4.94	4.83	4.73
3.9	14.78	10.15	9.74	9.29	8.96	8.59	8.32	8.01	7.53	7.12	6.77	6.47	6.21	5.98	5.78	5.60	5.45	5.30	5.17	5.06	4.96
4.0	15.16	10.59	10.17	9.70	9.35	8.98	8.68	8.37	7.87	7.44	7.07	6.76	6.49	6.25	6.04	5.86	5.69	5.54	5.41	5.29	5.18
4.1	15.53	11.05	10.60	10.12	9.76	9.36	9.06	8.74	8.21	7.76	7.39	7.06	6.78	6.53	6.31	6.12	5.95	5.79	5.65	5.53	5.42
4.2	15.91	11.50	11.04	10.54	10.17	9.76	9.44	9.11	8.56	8.10	7.70	7.36	7.07	6.81	6.58	6.38	6.21	6.04	5.89	5.77	5.65
4.3	16.29	11.97	11.50	10.98	10.58	10.16	9.83	9.48	8.92	8.43	8.02	7.67	7.37	7.10	6.86	6.65	6.47	6.30	6.15	6.02	5.89
4.4	16.67	12.45	11.95	11.41	11.01	10.57	10.23	9.87	9.28	8.78	8.35	7.99	7.67	7.39	7.14	6.93	6.74	6.56	6.40	6.27	6.14
4.5	17.05	12.93	12.42	11.86	11.44	10.98	10.63	10.26	9.65	9.13	8.69	8.31	7.98	7.69	7.43	7.21	7.01	6.83	6.66	6.53	6.39
4.6	17.43	13.42	12.89	12.31	11.88	11.41	11.04	10.65	10.02	9.48	9.03	8.63	8.29	7.99	7.73	7.49	7.29	7.10	6.93	6.79	6.65
4.7	17.81	13.92	13.37	12.78	12.32	11.84	11.46	11.05	10.40	9.85	9.37	8.97	8.61	8.30	8.03	7.78	7.57	7.37	7.20	7.05	6.91

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

1½" **Uponor PEX-a** — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	18.19	14.43	13.86	13.24	12.78	12.27	11.88	11.46	10.79	10.21	9.72	9.30	8.93	8.61	8.33	8.08	7.86	7.66	7.47	7.32	7.17
4.9	18.57	14.94	14.36	13.72	13.24	12.71	12.31	11.88	11.18	10.59	10.08	9.64	9.26	8.93	8.64	8.38	8.15	7.94	7.75	7.59	7.44
5.0	18.94	15.47	14.86	14.20	13.70	13.16	12.75	12.30	11.58	10.97	10.44	9.99	9.60	9.26	8.95	8.68	8.45	8.23	8.03	7.87	7.71
5.1	19.32	16.00	15.37	14.69	14.18	13.62	13.19	12.73	11.98	11.35	10.81	10.34	9.94	9.58	9.27	8.99	8.75	8.52	8.32	8.15	7.99
5.2	19.70	16.53	15.89	15.19	14.66	14.08	13.64	13.17	12.40	11.74	11.18	10.70	10.28	9.92	9.59	9.31	9.06	8.82	8.61	8.44	8.27
5.3	20.08	17.08	16.41	15.69	15.15	14.55	14.10	13.61	12.81	12.14	11.56	11.07	10.63	10.26	9.92	9.63	9.37	9.13	8.91	8.73	8.55
5.4	20.46	17.63	16.95	16.20	15.64	15.03	14.56	14.05	13.24	12.54	11.95	11.44	10.99	10.60	10.25	9.95	9.68	9.43	9.21	9.02	8.84
5.5	20.84	18.19	17.49	16.72	16.14	15.51	15.03	14.51	13.67	12.95	12.34	11.81	11.35	10.95	10.59	10.28	10.00	9.75	9.52	9.32	9.14
5.6	21.22	18.76	18.03	17.24	16.65	16.00	15.50	14.97	14.10	13.36	12.73	12.19	11.72	11.30	10.94	10.61	10.33	10.06	9.83	9.63	9.44
5.7	21.60	19.33	18.59	17.78	17.16	16.50	15.99	15.43	14.54	13.78	13.13	12.57	12.09	11.66	11.28	10.95	10.66	10.39	10.14	9.94	9.74
5.8	21.98	19.91	19.15	18.31	17.68	17.00	16.47	15.91	14.99	14.21	13.54	12.96	12.46	12.02	11.64	11.29	10.99	10.71	10.46	10.25	10.05
5.9	22.35	20.50	19.72	18.86	18.21	17.51	16.97	16.38	15.44	14.64	13.95	13.36	12.84	12.39	11.99	11.64	11.33	11.04	10.78	10.57	10.36
6.0	22.73	21.10	20.29	19.41	18.75	18.02	17.47	16.87	15.90	15.07	14.37	13.76	13.23	12.77	12.35	11.99	11.67	11.38	11.11	10.89	10.67
6.1	23.11	21.70	20.88	19.97	19.29	18.55	17.98	17.36	16.36	15.51	14.79	14.17	13.62	13.14	12.72	12.35	12.02	11.72	11.44	11.21	10.99
6.2	23.49	22.32	21.47	20.54	19.84	19.07	18.49	17.86	16.83	15.96	15.22	14.58	14.02	13.53	13.09	12.71	12.37	12.06	11.78	11.54	11.32
6.3	23.87	22.93	22.06	21.11	20.39	19.61	19.01	18.36	17.31	16.41	15.65	14.99	14.42	13.91	13.47	13.08	12.73	12.41	12.12	11.88	11.64
6.4	24.25	23.56	22.67	21.69	20.95	20.15	19.53	18.87	17.79	16.87	16.09	15.41	14.82	14.31	13.85	13.45	13.09	12.76	12.46	12.22	11.98
6.5	24.63	24.19	23.28	22.27	21.52	20.70	20.07	19.38	18.28	17.34	16.53	15.84	15.23	14.71	14.24	13.82	13.46	13.12	12.81	12.56	12.31
6.6	25.01	24.83	23.89	22.87	22.09	21.25	20.60	19.90	18.77	17.81	16.98	16.27	15.65	15.11	14.63	14.20	13.83	13.48	13.17	12.91	12.65
6.7	25.38	25.48	24.52	23.47	22.67	21.81	21.15	20.43	19.27	18.28	17.44	16.71	16.07	15.51	15.02	14.59	14.20	13.85	13.52	13.26	13.00
6.8	25.76	26.13	25.15	24.07	23.26	22.38	21.70	20.96	19.77	18.76	17.89	17.15	16.50	15.93	15.42	14.98	14.58	14.22	13.89	13.61	13.35
6.9	26.14	26.80	25.79	24.69	23.85	22.95	22.25	21.50	20.28	19.25	18.36	17.60	16.93	16.34	15.82	15.37	14.97	14.59	14.25	13.97	13.70
7.0	26.52	27.46	26.43	25.31	24.45	23.53	22.82	22.05	20.80	19.74	18.83	18.05	17.36	16.76	16.23	15.77	15.35	14.97	14.62	14.34	14.06
7.1	26.90	28.14	27.08	25.93	25.06	24.11	23.39	22.60	21.32	20.23	19.30	18.50	17.80	17.19	16.65	16.17	15.75	15.35	15.00	14.71	14.42
7.2	27.28	28.82	27.74	26.56	25.67	24.71	23.96	23.15	21.85	20.74	19.79	18.97	18.25	17.62	17.07	16.58	16.14	15.74	15.38	15.08	14.78
7.3	27.66	29.51	28.41	27.20	26.29	25.30	24.54	23.72	22.38	21.24	20.27	19.43	18.70	18.06	17.49	16.99	16.55	16.13	15.76	15.45	15.15
7.4	28.04	30.21	29.08	27.85	26.92	25.91	25.13	24.28	22.92	21.76	20.76	19.90	19.16	18.50	17.92	17.40	16.95	16.53	16.15	15.83	15.53
7.5	28.42	30.91	29.76	28.50	27.55	26.52	25.72	24.86	23.47	22.27	21.26	20.38	19.61	18.94	18.35	17.82	17.36	16.93	16.54	16.22	15.90
7.6	28.79	31.62	30.45	29.16	28.19	27.13	26.32	25.44	24.01	22.80	21.76	20.86	20.08	19.39	18.78	18.25	17.78	17.34	16.94	16.61	16.29
7.7	29.17	32.34	31.14	29.83	28.83	27.75	26.92	26.02	24.57	23.33	22.26	21.35	20.55	19.85	19.22	18.68	18.19	17.74	17.34	17.00	16.67
7.8	29.55	33.06	31.84	30.50	29.48	28.38	27.53	26.62	25.13	23.86	22.78	21.84	21.02	20.31	19.67	19.11	18.62	18.16	17.74	17.40	17.06
7.9	29.93	33.79	32.54	31.18	30.14	29.02	28.15	27.21	25.70	24.40	23.29	22.34	21.50	20.77	20.12	19.55	19.05	18.58	18.15	17.80	17.46
8.0	30.31	34.53	33.26	31.86	30.81	29.66	28.77	27.82	26.27	24.95	23.81	22.84	21.99	21.24	20.58	19.99	19.48	19.00	18.56	18.21	17.85

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	9.75	0.80	0.76	0.72	0.71	0.70	0.68	0.67	0.65	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.52
1.6	10.39	0.90	0.86	0.81	0.79	0.78	0.77	0.75	0.73	0.71	0.69	0.68	0.66	0.65	0.64	0.62	0.61	0.60	0.60	0.59	0.58
1.7	11.04	1.00	0.95	0.90	0.88	0.87	0.85	0.84	0.81	0.79	0.77	0.75	0.74	0.72	0.71	0.70	0.68	0.67	0.66	0.66	0.65
1.8	11.69	1.10	1.05	0.99	0.98	0.96	0.94	0.93	0.90	0.87	0.85	0.83	0.81	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72
1.9	12.34	1.21	1.15	1.09	1.07	1.05	1.04	1.02	0.99	0.96	0.94	0.92	0.90	0.88	0.86	0.85	0.83	0.82	0.81	0.80	0.79
2.0	12.99	1.32	1.26	1.20	1.17	1.15	1.13	1.11	1.08	1.05	1.03	1.00	0.98	0.96	0.95	0.93	0.91	0.90	0.89	0.88	0.87
2.1	13.64	1.44	1.38	1.30	1.28	1.26	1.24	1.22	1.18	1.15	1.12	1.09	1.07	1.05	1.03	1.01	1.00	0.98	0.97	0.96	0.94
2.2	14.29	1.56	1.49	1.41	1.39	1.36	1.34	1.32	1.28	1.25	1.22	1.19	1.16	1.14	1.12	1.10	1.08	1.07	1.05	1.04	1.03
2.3	14.94	1.69	1.61	1.53	1.50	1.47	1.45	1.43	1.39	1.35	1.32	1.29	1.26	1.23	1.21	1.19	1.17	1.16	1.14	1.13	1.11
2.4	15.59	1.82	1.74	1.65	1.62	1.59	1.56	1.54	1.49	1.45	1.42	1.39	1.36	1.33	1.31	1.29	1.27	1.25	1.23	1.21	1.20
2.5	16.24	1.95	1.87	1.77	1.74	1.71	1.68	1.65	1.61	1.56	1.53	1.49	1.46	1.43	1.41	1.38	1.36	1.34	1.32	1.31	1.29
2.6	16.89	2.09	2.00	1.90	1.86	1.83	1.80	1.77	1.72	1.68	1.64	1.60	1.57	1.54	1.51	1.48	1.46	1.44	1.42	1.40	1.38
2.7	17.54	2.23	2.14	2.03	1.99	1.96	1.93	1.89	1.84	1.79	1.75	1.71	1.68	1.64	1.61	1.59	1.56	1.54	1.52	1.50	1.48
2.8	18.19	2.38	2.28	2.16	2.12	2.09	2.05	2.02	1.96	1.91	1.87	1.82	1.79	1.75	1.72	1.69	1.67	1.64	1.62	1.60	1.58
2.9	18.84	2.53	2.42	2.30	2.26	2.22	2.19	2.15	2.09	2.03	1.99	1.94	1.90	1.87	1.83	1.80	1.78	1.75	1.73	1.71	1.68
3.0	19.49	2.69	2.57	2.44	2.40	2.36	2.32	2.28	2.22	2.16	2.11	2.06	2.02	1.98	1.95	1.92	1.89	1.86	1.84	1.81	1.79
3.1	20.14	2.85	2.72	2.59	2.54	2.50	2.46	2.42	2.35	2.29	2.24	2.19	2.14	2.10	2.07	2.03	2.00	1.97	1.95	1.92	1.90
3.2	20.79	3.01	2.88	2.74	2.69	2.64	2.60	2.56	2.49	2.42	2.37	2.32	2.27	2.23	2.19	2.15	2.12	2.09	2.06	2.04	2.01
3.3	21.44	3.18	3.04	2.89	2.84	2.79	2.75	2.70	2.63	2.56	2.50	2.45	2.40	2.35	2.31	2.27	2.24	2.21	2.18	2.15	2.13
3.4	22.09	3.35	3.21	3.05	2.99	2.94	2.90	2.85	2.77	2.70	2.64	2.58	2.53	2.48	2.44	2.40	2.36	2.33	2.30	2.27	2.24
3.5	22.74	3.52	3.37	3.21	3.15	3.10	3.05	3.00	2.92	2.84	2.78	2.72	2.66	2.61	2.57	2.53	2.49	2.45	2.42	2.39	2.36
3.6	23.39	3.70	3.55	3.37	3.31	3.25	3.21	3.16	3.07	2.99	2.92	2.86	2.80	2.75	2.70	2.66	2.62	2.58	2.55	2.52	2.49
3.7	24.04	3.88	3.72	3.54	3.48	3.42	3.37	3.31	3.22	3.14	3.07	3.00	2.94	2.89	2.84	2.79	2.75	2.71	2.68	2.64	2.61
3.8	24.69	4.07	3.90	3.71	3.65	3.58	3.53	3.47	3.38	3.29	3.22	3.15	3.09	3.03	2.98	2.93	2.89	2.85	2.81	2.77	2.74
3.9	25.34	4.26	4.08	3.88	3.82	3.75	3.70	3.64	3.54	3.45	3.37	3.30	3.23	3.17	3.12	3.07	3.02	2.98	2.94	2.91	2.87
4.0	25.99	4.46	4.27	4.06	3.99	3.92	3.87	3.81	3.70	3.61	3.52	3.45	3.38	3.32	3.26	3.21	3.17	3.12	3.08	3.04	3.01
4.1	26.64	4.65	4.46	4.24	4.17	4.10	4.04	3.98	3.87	3.77	3.68	3.61	3.54	3.47	3.41	3.36	3.31	3.26	3.22	3.18	3.14
4.2	27.29	4.86	4.66	4.43	4.36	4.28	4.22	4.15	4.04	3.94	3.85	3.77	3.69	3.62	3.56	3.51	3.46	3.41	3.36	3.32	3.28
4.3	27.94	5.06	4.85	4.62	4.54	4.46	4.40	4.33	4.21	4.11	4.01	3.93	3.85	3.78	3.72	3.66	3.61	3.55	3.51	3.47	3.43
4.4	28.59	5.27	5.06	4.81	4.73	4.65	4.58	4.51	4.39	4.28	4.18	4.09	4.01	3.94	3.87	3.81	3.76	3.70	3.66	3.61	3.57
4.5	29.24	5.48	5.26	5.01	4.92	4.84	4.77	4.69	4.57	4.45	4.35	4.26	4.18	4.10	4.03	3.97	3.91	3.86	3.81	3.76	3.72
4.6	29.89	5.70	5.47	5.20	5.12	5.03	4.96	4.88	4.75	4.63	4.53	4.43	4.35	4.27	4.20	4.13	4.07	4.01	3.96	3.92	3.87
4.7	30.54	5.92	5.68	5.41	5.32	5.23	5.15	5.07	4.93	4.81	4.70	4.61	4.52	4.44	4.36	4.29	4.23	4.17	4.12	4.07	4.02

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	31.18	6.15	5.90	5.61	5.52	5.43	5.35	5.27	5.12	5.00	4.88	4.78	4.69	4.61	4.53	4.46	4.40	4.33	4.28	4.23	4.18
4.9	31.83	6.37	6.12	5.82	5.73	5.63	5.55	5.46	5.32	5.19	5.07	4.96	4.87	4.78	4.70	4.63	4.56	4.50	4.44	4.39	4.34
5.0	32.48	6.61	6.34	6.04	5.94	5.84	5.75	5.66	5.51	5.38	5.26	5.15	5.05	4.96	4.88	4.80	4.73	4.67	4.61	4.55	4.50
5.1	33.13	6.84	6.57	6.25	6.15	6.05	5.96	5.87	5.71	5.57	5.45	5.33	5.23	5.14	5.05	4.97	4.90	4.84	4.78	4.72	4.67
5.2	33.78	7.08	6.80	6.47	6.37	6.26	6.17	6.07	5.91	5.77	5.64	5.52	5.42	5.32	5.23	5.15	5.08	5.01	4.95	4.89	4.83
5.3	34.43	7.32	7.03	6.69	6.59	6.48	6.38	6.28	6.12	5.97	5.83	5.71	5.61	5.51	5.42	5.33	5.26	5.18	5.12	5.06	5.00
5.4	35.08	7.57	7.27	6.92	6.81	6.69	6.60	6.50	6.32	6.17	6.03	5.91	5.80	5.69	5.60	5.52	5.44	5.36	5.29	5.23	5.17
5.5	35.73	7.82	7.51	7.15	7.04	6.92	6.82	6.71	6.54	6.38	6.24	6.11	5.99	5.89	5.79	5.70	5.62	5.54	5.47	5.41	5.35
5.6	36.38	8.07	7.75	7.38	7.27	7.14	7.04	6.93	6.75	6.59	6.44	6.31	6.19	6.08	5.98	5.89	5.81	5.73	5.65	5.59	5.53
5.7	37.03	8.33	8.00	7.62	7.50	7.37	7.27	7.16	6.97	6.80	6.65	6.51	6.39	6.28	6.17	6.08	5.99	5.91	5.84	5.77	5.71
5.8	37.68	8.59	8.25	7.86	7.74	7.60	7.50	7.38	7.19	7.01	6.86	6.72	6.59	6.48	6.37	6.27	6.19	6.10	6.03	5.96	5.89
5.9	38.33	8.86	8.50	8.10	7.98	7.84	7.73	7.61	7.41	7.23	7.07	6.93	6.80	6.68	6.57	6.47	6.38	6.29	6.22	6.14	6.07
6.0	38.98	9.12	8.76	8.35	8.22	8.08	7.97	7.85	7.64	7.45	7.29	7.14	7.01	6.88	6.77	6.67	6.58	6.49	6.41	6.33	6.26
6.1	39.63	9.39	9.02	8.60	8.46	8.32	8.20	8.08	7.87	7.68	7.51	7.36	7.22	7.09	6.98	6.87	6.78	6.68	6.60	6.52	6.45
6.2	40.28	9.67	9.29	8.85	8.71	8.57	8.45	8.32	8.10	7.91	7.73	7.58	7.43	7.30	7.19	7.08	6.98	6.88	6.80	6.72	6.65
6.3	40.93	9.95	9.56	9.11	8.97	8.82	8.69	8.56	8.34	8.14	7.96	7.80	7.65	7.52	7.40	7.29	7.18	7.09	7.00	6.92	6.84
6.4	41.58	10.23	9.83	9.37	9.22	9.07	8.94	8.81	8.57	8.37	8.19	8.02	7.87	7.73	7.61	7.50	7.39	7.29	7.20	7.12	7.04
6.5	42.23	10.51	10.10	9.63	9.48	9.32	9.19	9.05	8.82	8.61	8.42	8.25	8.09	7.95	7.83	7.71	7.60	7.50	7.41	7.32	7.24
6.6	42.88	10.80	10.38	9.90	9.74	9.58	9.45	9.30	9.06	8.85	8.65	8.48	8.32	8.18	8.05	7.92	7.81	7.71	7.61	7.53	7.44
6.7	43.53	11.10	10.66	10.17	10.01	9.84	9.70	9.56	9.31	9.09	8.89	8.71	8.55	8.40	8.27	8.14	8.03	7.92	7.83	7.74	7.65
6.8	44.18	11.39	10.95	10.44	10.28	10.10	9.96	9.82	9.56	9.33	9.13	8.95	8.78	8.63	8.49	8.36	8.25	8.14	8.04	7.95	7.86
6.9	44.83	11.69	11.23	10.71	10.55	10.37	10.23	10.08	9.81	9.58	9.37	9.19	9.01	8.86	8.72	8.59	8.47	8.36	8.25	8.16	8.07
7.0	45.48	11.99	11.53	10.99	10.82	10.64	10.49	10.34	10.07	9.83	9.62	9.43	9.25	9.09	8.95	8.81	8.69	8.58	8.47	8.38	8.28
7.1	46.13	12.30	11.82	11.27	11.10	10.92	10.76	10.60	10.33	10.09	9.87	9.67	9.49	9.33	9.18	9.04	8.92	8.80	8.69	8.59	8.50
7.2	46.78	12.61	12.12	11.56	11.38	11.19	11.04	10.87	10.59	10.34	10.12	9.92	9.73	9.57	9.42	9.28	9.15	9.03	8.92	8.81	8.72
7.3	47.43	12.92	12.42	11.85	11.67	11.47	11.31	11.15	10.86	10.60	10.37	10.17	9.98	9.81	9.65	9.51	9.38	9.25	9.14	9.04	8.94
7.4	48.08	13.24	12.73	12.14	11.95	11.76	11.59	11.42	11.13	10.87	10.63	10.42	10.23	10.05	9.89	9.75	9.61	9.49	9.37	9.26	9.16
7.5	48.73	13.56	13.03	12.43	12.24	12.04	11.87	11.70	11.40	11.13	10.89	10.68	10.48	10.30	10.14	9.99	9.85	9.72	9.60	9.49	9.39
7.6	49.38	13.88	13.35	12.73	12.54	12.33	12.16	11.98	11.67	11.40	11.15	10.93	10.73	10.55	10.38	10.23	10.09	9.96	9.84	9.72	9.62
7.7	50.03	14.21	13.66	13.03	12.83	12.62	12.45	12.27	11.95	11.67	11.42	11.19	10.99	10.80	10.63	10.47	10.33	10.20	10.07	9.96	9.85
7.8	50.68	14.54	13.98	13.34	13.13	12.92	12.74	12.55	12.23	11.95	11.69	11.46	11.25	11.06	10.88	10.72	10.58	10.44	10.31	10.19	10.09
7.9	51.33	14.87	14.30	13.64	13.44	13.22	13.03	12.84	12.51	12.22	11.96	11.72	11.51	11.32	11.14	10.97	10.82	10.68	10.55	10.43	10.32
8.0	51.97	15.21	14.62	13.95	13.74	13.52	13.33	13.14	12.80	12.50	12.23	11.99	11.77	11.58	11.39	11.23	11.07	10.93	10.80	10.68	10.56

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	9.75	1.08	1.04	1.00	0.97	0.94	0.92	0.89	0.84	0.81	0.77	0.74	0.72	0.70	0.68	0.66	0.64	0.63	0.62	0.60	0.60
1.6	10.39	1.20	1.16	1.12	1.09	1.05	1.02	0.99	0.94	0.90	0.86	0.83	0.80	0.78	0.76	0.74	0.72	0.70	0.69	0.68	0.67
1.7	11.04	1.33	1.29	1.24	1.21	1.17	1.14	1.10	1.05	1.00	0.96	0.93	0.89	0.87	0.84	0.82	0.80	0.78	0.77	0.75	0.74
1.8	11.69	1.47	1.42	1.37	1.33	1.29	1.25	1.22	1.16	1.11	1.06	1.02	0.99	0.96	0.93	0.91	0.89	0.87	0.85	0.83	0.82
1.9	12.34	1.61	1.56	1.50	1.46	1.41	1.38	1.34	1.27	1.22	1.17	1.12	1.09	1.05	1.02	1.00	0.98	0.95	0.94	0.92	0.91
2.0	12.99	1.76	1.70	1.64	1.60	1.55	1.51	1.46	1.39	1.33	1.28	1.23	1.19	1.15	1.12	1.10	1.07	1.05	1.03	1.01	0.99
2.1	13.64	1.91	1.85	1.79	1.74	1.68	1.64	1.59	1.51	1.45	1.39	1.34	1.30	1.26	1.22	1.19	1.17	1.14	1.12	1.10	1.08
2.2	14.29	2.07	2.01	1.94	1.88	1.82	1.77	1.72	1.64	1.57	1.51	1.45	1.41	1.36	1.33	1.30	1.27	1.24	1.21	1.19	1.17
2.3	14.94	2.24	2.17	2.09	2.03	1.97	1.92	1.86	1.77	1.70	1.63	1.57	1.52	1.48	1.43	1.40	1.37	1.34	1.31	1.29	1.27
2.4	15.59	2.40	2.33	2.25	2.19	2.12	2.06	2.01	1.91	1.83	1.76	1.69	1.64	1.59	1.55	1.51	1.48	1.44	1.42	1.39	1.37
2.5	16.24	2.58	2.50	2.41	2.35	2.27	2.22	2.15	2.05	1.96	1.89	1.82	1.76	1.71	1.66	1.62	1.59	1.55	1.52	1.50	1.47
2.6	16.89	2.76	2.67	2.58	2.51	2.43	2.37	2.30	2.20	2.10	2.02	1.95	1.89	1.83	1.78	1.74	1.70	1.66	1.63	1.60	1.58
2.7	17.54	2.94	2.85	2.76	2.68	2.60	2.53	2.46	2.35	2.25	2.16	2.08	2.02	1.96	1.90	1.86	1.82	1.78	1.75	1.72	1.69
2.8	18.19	3.13	3.04	2.93	2.85	2.77	2.70	2.62	2.50	2.39	2.30	2.22	2.15	2.09	2.03	1.99	1.94	1.90	1.86	1.83	1.80
2.9	18.84	3.33	3.23	3.12	3.03	2.94	2.87	2.79	2.66	2.55	2.45	2.36	2.29	2.22	2.16	2.11	2.07	2.02	1.98	1.95	1.92
3.0	19.49	3.53	3.42	3.31	3.22	3.12	3.04	2.96	2.82	2.70	2.60	2.51	2.43	2.36	2.30	2.24	2.19	2.15	2.11	2.07	2.04
3.1	20.14	3.73	3.62	3.50	3.40	3.30	3.22	3.13	2.99	2.86	2.75	2.66	2.57	2.50	2.43	2.38	2.33	2.28	2.23	2.19	2.16
3.2	20.79	3.94	3.83	3.70	3.60	3.49	3.40	3.31	3.16	3.03	2.91	2.81	2.72	2.64	2.57	2.52	2.46	2.41	2.36	2.32	2.29
3.3	21.44	4.16	4.03	3.90	3.79	3.68	3.59	3.49	3.33	3.19	3.07	2.97	2.87	2.79	2.72	2.66	2.60	2.54	2.50	2.45	2.42
3.4	22.09	4.38	4.25	4.11	4.00	3.88	3.78	3.68	3.51	3.36	3.24	3.13	3.03	2.94	2.87	2.80	2.74	2.68	2.63	2.59	2.55
3.5	22.74	4.60	4.47	4.32	4.20	4.08	3.98	3.87	3.69	3.54	3.41	3.29	3.19	3.10	3.02	2.95	2.89	2.83	2.77	2.72	2.69
3.6	23.39	4.83	4.69	4.54	4.41	4.28	4.18	4.07	3.88	3.72	3.58	3.46	3.35	3.26	3.17	3.10	3.03	2.97	2.92	2.87	2.83
3.7	24.04	5.07	4.92	4.76	4.63	4.49	4.38	4.27	4.07	3.90	3.76	3.63	3.52	3.42	3.33	3.26	3.19	3.12	3.06	3.01	2.97
3.8	24.69	5.31	5.15	4.98	4.85	4.71	4.59	4.47	4.27	4.09	3.94	3.81	3.69	3.59	3.49	3.42	3.34	3.27	3.21	3.16	3.11
3.9	25.34	5.55	5.39	5.21	5.07	4.93	4.81	4.68	4.47	4.28	4.12	3.98	3.86	3.76	3.66	3.58	3.50	3.43	3.37	3.31	3.26
4.0	25.99	5.80	5.63	5.45	5.30	5.15	5.02	4.89	4.67	4.48	4.31	4.17	4.04	3.93	3.83	3.74	3.66	3.59	3.52	3.46	3.41
4.1	26.64	6.06	5.88	5.69	5.54	5.38	5.25	5.11	4.88	4.68	4.51	4.35	4.22	4.10	4.00	3.91	3.83	3.75	3.68	3.62	3.57
4.2	27.29	6.31	6.13	5.93	5.77	5.61	5.47	5.33	5.09	4.88	4.70	4.54	4.41	4.28	4.17	4.08	3.99	3.91	3.84	3.78	3.72
4.3	27.94	6.58	6.38	6.18	6.02	5.84	5.70	5.55	5.30	5.09	4.90	4.74	4.59	4.47	4.35	4.26	4.16	4.08	4.01	3.94	3.89
4.4	28.59	6.84	6.65	6.43	6.26	6.08	5.94	5.78	5.52	5.30	5.10	4.93	4.79	4.65	4.53	4.44	4.34	4.25	4.18	4.10	4.05
4.5	29.24	7.12	6.91	6.69	6.51	6.33	6.17	6.01	5.74	5.51	5.31	5.13	4.98	4.84	4.72	4.62	4.52	4.43	4.35	4.27	4.22
4.6	29.89	7.39	7.18	6.95	6.77	6.57	6.42	6.25	5.97	5.73	5.52	5.34	5.18	5.04	4.91	4.80	4.70	4.60	4.52	4.44	4.38
4.7	30.54	7.67	7.45	7.21	7.03	6.83	6.66	6.49	6.20	5.95	5.74	5.54	5.38	5.23	5.10	4.99	4.88	4.78	4.70	4.62	4.56

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	31.18	7.96	7.73	7.48	7.29	7.08	6.91	6.73	6.44	6.18	5.95	5.76	5.59	5.43	5.29	5.18	5.07	4.97	4.88	4.80	4.73
4.9	31.83	8.25	8.01	7.76	7.56	7.34	7.17	6.98	6.67	6.41	6.18	5.97	5.79	5.64	5.49	5.37	5.26	5.15	5.06	4.98	4.91
5.0	32.48	8.55	8.30	8.04	7.83	7.61	7.43	7.23	6.92	6.64	6.40	6.19	6.01	5.84	5.69	5.57	5.45	5.34	5.25	5.16	5.09
5.1	33.13	8.85	8.59	8.32	8.11	7.88	7.69	7.49	7.16	6.88	6.63	6.41	6.22	6.05	5.90	5.77	5.65	5.54	5.44	5.35	5.28
5.2	33.78	9.15	8.89	8.61	8.39	8.15	7.96	7.75	7.41	7.12	6.86	6.63	6.44	6.27	6.11	5.98	5.85	5.73	5.63	5.54	5.46
5.3	34.43	9.46	9.19	8.90	8.67	8.43	8.23	8.01	7.67	7.36	7.10	6.86	6.66	6.48	6.32	6.18	6.05	5.93	5.83	5.73	5.65
5.4	35.08	9.77	9.49	9.19	8.96	8.71	8.50	8.28	7.92	7.61	7.34	7.09	6.89	6.70	6.53	6.39	6.26	6.13	6.03	5.92	5.85
5.5	35.73	10.09	9.80	9.49	9.25	8.99	8.78	8.55	8.18	7.86	7.58	7.33	7.12	6.92	6.75	6.61	6.47	6.34	6.23	6.12	6.04
5.6	36.38	10.41	10.12	9.80	9.55	9.28	9.06	8.83	8.45	8.11	7.83	7.57	7.35	7.15	6.97	6.82	6.68	6.55	6.44	6.32	6.24
5.7	37.03	10.74	10.43	10.11	9.85	9.57	9.35	9.11	8.72	8.37	8.07	7.81	7.58	7.38	7.19	7.04	6.89	6.76	6.64	6.53	6.45
5.8	37.68	11.07	10.76	10.42	10.16	9.87	9.64	9.39	8.99	8.64	8.33	8.06	7.82	7.61	7.42	7.27	7.11	6.97	6.85	6.74	6.65
5.9	38.33	11.40	11.08	10.74	10.46	10.17	9.94	9.68	9.26	8.90	8.58	8.30	8.07	7.85	7.65	7.49	7.33	7.19	7.07	6.95	6.86
6.0	38.98	11.74	11.41	11.06	10.78	10.48	10.23	9.97	9.54	9.17	8.84	8.56	8.31	8.09	7.88	7.72	7.56	7.41	7.28	7.16	7.07
6.1	39.63	12.09	11.75	11.38	11.09	10.79	10.54	10.27	9.83	9.44	9.11	8.81	8.56	8.33	8.12	7.95	7.79	7.63	7.50	7.38	7.28
6.2	40.28	12.43	12.09	11.71	11.42	11.10	10.84	10.57	10.11	9.72	9.38	9.07	8.81	8.58	8.36	8.19	8.02	7.86	7.73	7.60	7.50
6.3	40.93	12.79	12.43	12.04	11.74	11.42	11.15	10.87	10.40	10.00	9.65	9.33	9.07	8.82	8.60	8.43	8.25	8.09	7.95	7.82	7.72
6.4	41.58	13.14	12.78	12.38	12.07	11.74	11.47	11.17	10.70	10.28	9.92	9.60	9.32	9.08	8.85	8.67	8.49	8.32	8.18	8.04	7.94
6.5	42.23	13.50	13.13	12.72	12.40	12.06	11.78	11.48	10.99	10.57	10.20	9.87	9.59	9.33	9.10	8.91	8.73	8.55	8.41	8.27	8.16
6.6	42.88	13.87	13.48	13.07	12.74	12.39	12.10	11.80	11.30	10.86	10.48	10.14	9.85	9.59	9.35	9.16	8.97	8.79	8.65	8.50	8.39
6.7	43.53	14.24	13.84	13.42	13.08	12.72	12.43	12.12	11.60	11.15	10.76	10.42	10.12	9.85	9.61	9.41	9.21	9.03	8.88	8.73	8.62
6.8	44.18	14.61	14.21	13.77	13.43	13.06	12.76	12.44	11.91	11.45	11.05	10.69	10.39	10.12	9.86	9.66	9.46	9.28	9.12	8.97	8.86
6.9	44.83	14.99	14.57	14.13	13.78	13.40	13.09	12.76	12.22	11.75	11.34	10.98	10.66	10.38	10.13	9.92	9.71	9.52	9.37	9.21	9.09
7.0	45.48	15.37	14.95	14.49	14.13	13.74	13.43	13.09	12.54	12.05	11.63	11.26	10.94	10.65	10.39	10.18	9.97	9.77	9.61	9.45	9.33
7.1	46.13	15.76	15.32	14.85	14.49	14.09	13.77	13.42	12.86	12.36	11.93	11.55	11.22	10.93	10.66	10.44	10.22	10.03	9.86	9.70	9.57
7.2	46.78	16.15	15.70	15.22	14.85	14.44	14.11	13.76	13.18	12.67	12.23	11.84	11.51	11.20	10.93	10.70	10.48	10.28	10.11	9.94	9.82
7.3	47.43	16.54	16.09	15.60	15.21	14.80	14.46	14.10	13.50	12.99	12.54	12.14	11.79	11.48	11.20	10.97	10.75	10.54	10.37	10.19	10.06
7.4	48.08	16.94	16.48	15.97	15.58	15.16	14.81	14.44	13.83	13.30	12.84	12.43	12.08	11.77	11.48	11.24	11.01	10.80	10.62	10.45	10.31
7.5	48.73	17.34	16.87	16.36	15.95	15.52	15.17	14.79	14.17	13.63	13.15	12.74	12.38	12.05	11.76	11.52	11.28	11.07	10.88	10.70	10.57
7.6	49.38	17.75	17.27	16.74	16.33	15.89	15.53	15.14	14.50	13.95	13.47	13.04	12.67	12.34	12.04	11.80	11.55	11.33	11.15	10.96	10.82
7.7	50.03	18.16	17.67	17.13	16.71	16.26	15.89	15.49	14.84	14.28	13.79	13.35	12.97	12.64	12.33	12.08	11.83	11.60	11.41	11.22	11.08
7.8	50.68	18.58	18.07	17.52	17.09	16.63	16.25	15.85	15.19	14.61	14.11	13.66	13.28	12.93	12.61	12.36	12.11	11.87	11.68	11.49	11.34
7.9	51.33	19.00	18.48	17.92	17.48	17.01	16.62	16.21	15.54	14.94	14.43	13.97	13.58	13.23	12.91	12.65	12.39	12.15	11.95	11.75	11.61
8.0	51.97	19.42	18.89	18.32	17.87	17.39	17.00	16.58	15.89	15.28	14.76	14.29	13.89	13.53	13.20	12.93	12.67	12.43	12.23	12.02	11.87

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	9.75	1.26	1.21	1.15	1.11	1.07	1.03	0.99	0.93	0.88	0.84	0.81	0.77	0.75	0.72	0.70	0.68	0.66	0.65	0.64	0.62
1.6	10.39	1.41	1.35	1.29	1.24	1.19	1.15	1.11	1.04	0.99	0.94	0.90	0.86	0.83	0.81	0.78	0.76	0.74	0.73	0.71	0.70
1.7	11.04	1.56	1.49	1.42	1.37	1.32	1.28	1.23	1.16	1.10	1.05	1.00	0.96	0.93	0.90	0.87	0.85	0.83	0.81	0.79	0.78
1.8	11.69	1.71	1.64	1.57	1.51	1.45	1.41	1.36	1.28	1.21	1.15	1.11	1.06	1.02	0.99	0.96	0.94	0.91	0.90	0.88	0.86
1.9	12.34	1.88	1.80	1.72	1.66	1.59	1.54	1.49	1.40	1.33	1.27	1.21	1.17	1.13	1.09	1.06	1.03	1.01	0.99	0.96	0.95
2.0	12.99	2.05	1.97	1.88	1.81	1.74	1.69	1.63	1.53	1.45	1.39	1.33	1.28	1.23	1.19	1.16	1.13	1.10	1.08	1.06	1.04
2.1	13.64	2.22	2.14	2.04	1.97	1.89	1.83	1.77	1.67	1.58	1.51	1.45	1.39	1.34	1.30	1.26	1.23	1.20	1.18	1.15	1.13
2.2	14.29	2.41	2.31	2.21	2.13	2.05	1.99	1.92	1.81	1.71	1.64	1.57	1.51	1.46	1.41	1.37	1.34	1.30	1.28	1.25	1.23
2.3	14.94	2.59	2.49	2.38	2.30	2.21	2.14	2.07	1.95	1.85	1.77	1.69	1.63	1.57	1.52	1.48	1.45	1.41	1.38	1.35	1.33
2.4	15.59	2.79	2.68	2.56	2.47	2.38	2.31	2.23	2.10	1.99	1.90	1.83	1.76	1.70	1.64	1.60	1.56	1.52	1.49	1.46	1.43
2.5	16.24	2.99	2.87	2.75	2.65	2.55	2.47	2.39	2.26	2.14	2.04	1.96	1.89	1.82	1.77	1.72	1.68	1.63	1.60	1.57	1.54
2.6	16.89	3.19	3.07	2.94	2.84	2.73	2.65	2.56	2.41	2.29	2.19	2.10	2.02	1.95	1.89	1.84	1.80	1.75	1.72	1.68	1.65
2.7	17.54	3.41	3.28	3.13	3.03	2.91	2.83	2.73	2.58	2.45	2.34	2.24	2.16	2.09	2.02	1.97	1.92	1.87	1.84	1.80	1.77
2.8	18.19	3.62	3.48	3.33	3.22	3.10	3.01	2.91	2.75	2.61	2.49	2.39	2.30	2.22	2.16	2.10	2.05	2.00	1.96	1.92	1.89
2.9	18.84	3.85	3.70	3.54	3.42	3.29	3.20	3.09	2.92	2.77	2.65	2.54	2.45	2.37	2.29	2.23	2.18	2.13	2.09	2.04	2.01
3.0	19.49	4.07	3.92	3.75	3.63	3.49	3.39	3.28	3.09	2.94	2.81	2.70	2.60	2.51	2.44	2.37	2.31	2.26	2.21	2.17	2.13
3.1	20.14	4.31	4.15	3.97	3.84	3.70	3.59	3.47	3.28	3.11	2.98	2.86	2.75	2.66	2.58	2.51	2.45	2.39	2.35	2.30	2.26
3.2	20.79	4.55	4.38	4.19	4.05	3.90	3.79	3.66	3.46	3.29	3.15	3.02	2.91	2.81	2.73	2.66	2.59	2.53	2.48	2.43	2.39
3.3	21.44	4.80	4.62	4.42	4.28	4.12	4.00	3.87	3.65	3.47	3.32	3.19	3.07	2.97	2.88	2.81	2.74	2.67	2.62	2.57	2.53
3.4	22.09	5.05	4.86	4.65	4.50	4.34	4.21	4.07	3.85	3.66	3.50	3.36	3.24	3.13	3.04	2.96	2.89	2.82	2.77	2.71	2.66
3.5	22.74	5.30	5.11	4.89	4.73	4.56	4.42	4.28	4.05	3.85	3.68	3.54	3.41	3.30	3.20	3.11	3.04	2.97	2.91	2.85	2.81
3.6	23.39	5.56	5.36	5.14	4.97	4.79	4.65	4.50	4.25	4.04	3.87	3.72	3.58	3.47	3.36	3.27	3.20	3.12	3.06	3.00	2.95
3.7	24.04	5.83	5.62	5.38	5.21	5.02	4.87	4.71	4.46	4.24	4.06	3.90	3.76	3.64	3.53	3.44	3.36	3.28	3.22	3.15	3.10
3.8	24.69	6.10	5.88	5.64	5.45	5.26	5.10	4.94	4.67	4.45	4.25	4.09	3.94	3.81	3.70	3.60	3.52	3.43	3.37	3.30	3.25
3.9	25.34	6.38	6.15	5.89	5.70	5.50	5.34	5.17	4.89	4.65	4.45	4.28	4.12	3.99	3.87	3.77	3.69	3.60	3.53	3.46	3.40
4.0	25.99	6.67	6.42	6.16	5.96	5.74	5.58	5.40	5.11	4.86	4.65	4.47	4.31	4.18	4.05	3.95	3.85	3.76	3.69	3.62	3.56
4.1	26.64	6.95	6.70	6.43	6.22	6.00	5.82	5.64	5.34	5.08	4.86	4.67	4.51	4.36	4.23	4.12	4.03	3.93	3.86	3.78	3.72
4.2	27.29	7.25	6.99	6.70	6.48	6.25	6.07	5.88	5.56	5.30	5.07	4.88	4.70	4.55	4.42	4.30	4.20	4.10	4.03	3.95	3.89
4.3	27.94	7.55	7.27	6.98	6.75	6.51	6.33	6.12	5.80	5.52	5.29	5.08	4.90	4.75	4.61	4.49	4.38	4.28	4.20	4.12	4.05
4.4	28.59	7.85	7.57	7.26	7.03	6.78	6.58	6.38	6.04	5.75	5.50	5.29	5.10	4.94	4.80	4.67	4.57	4.46	4.38	4.29	4.22
4.5	29.24	8.16	7.87	7.55	7.31	7.05	6.85	6.63	6.28	5.98	5.73	5.51	5.31	5.14	4.99	4.86	4.75	4.64	4.56	4.47	4.40
4.6	29.89	8.48	8.17	7.84	7.59	7.32	7.11	6.89	6.53	6.21	5.95	5.72	5.52	5.35	5.19	5.06	4.94	4.83	4.74	4.64	4.57
4.7	30.54	8.80	8.48	8.14	7.88	7.60	7.39	7.15	6.78	6.45	6.18	5.95	5.74	5.56	5.39	5.26	5.14	5.02	4.93	4.83	4.75

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	31.18	9.12	8.79	8.44	8.17	7.88	7.66	7.42	7.03	6.70	6.42	6.17	5.95	5.77	5.60	5.46	5.33	5.21	5.12	5.01	4.93
4.9	31.83	9.45	9.11	8.75	8.47	8.17	7.94	7.69	7.29	6.94	6.65	6.40	6.18	5.98	5.81	5.66	5.53	5.40	5.31	5.20	5.12
5.0	32.48	9.78	9.44	9.06	8.77	8.46	8.23	7.97	7.55	7.20	6.90	6.63	6.40	6.20	6.02	5.87	5.74	5.60	5.50	5.39	5.31
5.1	33.13	10.12	9.77	9.37	9.08	8.76	8.52	8.25	7.82	7.45	7.14	6.87	6.63	6.42	6.24	6.08	5.94	5.80	5.70	5.59	5.50
5.2	33.78	10.47	10.10	9.69	9.39	9.06	8.81	8.53	8.09	7.71	7.39	7.11	6.86	6.65	6.46	6.29	6.15	6.01	5.90	5.78	5.70
5.3	34.43	10.82	10.44	10.02	9.71	9.37	9.11	8.82	8.36	7.97	7.64	7.35	7.10	6.88	6.68	6.51	6.36	6.22	6.11	5.98	5.89
5.4	35.08	11.17	10.78	10.35	10.03	9.68	9.41	9.12	8.64	8.24	7.90	7.60	7.34	7.11	6.90	6.73	6.58	6.43	6.32	6.19	6.09
5.5	35.73	11.53	11.13	10.69	10.35	9.99	9.71	9.41	8.93	8.51	8.16	7.85	7.58	7.34	7.13	6.95	6.80	6.64	6.53	6.39	6.30
5.6	36.38	11.90	11.48	11.03	10.68	10.31	10.03	9.72	9.21	8.78	8.42	8.11	7.82	7.58	7.37	7.18	7.02	6.86	6.74	6.60	6.50
5.7	37.03	12.27	11.84	11.37	11.02	10.64	10.34	10.02	9.50	9.06	8.69	8.36	8.07	7.83	7.60	7.41	7.25	7.08	6.96	6.82	6.71
5.8	37.68	12.64	12.20	11.72	11.36	10.96	10.66	10.33	9.80	9.35	8.96	8.63	8.33	8.07	7.84	7.65	7.48	7.30	7.18	7.03	6.93
5.9	38.33	13.02	12.57	12.07	11.70	11.29	10.98	10.65	10.10	9.63	9.24	8.89	8.58	8.32	8.08	7.88	7.71	7.53	7.40	7.25	7.14
6.0	38.98	13.40	12.94	12.43	12.05	11.63	11.31	10.96	10.40	9.92	9.51	9.16	8.84	8.57	8.33	8.12	7.94	7.76	7.63	7.47	7.36
6.1	39.63	13.79	13.31	12.79	12.40	11.97	11.64	11.29	10.71	10.21	9.80	9.43	9.11	8.83	8.58	8.37	8.18	7.99	7.86	7.70	7.58
6.2	40.28	14.19	13.70	13.16	12.75	12.32	11.98	11.61	11.02	10.51	10.08	9.71	9.37	9.09	8.83	8.61	8.42	8.23	8.09	7.93	7.81
6.3	40.93	14.59	14.08	13.53	13.12	12.67	12.32	11.94	11.33	10.81	10.37	9.99	9.65	9.35	9.09	8.86	8.67	8.47	8.32	8.16	8.04
6.4	41.58	14.99	14.47	13.91	13.48	13.02	12.66	12.28	11.65	11.12	10.66	10.27	9.92	9.62	9.35	9.11	8.91	8.71	8.56	8.39	8.27
6.5	42.23	15.40	14.87	14.29	13.85	13.38	13.01	12.62	11.97	11.43	10.96	10.56	10.20	9.89	9.61	9.37	9.16	8.96	8.80	8.63	8.50
6.6	42.88	15.81	15.27	14.67	14.22	13.74	13.36	12.96	12.30	11.74	11.26	10.85	10.48	10.16	9.87	9.63	9.42	9.21	9.05	8.87	8.74
6.7	43.53	16.23	15.67	15.06	14.60	14.10	13.72	13.31	12.63	12.05	11.57	11.14	10.76	10.43	10.14	9.89	9.68	9.46	9.30	9.11	8.98
6.8	44.18	16.65	16.08	15.45	14.98	14.48	14.08	13.66	12.96	12.37	11.87	11.44	11.05	10.71	10.41	10.16	9.94	9.71	9.55	9.36	9.22
6.9	44.83	17.07	16.49	15.85	15.37	14.85	14.45	14.01	13.30	12.70	12.18	11.74	11.34	11.00	10.69	10.43	10.20	9.97	9.80	9.61	9.46
7.0	45.48	17.51	16.91	16.25	15.76	15.23	14.82	14.37	13.64	13.02	12.50	12.04	11.63	11.28	10.97	10.70	10.46	10.23	10.06	9.86	9.71
7.1	46.13	17.94	17.33	16.66	16.16	15.61	15.19	14.73	13.99	13.35	12.82	12.35	11.93	11.57	11.25	10.97	10.73	10.49	10.31	10.11	9.96
7.2	46.78	18.38	17.76	17.07	16.56	16.00	15.57	15.10	14.34	13.69	13.14	12.66	12.23	11.86	11.53	11.25	11.01	10.76	10.58	10.37	10.22
7.3	47.43	18.83	18.19	17.49	16.96	16.39	15.95	15.47	14.69	14.03	13.46	12.97	12.54	12.16	11.82	11.53	11.28	11.03	10.84	10.63	10.47
7.4	48.08	19.28	18.62	17.91	17.37	16.78	16.33	15.84	15.05	14.37	13.79	13.29	12.84	12.46	12.11	11.82	11.56	11.30	11.11	10.89	10.73
7.5	48.73	19.73	19.06	18.33	17.78	17.18	16.72	16.22	15.41	14.71	14.12	13.61	13.15	12.76	12.41	12.10	11.84	11.58	11.38	11.16	11.00
7.6	49.38	20.19	19.51	18.76	18.20	17.59	17.12	16.60	15.77	15.06	14.46	13.94	13.47	13.07	12.70	12.39	12.13	11.86	11.66	11.43	11.26
7.7	50.03	20.66	19.96	19.19	18.62	18.00	17.51	16.99	16.14	15.42	14.80	14.26	13.78	13.37	13.00	12.69	12.41	12.14	11.93	11.70	11.53
7.8	50.68	21.12	20.41	19.63	19.04	18.41	17.91	17.38	16.51	15.77	15.14	14.59	14.11	13.69	13.31	12.98	12.70	12.42	12.21	11.98	11.80
7.9	51.33	21.60	20.87	20.07	19.47	18.82	18.32	17.78	16.89	16.13	15.49	14.93	14.43	14.00	13.61	13.28	13.00	12.71	12.50	12.25	12.08
8.0	51.97	22.07	21.33	20.52	19.91	19.24	18.73	18.17	17.27	16.49	15.84	15.27	14.76	14.32	13.92	13.59	13.29	13.00	12.78	12.53	12.35

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	9.75	1.43	1.37	1.30	1.25	1.19	1.15	1.11	1.03	0.97	0.92	0.88	0.84	0.80	0.78	0.75	0.73	0.71	0.69	0.67	0.66
1.6	10.39	1.59	1.52	1.45	1.39	1.33	1.28	1.23	1.15	1.09	1.03	0.98	0.94	0.90	0.87	0.84	0.81	0.79	0.77	0.75	0.74
1.7	11.04	1.76	1.69	1.60	1.54	1.47	1.42	1.37	1.28	1.20	1.14	1.09	1.04	1.00	0.96	0.93	0.91	0.88	0.86	0.84	0.82
1.8	11.69	1.94	1.86	1.77	1.70	1.62	1.57	1.51	1.41	1.33	1.26	1.20	1.15	1.10	1.07	1.03	1.00	0.97	0.95	0.93	0.91
1.9	12.34	2.12	2.03	1.93	1.86	1.78	1.72	1.65	1.55	1.46	1.38	1.32	1.26	1.21	1.17	1.13	1.10	1.07	1.04	1.02	1.00
2.0	12.99	2.31	2.21	2.11	2.03	1.94	1.88	1.80	1.69	1.59	1.51	1.44	1.38	1.33	1.28	1.24	1.20	1.17	1.14	1.11	1.09
2.1	13.64	2.51	2.40	2.29	2.20	2.11	2.04	1.96	1.84	1.73	1.64	1.57	1.50	1.44	1.39	1.35	1.31	1.27	1.24	1.21	1.19
2.2	14.29	2.71	2.60	2.48	2.38	2.28	2.21	2.12	1.99	1.88	1.78	1.70	1.63	1.57	1.51	1.46	1.42	1.38	1.35	1.32	1.29
2.3	14.94	2.92	2.80	2.67	2.57	2.46	2.38	2.29	2.15	2.03	1.92	1.84	1.76	1.69	1.63	1.58	1.54	1.50	1.46	1.43	1.40
2.4	15.59	3.14	3.01	2.87	2.76	2.65	2.56	2.46	2.31	2.18	2.07	1.98	1.90	1.82	1.76	1.71	1.66	1.61	1.57	1.54	1.50
2.5	16.24	3.36	3.22	3.07	2.96	2.84	2.74	2.64	2.48	2.34	2.22	2.12	2.04	1.96	1.89	1.83	1.78	1.73	1.69	1.65	1.62
2.6	16.89	3.59	3.45	3.29	3.16	3.03	2.93	2.83	2.65	2.51	2.38	2.27	2.18	2.10	2.03	1.96	1.91	1.86	1.81	1.77	1.73
2.7	17.54	3.83	3.67	3.50	3.37	3.24	3.13	3.02	2.83	2.67	2.54	2.43	2.33	2.24	2.17	2.10	2.04	1.98	1.93	1.89	1.85
2.8	18.19	4.07	3.91	3.73	3.59	3.44	3.33	3.21	3.01	2.85	2.71	2.59	2.48	2.39	2.31	2.24	2.17	2.12	2.06	2.02	1.98
2.9	18.84	4.32	4.15	3.96	3.81	3.66	3.54	3.41	3.20	3.03	2.88	2.75	2.64	2.54	2.45	2.38	2.31	2.25	2.20	2.15	2.10
3.0	19.49	4.58	4.39	4.19	4.04	3.87	3.75	3.61	3.40	3.21	3.05	2.92	2.80	2.70	2.61	2.53	2.46	2.39	2.33	2.28	2.23
3.1	20.14	4.84	4.64	4.43	4.27	4.10	3.97	3.82	3.59	3.40	3.23	3.09	2.96	2.86	2.76	2.68	2.60	2.53	2.47	2.42	2.37
3.2	20.79	5.10	4.90	4.68	4.51	4.33	4.19	4.04	3.80	3.59	3.42	3.27	3.13	3.02	2.92	2.83	2.75	2.68	2.61	2.56	2.51
3.3	21.44	5.38	5.16	4.93	4.75	4.56	4.42	4.26	4.00	3.79	3.60	3.45	3.31	3.19	3.08	2.99	2.91	2.83	2.76	2.70	2.65
3.4	22.09	5.66	5.43	5.19	5.00	4.80	4.65	4.48	4.22	3.99	3.80	3.63	3.49	3.36	3.25	3.15	3.06	2.98	2.91	2.85	2.79
3.5	22.74	5.94	5.71	5.45	5.26	5.05	4.89	4.71	4.43	4.20	3.99	3.82	3.67	3.54	3.42	3.31	3.22	3.14	3.06	3.00	2.94
3.6	23.39	6.23	5.99	5.72	5.52	5.30	5.13	4.95	4.66	4.41	4.19	4.01	3.85	3.71	3.59	3.48	3.39	3.30	3.22	3.15	3.09
3.7	24.04	6.53	6.27	5.99	5.78	5.55	5.38	5.19	4.88	4.62	4.40	4.21	4.04	3.90	3.77	3.66	3.56	3.46	3.38	3.31	3.24
3.8	24.69	6.83	6.56	6.27	6.05	5.81	5.63	5.43	5.11	4.84	4.61	4.41	4.24	4.09	3.95	3.83	3.73	3.63	3.54	3.47	3.40
3.9	25.34	7.14	6.86	6.56	6.33	6.08	5.89	5.68	5.35	5.07	4.82	4.62	4.44	4.28	4.14	4.01	3.90	3.80	3.71	3.64	3.56
4.0	25.99	7.45	7.16	6.85	6.61	6.35	6.15	5.94	5.59	5.29	5.04	4.83	4.64	4.47	4.33	4.20	4.08	3.98	3.88	3.80	3.73
4.1	26.64	7.77	7.47	7.14	6.90	6.63	6.42	6.20	5.83	5.53	5.26	5.04	4.84	4.67	4.52	4.38	4.27	4.16	4.06	3.98	3.89
4.2	27.29	8.10	7.79	7.44	7.19	6.91	6.69	6.46	6.08	5.76	5.49	5.26	5.05	4.87	4.71	4.58	4.45	4.34	4.23	4.15	4.07
4.3	27.94	8.43	8.11	7.75	7.48	7.19	6.97	6.73	6.34	6.01	5.72	5.48	5.27	5.08	4.91	4.77	4.64	4.52	4.42	4.33	4.24
4.4	28.59	8.77	8.43	8.06	7.79	7.48	7.25	7.00	6.60	6.25	5.96	5.70	5.48	5.29	5.12	4.97	4.84	4.71	4.60	4.51	4.42
4.5	29.24	9.11	8.76	8.38	8.09	7.78	7.54	7.28	6.86	6.50	6.20	5.93	5.71	5.50	5.33	5.17	5.03	4.90	4.79	4.69	4.60
4.6	29.89	9.46	9.10	8.70	8.40	8.08	7.83	7.56	7.13	6.76	6.44	6.17	5.93	5.72	5.54	5.38	5.23	5.10	4.98	4.88	4.78
4.7	30.54	9.81	9.44	9.03	8.72	8.39	8.13	7.85	7.40	7.02	6.69	6.41	6.16	5.94	5.75	5.58	5.44	5.30	5.17	5.07	4.97

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	31.18	10.17	9.79	9.36	9.04	8.70	8.43	8.14	7.68	7.28	6.94	6.65	6.39	6.17	5.97	5.80	5.64	5.50	5.37	5.26	5.16
4.9	31.83	10.54	10.14	9.70	9.37	9.01	8.74	8.44	7.96	7.55	7.19	6.89	6.63	6.40	6.19	6.01	5.85	5.71	5.57	5.46	5.35
5.0	32.48	10.91	10.49	10.04	9.70	9.33	9.05	8.74	8.24	7.82	7.45	7.14	6.87	6.63	6.42	6.23	6.07	5.91	5.78	5.66	5.55
5.1	33.13	11.28	10.86	10.39	10.04	9.66	9.36	9.05	8.53	8.09	7.72	7.40	7.11	6.87	6.65	6.45	6.29	6.13	5.98	5.87	5.75
5.2	33.78	11.66	11.23	10.74	10.38	9.99	9.68	9.36	8.83	8.37	7.99	7.65	7.36	7.11	6.88	6.68	6.51	6.34	6.19	6.07	5.95
5.3	34.43	12.05	11.60	11.10	10.73	10.32	10.01	9.67	9.12	8.66	8.26	7.91	7.61	7.35	7.12	6.91	6.73	6.56	6.41	6.28	6.16
5.4	35.08	12.44	11.98	11.47	11.08	10.66	10.34	9.99	9.43	8.94	8.53	8.18	7.87	7.60	7.36	7.14	6.96	6.78	6.63	6.50	6.37
5.5	35.73	12.84	12.36	11.83	11.44	11.01	10.67	10.31	9.73	9.24	8.81	8.45	8.13	7.85	7.60	7.38	7.19	7.01	6.85	6.71	6.58
5.6	36.38	13.24	12.75	12.21	11.80	11.36	11.01	10.64	10.04	9.53	9.10	8.72	8.39	8.10	7.85	7.62	7.42	7.24	7.07	6.93	6.80
5.7	37.03	13.65	13.14	12.59	12.17	11.71	11.36	10.98	10.36	9.83	9.38	9.00	8.66	8.36	8.10	7.86	7.66	7.47	7.30	7.15	7.02
5.8	37.68	14.07	13.54	12.97	12.54	12.07	11.71	11.31	10.68	10.14	9.68	9.28	8.93	8.62	8.35	8.11	7.90	7.71	7.53	7.38	7.24
5.9	38.33	14.48	13.95	13.36	12.91	12.43	12.06	11.66	11.00	10.45	9.97	9.56	9.20	8.89	8.61	8.36	8.15	7.94	7.76	7.61	7.46
6.0	38.98	14.91	14.36	13.75	13.29	12.80	12.42	12.00	11.33	10.76	10.27	9.85	9.48	9.16	8.87	8.62	8.39	8.19	8.00	7.84	7.69
6.1	39.63	15.34	14.77	14.15	13.68	13.17	12.78	12.35	11.66	11.08	10.57	10.14	9.76	9.43	9.13	8.87	8.64	8.43	8.24	8.08	7.92
6.2	40.28	15.77	15.19	14.55	14.07	13.55	13.14	12.71	12.00	11.40	10.88	10.43	10.05	9.70	9.40	9.13	8.90	8.68	8.48	8.32	8.16
6.3	40.93	16.21	15.61	14.96	14.47	13.93	13.52	13.07	12.34	11.72	11.19	10.73	10.33	9.98	9.67	9.40	9.16	8.93	8.73	8.56	8.39
6.4	41.58	16.66	16.04	15.37	14.87	14.32	13.89	13.43	12.69	12.05	11.51	11.04	10.63	10.27	9.95	9.66	9.42	9.18	8.98	8.80	8.63
6.5	42.23	17.11	16.48	15.79	15.27	14.71	14.27	13.80	13.04	12.38	11.82	11.34	10.92	10.55	10.22	9.94	9.68	9.44	9.23	9.05	8.88
6.6	42.88	17.56	16.92	16.21	15.68	15.10	14.66	14.17	13.39	12.72	12.15	11.65	11.22	10.84	10.50	10.21	9.95	9.70	9.48	9.30	9.12
6.7	43.53	18.02	17.36	16.64	16.09	15.50	15.04	14.55	13.75	13.06	12.47	11.97	11.52	11.13	10.79	10.49	10.22	9.97	9.74	9.55	9.37
6.8	44.18	18.49	17.81	17.07	16.51	15.91	15.44	14.93	14.11	13.40	12.80	12.28	11.83	11.43	11.08	10.77	10.49	10.24	10.00	9.81	9.62
6.9	44.83	18.96	18.27	17.51	16.94	16.31	15.83	15.32	14.47	13.75	13.14	12.61	12.14	11.73	11.37	11.05	10.77	10.51	10.27	10.07	9.88
7.0	45.48	19.43	18.72	17.95	17.37	16.73	16.24	15.70	14.84	14.11	13.47	12.93	12.45	12.04	11.66	11.34	11.05	10.78	10.54	10.33	10.14
7.1	46.13	19.91	19.19	18.40	17.80	17.15	16.64	16.10	15.22	14.46	13.82	13.26	12.77	12.34	11.96	11.63	11.33	11.06	10.81	10.60	10.40
7.2	46.78	20.40	19.66	18.85	18.24	17.57	17.05	16.50	15.59	14.82	14.16	13.59	13.09	12.65	12.26	11.92	11.62	11.34	11.08	10.87	10.66
7.3	47.43	20.89	20.13	19.30	18.68	18.00	17.47	16.90	15.98	15.19	14.51	13.93	13.42	12.97	12.57	12.22	11.91	11.62	11.36	11.14	10.93
7.4	48.08	21.38	20.61	19.76	19.12	18.43	17.89	17.31	16.36	15.55	14.86	14.27	13.74	13.28	12.88	12.52	12.20	11.91	11.64	11.42	11.20
7.5	48.73	21.88	21.10	20.23	19.58	18.86	18.31	17.72	16.75	15.93	15.22	14.61	14.07	13.61	13.19	12.82	12.50	12.20	11.92	11.70	11.47
7.6	49.38	22.39	21.58	20.70	20.03	19.30	18.74	18.13	17.15	16.30	15.58	14.96	14.41	13.93	13.50	13.13	12.80	12.49	12.21	11.98	11.75
7.7	50.03	22.90	22.08	21.17	20.49	19.75	19.17	18.55	17.54	16.68	15.94	15.31	14.75	14.26	13.82	13.44	13.10	12.78	12.50	12.26	12.03
7.8	50.68	23.42	22.58	21.65	20.96	20.20	19.61	18.98	17.95	17.07	16.31	15.66	15.09	14.59	14.14	13.75	13.41	13.08	12.79	12.55	12.31
7.9	51.33	23.94	23.08	22.14	21.43	20.65	20.05	19.40	18.35	17.45	16.68	16.02	15.43	14.92	14.47	14.07	13.71	13.38	13.09	12.84	12.60
8.0	51.97	24.46	23.59	22.63	21.90	21.11	20.50	19.84	18.76	17.84	17.06	16.38	15.78	15.26	14.80	14.39	14.03	13.69	13.38	13.13	12.88

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	14.85	0.61	0.59	0.56	0.55	0.53	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.42	0.41	0.41	0.40
1.6	15.84	0.69	0.66	0.62	0.61	0.60	0.59	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.48	0.47	0.46	0.46	0.45
1.7	16.83	0.76	0.73	0.69	0.68	0.67	0.66	0.64	0.63	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.51	0.50
1.8	17.82	0.84	0.81	0.76	0.75	0.74	0.73	0.71	0.69	0.67	0.66	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55
1.9	18.81	0.93	0.89	0.84	0.83	0.81	0.80	0.78	0.76	0.74	0.72	0.71	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61
2.0	19.80	1.01	0.97	0.92	0.90	0.89	0.87	0.86	0.83	0.81	0.79	0.77	0.76	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67
2.1	20.79	1.11	1.06	1.00	0.99	0.97	0.95	0.94	0.91	0.89	0.86	0.85	0.83	0.81	0.80	0.78	0.77	0.76	0.75	0.74	0.73
2.2	21.78	1.20	1.15	1.09	1.07	1.05	1.03	1.02	0.99	0.96	0.94	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80
2.3	22.77	1.30	1.24	1.18	1.16	1.14	1.12	1.10	1.07	1.04	1.02	0.99	0.97	0.96	0.94	0.92	0.91	0.90	0.88	0.87	0.86
2.4	23.76	1.40	1.34	1.27	1.25	1.22	1.21	1.19	1.15	1.12	1.10	1.07	1.05	1.03	1.01	1.00	0.98	0.97	0.95	0.94	0.93
2.5	24.75	1.50	1.44	1.36	1.34	1.32	1.30	1.28	1.24	1.21	1.18	1.15	1.13	1.11	1.09	1.07	1.06	1.04	1.03	1.01	1.00
2.6	25.74	1.61	1.54	1.46	1.44	1.41	1.39	1.37	1.33	1.29	1.26	1.24	1.21	1.19	1.17	1.15	1.13	1.12	1.10	1.09	1.07
2.7	26.73	1.72	1.65	1.56	1.54	1.51	1.49	1.46	1.42	1.38	1.35	1.32	1.30	1.27	1.25	1.23	1.21	1.19	1.18	1.16	1.15
2.8	27.72	1.83	1.75	1.67	1.64	1.61	1.59	1.56	1.52	1.48	1.44	1.41	1.38	1.36	1.33	1.31	1.29	1.27	1.26	1.24	1.23
2.9	28.71	1.95	1.87	1.77	1.74	1.71	1.69	1.66	1.61	1.57	1.54	1.50	1.47	1.45	1.42	1.40	1.38	1.36	1.34	1.32	1.31
3.0	29.70	2.07	1.98	1.88	1.85	1.82	1.79	1.76	1.71	1.67	1.63	1.60	1.57	1.54	1.51	1.49	1.46	1.44	1.42	1.41	1.39
3.1	30.69	2.19	2.10	2.00	1.96	1.93	1.90	1.87	1.82	1.77	1.73	1.69	1.66	1.63	1.60	1.58	1.55	1.53	1.51	1.49	1.47
3.2	31.68	2.32	2.22	2.11	2.08	2.04	2.01	1.98	1.92	1.87	1.83	1.79	1.76	1.72	1.70	1.67	1.64	1.62	1.60	1.58	1.56
3.3	32.67	2.45	2.34	2.23	2.19	2.15	2.12	2.09	2.03	1.98	1.93	1.89	1.86	1.82	1.79	1.76	1.74	1.71	1.69	1.67	1.65
3.4	33.66	2.58	2.47	2.35	2.31	2.27	2.24	2.20	2.14	2.09	2.04	2.00	1.96	1.92	1.89	1.86	1.83	1.81	1.78	1.76	1.74
3.5	34.65	2.71	2.60	2.47	2.43	2.39	2.36	2.32	2.26	2.20	2.15	2.10	2.06	2.03	1.99	1.96	1.93	1.90	1.88	1.86	1.84
3.6	35.64	2.85	2.73	2.60	2.56	2.51	2.48	2.44	2.37	2.31	2.26	2.21	2.17	2.13	2.09	2.06	2.03	2.00	1.98	1.95	1.93
3.7	36.63	2.99	2.87	2.73	2.69	2.64	2.60	2.56	2.49	2.43	2.37	2.32	2.28	2.24	2.20	2.17	2.13	2.10	2.08	2.05	2.03
3.8	37.62	3.14	3.01	2.86	2.82	2.77	2.73	2.69	2.61	2.55	2.49	2.44	2.39	2.35	2.31	2.27	2.24	2.21	2.18	2.15	2.13
3.9	38.61	3.28	3.15	3.00	2.95	2.90	2.86	2.81	2.74	2.67	2.61	2.55	2.50	2.46	2.42	2.38	2.35	2.31	2.28	2.26	2.23
4.0	39.60	3.43	3.29	3.14	3.09	3.03	2.99	2.94	2.86	2.79	2.73	2.67	2.62	2.57	2.53	2.49	2.46	2.42	2.39	2.36	2.34
4.1	40.59	3.59	3.44	3.28	3.22	3.17	3.12	3.08	2.99	2.92	2.85	2.79	2.74	2.69	2.65	2.61	2.57	2.53	2.50	2.47	2.44
4.2	41.58	3.74	3.59	3.42	3.37	3.31	3.26	3.21	3.12	3.05	2.98	2.92	2.86	2.81	2.76	2.72	2.68	2.65	2.61	2.58	2.55
4.3	42.57	3.90	3.75	3.57	3.51	3.45	3.40	3.35	3.26	3.18	3.11	3.04	2.99	2.93	2.88	2.84	2.80	2.76	2.73	2.69	2.66
4.4	43.57	4.06	3.90	3.72	3.66	3.59	3.54	3.49	3.40	3.31	3.24	3.17	3.11	3.06	3.01	2.96	2.92	2.88	2.84	2.81	2.78
4.5	44.56	4.23	4.06	3.87	3.81	3.74	3.69	3.63	3.53	3.45	3.37	3.30	3.24	3.18	3.13	3.08	3.04	3.00	2.96	2.92	2.89
4.6	45.55	4.40	4.22	4.02	3.96	3.89	3.84	3.78	3.68	3.59	3.51	3.44	3.37	3.31	3.26	3.21	3.16	3.12	3.08	3.04	3.01
4.7	46.54	4.57	4.39	4.18	4.11	4.04	3.99	3.92	3.82	3.73	3.65	3.57	3.50	3.44	3.39	3.33	3.29	3.24	3.20	3.16	3.13

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" **Uponor PEX-a** — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	47.53	4.74	4.55	4.34	4.27	4.20	4.14	4.08	3.97	3.87	3.79	3.71	3.64	3.57	3.52	3.46	3.41	3.37	3.33	3.29	3.25
4.9	48.52	4.92	4.72	4.50	4.43	4.35	4.29	4.23	4.12	4.02	3.93	3.85	3.78	3.71	3.65	3.59	3.54	3.49	3.45	3.41	3.37
5.0	49.51	5.10	4.90	4.67	4.59	4.51	4.45	4.38	4.27	4.17	4.07	3.99	3.92	3.85	3.79	3.73	3.67	3.63	3.58	3.54	3.50
5.1	50.50	5.28	5.07	4.83	4.76	4.68	4.61	4.54	4.42	4.32	4.22	4.14	4.06	3.99	3.92	3.86	3.81	3.76	3.71	3.67	3.63
5.2	51.49	5.46	5.25	5.00	4.93	4.84	4.77	4.70	4.58	4.47	4.37	4.28	4.20	4.13	4.06	4.00	3.94	3.89	3.84	3.80	3.76
5.3	52.48	5.65	5.43	5.18	5.10	5.01	4.94	4.87	4.74	4.63	4.52	4.43	4.35	4.27	4.21	4.14	4.08	4.03	3.98	3.93	3.89
5.4	53.47	5.84	5.61	5.35	5.27	5.18	5.11	5.03	4.90	4.78	4.68	4.58	4.50	4.42	4.35	4.28	4.22	4.17	4.12	4.07	4.02
5.5	54.46	6.04	5.80	5.53	5.44	5.35	5.28	5.20	5.06	4.94	4.84	4.74	4.65	4.57	4.50	4.43	4.37	4.31	4.25	4.21	4.16
5.6	55.45	6.23	5.99	5.71	5.62	5.53	5.45	5.37	5.23	5.11	4.99	4.89	4.80	4.72	4.64	4.57	4.51	4.45	4.40	4.35	4.30
5.7	56.44	6.43	6.18	5.89	5.80	5.71	5.63	5.54	5.40	5.27	5.16	5.05	4.96	4.87	4.80	4.72	4.66	4.60	4.54	4.49	4.44
5.8	57.43	6.63	6.38	6.08	5.99	5.89	5.80	5.72	5.57	5.44	5.32	5.21	5.12	5.03	4.95	4.87	4.81	4.74	4.68	4.63	4.58
5.9	58.42	6.84	6.57	6.27	6.17	6.07	5.99	5.90	5.74	5.61	5.49	5.38	5.28	5.19	5.10	5.03	4.96	4.89	4.83	4.78	4.72
6.0	59.41	7.05	6.77	6.46	6.36	6.25	6.17	6.08	5.92	5.78	5.65	5.54	5.44	5.35	5.26	5.18	5.11	5.04	4.98	4.92	4.87
6.1	60.40	7.26	6.97	6.65	6.55	6.44	6.35	6.26	6.10	5.95	5.83	5.71	5.60	5.51	5.42	5.34	5.27	5.20	5.13	5.07	5.02
6.2	61.39	7.47	7.18	6.85	6.74	6.63	6.54	6.45	6.28	6.13	6.00	5.88	5.77	5.67	5.58	5.50	5.42	5.35	5.29	5.23	5.17
6.3	62.38	7.68	7.39	7.05	6.94	6.83	6.73	6.63	6.46	6.31	6.17	6.05	5.94	5.84	5.75	5.66	5.58	5.51	5.44	5.38	5.32
6.4	63.37	7.90	7.60	7.25	7.14	7.02	6.92	6.82	6.65	6.49	6.35	6.23	6.11	6.01	5.91	5.83	5.75	5.67	5.60	5.54	5.48
6.5	64.36	8.12	7.81	7.45	7.34	7.22	7.12	7.02	6.84	6.68	6.53	6.40	6.29	6.18	6.08	5.99	5.91	5.83	5.76	5.70	5.63
6.6	65.35	8.35	8.03	7.66	7.54	7.42	7.32	7.21	7.03	6.86	6.71	6.58	6.46	6.35	6.25	6.16	6.07	6.00	5.92	5.86	5.79
6.7	66.34	8.57	8.24	7.87	7.75	7.62	7.52	7.41	7.22	7.05	6.90	6.76	6.64	6.53	6.42	6.33	6.24	6.16	6.09	6.02	5.95
6.8	67.33	8.80	8.47	8.08	7.96	7.83	7.72	7.61	7.41	7.24	7.09	6.95	6.82	6.70	6.60	6.50	6.41	6.33	6.25	6.18	6.12
6.9	68.32	9.03	8.69	8.29	8.17	8.03	7.92	7.81	7.61	7.43	7.27	7.13	7.00	6.88	6.78	6.68	6.59	6.50	6.42	6.35	6.28
7.0	69.31	9.27	8.92	8.51	8.38	8.24	8.13	8.01	7.81	7.63	7.47	7.32	7.19	7.07	6.95	6.85	6.76	6.67	6.59	6.52	6.45
7.1	70.30	9.51	9.14	8.73	8.60	8.46	8.34	8.22	8.01	7.83	7.66	7.51	7.37	7.25	7.14	7.03	6.94	6.85	6.76	6.69	6.62
7.2	71.29	9.75	9.37	8.95	8.81	8.67	8.55	8.43	8.22	8.03	7.85	7.70	7.56	7.43	7.32	7.21	7.11	7.02	6.94	6.86	6.79
7.3	72.28	9.99	9.61	9.17	9.04	8.89	8.77	8.64	8.42	8.23	8.05	7.90	7.75	7.62	7.50	7.39	7.29	7.20	7.11	7.03	6.96
7.4	73.27	10.23	9.85	9.40	9.26	9.11	8.99	8.86	8.63	8.43	8.25	8.09	7.95	7.81	7.69	7.58	7.48	7.38	7.29	7.21	7.13
7.5	74.26	10.48	10.08	9.63	9.48	9.33	9.20	9.07	8.84	8.64	8.46	8.29	8.14	8.01	7.88	7.77	7.66	7.56	7.47	7.39	7.31
7.6	75.25	10.73	10.33	9.86	9.71	9.56	9.43	9.29	9.06	8.85	8.66	8.49	8.34	8.20	8.07	7.96	7.85	7.75	7.65	7.57	7.49
7.7	76.24	10.98	10.57	10.09	9.94	9.78	9.65	9.51	9.27	9.06	8.87	8.70	8.54	8.40	8.27	8.15	8.04	7.93	7.84	7.75	7.67
7.8	77.23	11.24	10.82	10.33	10.17	10.01	9.88	9.73	9.49	9.27	9.08	8.90	8.74	8.59	8.46	8.34	8.23	8.12	8.03	7.94	7.85
7.9	78.22	11.50	11.07	10.57	10.41	10.24	10.10	9.96	9.71	9.49	9.29	9.11	8.94	8.80	8.66	8.53	8.42	8.31	8.21	8.12	8.04
8.0	79.21	11.76	11.32	10.81	10.65	10.48	10.34	10.19	9.93	9.70	9.50	9.32	9.15	9.00	8.86	8.73	8.61	8.50	8.40	8.31	8.22

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	14.85	0.82	0.79	0.77	0.74	0.72	0.70	0.68	0.65	0.62	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.48	0.48	0.47	0.46
1.6	15.84	0.92	0.89	0.85	0.83	0.80	0.78	0.76	0.72	0.69	0.66	0.64	0.62	0.60	0.58	0.57	0.56	0.54	0.53	0.52	0.52
1.7	16.83	1.02	0.98	0.95	0.92	0.89	0.87	0.84	0.80	0.77	0.74	0.71	0.69	0.67	0.65	0.63	0.62	0.60	0.59	0.58	0.57
1.8	17.82	1.12	1.08	1.05	1.02	0.99	0.96	0.93	0.89	0.85	0.82	0.79	0.76	0.74	0.72	0.70	0.68	0.67	0.66	0.64	0.64
1.9	18.81	1.23	1.19	1.15	1.12	1.08	1.05	1.02	0.98	0.93	0.90	0.86	0.84	0.81	0.79	0.77	0.75	0.74	0.72	0.71	0.70
2.0	19.80	1.34	1.30	1.25	1.22	1.18	1.15	1.12	1.07	1.02	0.98	0.95	0.92	0.89	0.86	0.84	0.82	0.81	0.79	0.78	0.77
2.1	20.79	1.46	1.41	1.37	1.33	1.29	1.25	1.22	1.16	1.11	1.07	1.03	1.00	0.97	0.94	0.92	0.90	0.88	0.86	0.85	0.84
2.2	21.78	1.58	1.53	1.48	1.44	1.39	1.36	1.32	1.26	1.21	1.16	1.12	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.92	0.91
2.3	22.77	1.71	1.65	1.60	1.55	1.51	1.47	1.43	1.36	1.30	1.25	1.21	1.17	1.14	1.11	1.08	1.06	1.03	1.02	1.00	0.98
2.4	23.76	1.84	1.78	1.72	1.67	1.62	1.58	1.54	1.47	1.40	1.35	1.30	1.26	1.23	1.19	1.17	1.14	1.12	1.10	1.08	1.06
2.5	24.75	1.97	1.91	1.85	1.80	1.74	1.70	1.65	1.57	1.51	1.45	1.40	1.36	1.32	1.28	1.25	1.23	1.20	1.18	1.16	1.14
2.6	25.74	2.11	2.04	1.98	1.92	1.86	1.82	1.77	1.69	1.62	1.55	1.50	1.45	1.41	1.37	1.34	1.31	1.29	1.26	1.24	1.22
2.7	26.73	2.25	2.18	2.11	2.05	1.99	1.94	1.89	1.80	1.73	1.66	1.60	1.55	1.51	1.47	1.44	1.41	1.38	1.35	1.33	1.31
2.8	27.72	2.39	2.32	2.25	2.19	2.12	2.07	2.01	1.92	1.84	1.77	1.71	1.66	1.61	1.57	1.53	1.50	1.47	1.44	1.42	1.40
2.9	28.71	2.54	2.47	2.39	2.32	2.26	2.20	2.14	2.04	1.96	1.88	1.82	1.76	1.71	1.67	1.63	1.60	1.56	1.53	1.51	1.49
3.0	29.70	2.70	2.62	2.53	2.46	2.39	2.33	2.27	2.17	2.08	2.00	1.93	1.87	1.82	1.77	1.73	1.70	1.66	1.63	1.60	1.58
3.1	30.69	2.86	2.77	2.68	2.61	2.53	2.47	2.40	2.30	2.20	2.12	2.05	1.99	1.93	1.88	1.84	1.80	1.76	1.73	1.70	1.67
3.2	31.68	3.02	2.93	2.83	2.76	2.68	2.61	2.54	2.43	2.33	2.24	2.17	2.10	2.04	1.99	1.94	1.90	1.86	1.83	1.80	1.77
3.3	32.67	3.18	3.09	2.99	2.91	2.83	2.76	2.68	2.56	2.46	2.37	2.29	2.22	2.16	2.10	2.05	2.01	1.97	1.93	1.90	1.87
3.4	33.66	3.35	3.25	3.15	3.07	2.98	2.90	2.83	2.70	2.59	2.50	2.41	2.34	2.27	2.21	2.17	2.12	2.08	2.04	2.00	1.98
3.5	34.65	3.52	3.42	3.31	3.22	3.13	3.06	2.97	2.84	2.73	2.63	2.54	2.46	2.39	2.33	2.28	2.23	2.19	2.15	2.11	2.08
3.6	35.64	3.70	3.59	3.48	3.39	3.29	3.21	3.13	2.99	2.87	2.76	2.67	2.59	2.52	2.45	2.40	2.35	2.30	2.26	2.22	2.19
3.7	36.63	3.88	3.77	3.65	3.55	3.45	3.37	3.28	3.13	3.01	2.90	2.80	2.72	2.64	2.57	2.52	2.46	2.41	2.37	2.33	2.30
3.8	37.62	4.07	3.95	3.82	3.72	3.62	3.53	3.44	3.28	3.15	3.04	2.94	2.85	2.77	2.70	2.64	2.58	2.53	2.49	2.44	2.41
3.9	38.61	4.25	4.13	4.00	3.90	3.78	3.69	3.60	3.44	3.30	3.18	3.07	2.98	2.90	2.83	2.77	2.71	2.65	2.61	2.56	2.53
4.0	39.60	4.44	4.32	4.18	4.07	3.96	3.86	3.76	3.60	3.45	3.33	3.22	3.12	3.04	2.96	2.89	2.83	2.78	2.73	2.68	2.64
4.1	40.59	4.64	4.51	4.36	4.25	4.13	4.03	3.93	3.76	3.61	3.48	3.36	3.26	3.17	3.09	3.03	2.96	2.90	2.85	2.80	2.76
4.2	41.58	4.84	4.70	4.55	4.43	4.31	4.21	4.10	3.92	3.76	3.63	3.51	3.40	3.31	3.23	3.16	3.09	3.03	2.98	2.93	2.89
4.3	42.57	5.04	4.90	4.74	4.62	4.49	4.38	4.27	4.08	3.92	3.78	3.66	3.55	3.45	3.37	3.29	3.22	3.16	3.11	3.05	3.01
4.4	43.57	5.25	5.10	4.94	4.81	4.68	4.57	4.45	4.25	4.09	3.94	3.81	3.70	3.60	3.51	3.43	3.36	3.29	3.24	3.18	3.14
4.5	44.56	5.46	5.30	5.13	5.00	4.86	4.75	4.63	4.43	4.25	4.10	3.96	3.85	3.75	3.65	3.57	3.50	3.43	3.37	3.31	3.27
4.6	45.55	5.67	5.51	5.34	5.20	5.05	4.94	4.81	4.60	4.42	4.26	4.12	4.00	3.89	3.80	3.72	3.64	3.57	3.50	3.44	3.40
4.7	46.54	5.89	5.72	5.54	5.40	5.25	5.13	4.99	4.78	4.59	4.43	4.28	4.16	4.05	3.94	3.86	3.78	3.71	3.64	3.58	3.53

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	47.53	6.11	5.93	5.75	5.60	5.45	5.32	5.18	4.96	4.77	4.60	4.45	4.32	4.20	4.10	4.01	3.93	3.85	3.78	3.72	3.67
4.9	48.52	6.33	6.15	5.96	5.81	5.65	5.52	5.38	5.14	4.94	4.77	4.61	4.48	4.36	4.25	4.16	4.07	3.99	3.93	3.86	3.81
5.0	49.51	6.56	6.37	6.17	6.02	5.85	5.72	5.57	5.33	5.12	4.94	4.78	4.64	4.52	4.41	4.31	4.22	4.14	4.07	4.00	3.95
5.1	50.50	6.79	6.60	6.39	6.23	6.06	5.92	5.77	5.52	5.31	5.12	4.95	4.81	4.68	4.56	4.47	4.38	4.29	4.22	4.15	4.09
5.2	51.49	7.02	6.83	6.61	6.45	6.27	6.13	5.97	5.71	5.49	5.30	5.13	4.98	4.85	4.73	4.63	4.53	4.44	4.37	4.29	4.24
5.3	52.48	7.26	7.06	6.84	6.67	6.48	6.33	6.17	5.91	5.68	5.48	5.30	5.15	5.02	4.89	4.79	4.69	4.60	4.52	4.44	4.39
5.4	53.47	7.50	7.29	7.07	6.89	6.70	6.55	6.38	6.11	5.87	5.67	5.48	5.33	5.19	5.06	4.95	4.85	4.75	4.67	4.60	4.54
5.5	54.46	7.74	7.53	7.30	7.12	6.92	6.76	6.59	6.31	6.07	5.85	5.67	5.50	5.36	5.23	5.12	5.01	4.91	4.83	4.75	4.69
5.6	55.45	7.99	7.77	7.53	7.35	7.14	6.98	6.80	6.52	6.26	6.04	5.85	5.68	5.53	5.40	5.29	5.18	5.08	4.99	4.91	4.84
5.7	56.44	8.24	8.02	7.77	7.58	7.37	7.20	7.02	6.72	6.46	6.24	6.04	5.87	5.71	5.57	5.46	5.34	5.24	5.15	5.07	5.00
5.8	57.43	8.50	8.26	8.01	7.81	7.60	7.43	7.24	6.93	6.67	6.43	6.23	6.05	5.89	5.75	5.63	5.51	5.41	5.32	5.23	5.16
5.9	58.42	8.76	8.52	8.26	8.05	7.83	7.65	7.46	7.15	6.87	6.63	6.42	6.24	6.08	5.93	5.80	5.69	5.57	5.48	5.39	5.32
6.0	59.41	9.02	8.77	8.50	8.29	8.07	7.88	7.69	7.36	7.08	6.83	6.62	6.43	6.26	6.11	5.98	5.86	5.75	5.65	5.56	5.49
6.1	60.40	9.28	9.03	8.75	8.54	8.31	8.12	7.91	7.58	7.29	7.04	6.81	6.62	6.45	6.29	6.16	6.04	5.92	5.82	5.72	5.65
6.2	61.39	9.55	9.29	9.01	8.79	8.55	8.35	8.15	7.80	7.51	7.25	7.02	6.82	6.64	6.48	6.34	6.22	6.09	5.99	5.89	5.82
6.3	62.38	9.82	9.55	9.26	9.04	8.79	8.59	8.38	8.03	7.72	7.46	7.22	7.02	6.83	6.67	6.53	6.40	6.27	6.17	6.07	5.99
6.4	63.37	10.10	9.82	9.52	9.29	9.04	8.84	8.62	8.26	7.94	7.67	7.42	7.22	7.03	6.86	6.72	6.58	6.45	6.35	6.24	6.16
6.5	64.36	10.38	10.09	9.79	9.55	9.29	9.08	8.86	8.49	8.16	7.88	7.63	7.42	7.23	7.05	6.91	6.77	6.64	6.53	6.42	6.34
6.6	65.35	10.66	10.37	10.05	9.81	9.54	9.33	9.10	8.72	8.39	8.10	7.84	7.63	7.43	7.25	7.10	6.95	6.82	6.71	6.60	6.52
6.7	66.34	10.94	10.64	10.32	10.07	9.80	9.58	9.34	8.95	8.62	8.32	8.06	7.83	7.63	7.44	7.29	7.15	7.01	6.89	6.78	6.70
6.8	67.33	11.23	10.93	10.60	10.34	10.06	9.84	9.59	9.19	8.85	8.54	8.27	8.04	7.84	7.64	7.49	7.34	7.20	7.08	6.96	6.88
6.9	68.32	11.52	11.21	10.87	10.61	10.32	10.09	9.84	9.44	9.08	8.77	8.49	8.26	8.04	7.85	7.69	7.53	7.39	7.27	7.15	7.06
7.0	69.31	11.82	11.50	11.15	10.88	10.59	10.35	10.10	9.68	9.31	9.00	8.71	8.47	8.25	8.05	7.89	7.73	7.58	7.46	7.34	7.25
7.1	70.30	12.11	11.79	11.43	11.16	10.86	10.62	10.35	9.93	9.55	9.23	8.94	8.69	8.47	8.26	8.09	7.93	7.78	7.65	7.53	7.43
7.2	71.29	12.41	12.08	11.72	11.44	11.13	10.88	10.61	10.18	9.79	9.46	9.16	8.91	8.68	8.47	8.30	8.13	7.98	7.85	7.72	7.63
7.3	72.28	12.72	12.38	12.01	11.72	11.41	11.15	10.88	10.43	10.04	9.70	9.39	9.13	8.90	8.68	8.51	8.34	8.18	8.05	7.92	7.82
7.4	73.27	13.03	12.68	12.30	12.00	11.68	11.42	11.14	10.68	10.28	9.93	9.62	9.36	9.12	8.90	8.72	8.54	8.38	8.25	8.11	8.01
7.5	74.26	13.34	12.98	12.59	12.29	11.96	11.70	11.41	10.94	10.53	10.17	9.86	9.59	9.34	9.12	8.93	8.75	8.59	8.45	8.31	8.21
7.6	75.25	13.65	13.29	12.89	12.58	12.25	11.98	11.68	11.20	10.78	10.42	10.09	9.82	9.57	9.33	9.15	8.97	8.80	8.65	8.51	8.41
7.7	76.24	13.97	13.60	13.19	12.87	12.53	12.26	11.96	11.47	11.04	10.66	10.33	10.05	9.79	9.56	9.37	9.18	9.01	8.86	8.72	8.61
7.8	77.23	14.29	13.91	13.50	13.17	12.82	12.54	12.23	11.73	11.30	10.91	10.57	10.28	10.02	9.78	9.59	9.40	9.22	9.07	8.92	8.81
7.9	78.22	14.61	14.22	13.80	13.47	13.12	12.83	12.51	12.00	11.55	11.16	10.82	10.52	10.25	10.01	9.81	9.61	9.43	9.28	9.13	9.02
8.0	79.21	14.94	14.54	14.11	13.77	13.41	13.11	12.80	12.27	11.82	11.42	11.07	10.76	10.49	10.24	10.03	9.83	9.65	9.49	9.34	9.23

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	14.85	0.96	0.92	0.88	0.84	0.81	0.79	0.76	0.71	0.68	0.64	0.62	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.49	0.48
1.6	15.84	1.07	1.02	0.98	0.94	0.91	0.88	0.85	0.80	0.76	0.72	0.69	0.66	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.54
1.7	16.83	1.18	1.13	1.08	1.05	1.00	0.97	0.94	0.89	0.84	0.80	0.77	0.74	0.71	0.69	0.67	0.65	0.64	0.62	0.61	0.60
1.8	17.82	1.30	1.25	1.19	1.15	1.11	1.07	1.04	0.98	0.93	0.88	0.85	0.82	0.79	0.76	0.74	0.72	0.70	0.69	0.68	0.66
1.9	18.81	1.43	1.37	1.31	1.26	1.22	1.18	1.14	1.07	1.02	0.97	0.93	0.90	0.87	0.84	0.82	0.80	0.78	0.76	0.74	0.73
2.0	19.80	1.55	1.49	1.43	1.38	1.33	1.29	1.24	1.17	1.11	1.06	1.02	0.98	0.95	0.92	0.89	0.87	0.85	0.83	0.81	0.80
2.1	20.79	1.69	1.62	1.55	1.50	1.44	1.40	1.35	1.28	1.21	1.16	1.11	1.07	1.03	1.00	0.97	0.95	0.93	0.91	0.89	0.87
2.2	21.78	1.83	1.76	1.68	1.63	1.56	1.52	1.47	1.38	1.31	1.26	1.20	1.16	1.12	1.09	1.06	1.03	1.01	0.99	0.96	0.95
2.3	22.77	1.97	1.90	1.82	1.75	1.69	1.64	1.58	1.49	1.42	1.36	1.30	1.25	1.21	1.17	1.14	1.12	1.09	1.07	1.04	1.03
2.4	23.76	2.12	2.04	1.95	1.89	1.82	1.76	1.70	1.61	1.53	1.46	1.40	1.35	1.31	1.27	1.23	1.20	1.17	1.15	1.13	1.11
2.5	24.75	2.27	2.19	2.09	2.02	1.95	1.89	1.83	1.73	1.64	1.57	1.51	1.45	1.40	1.36	1.32	1.29	1.26	1.24	1.21	1.19
2.6	25.74	2.43	2.34	2.24	2.17	2.09	2.02	1.96	1.85	1.76	1.68	1.61	1.55	1.50	1.46	1.42	1.39	1.35	1.33	1.30	1.28
2.7	26.73	2.59	2.50	2.39	2.31	2.23	2.16	2.09	1.98	1.88	1.80	1.72	1.66	1.61	1.56	1.52	1.48	1.45	1.42	1.39	1.37
2.8	27.72	2.76	2.66	2.54	2.46	2.37	2.30	2.23	2.10	2.00	1.91	1.84	1.77	1.71	1.66	1.62	1.58	1.54	1.51	1.48	1.46
2.9	28.71	2.93	2.82	2.70	2.61	2.52	2.45	2.37	2.24	2.13	2.04	1.96	1.88	1.82	1.77	1.72	1.68	1.64	1.61	1.58	1.55
3.0	29.70	3.10	2.99	2.87	2.77	2.67	2.59	2.51	2.37	2.26	2.16	2.08	2.00	1.94	1.88	1.83	1.79	1.74	1.71	1.68	1.65
3.1	30.69	3.28	3.16	3.03	2.93	2.83	2.75	2.66	2.51	2.39	2.29	2.20	2.12	2.05	1.99	1.94	1.89	1.85	1.81	1.78	1.75
3.2	31.68	3.47	3.34	3.20	3.10	2.99	2.90	2.81	2.66	2.53	2.42	2.33	2.24	2.17	2.11	2.05	2.00	1.96	1.92	1.88	1.85
3.3	32.67	3.66	3.52	3.38	3.27	3.15	3.06	2.96	2.80	2.67	2.55	2.46	2.37	2.29	2.22	2.17	2.12	2.07	2.03	1.99	1.95
3.4	33.66	3.85	3.71	3.56	3.44	3.32	3.22	3.12	2.95	2.81	2.69	2.59	2.50	2.42	2.34	2.28	2.23	2.18	2.14	2.09	2.06
3.5	34.65	4.04	3.90	3.74	3.62	3.49	3.39	3.28	3.11	2.96	2.83	2.72	2.63	2.54	2.47	2.40	2.35	2.29	2.25	2.21	2.17
3.6	35.64	4.25	4.09	3.93	3.80	3.66	3.56	3.45	3.26	3.11	2.98	2.86	2.76	2.67	2.59	2.53	2.47	2.41	2.37	2.32	2.28
3.7	36.63	4.45	4.29	4.12	3.99	3.84	3.73	3.62	3.43	3.26	3.12	3.00	2.90	2.81	2.72	2.65	2.59	2.53	2.49	2.44	2.40
3.8	37.62	4.66	4.49	4.31	4.17	4.03	3.91	3.79	3.59	3.42	3.27	3.15	3.04	2.94	2.86	2.78	2.72	2.66	2.61	2.55	2.52
3.9	38.61	4.87	4.70	4.51	4.37	4.21	4.09	3.96	3.76	3.58	3.43	3.30	3.18	3.08	2.99	2.91	2.85	2.78	2.73	2.68	2.64
4.0	39.60	5.09	4.91	4.71	4.56	4.40	4.28	4.14	3.93	3.74	3.58	3.45	3.33	3.22	3.13	3.05	2.98	2.91	2.86	2.80	2.76
4.1	40.59	5.31	5.12	4.92	4.76	4.59	4.47	4.33	4.10	3.91	3.74	3.60	3.48	3.37	3.27	3.19	3.11	3.04	2.99	2.93	2.88
4.2	41.58	5.54	5.34	5.13	4.97	4.79	4.66	4.51	4.28	4.08	3.91	3.76	3.63	3.51	3.41	3.33	3.25	3.18	3.12	3.06	3.01
4.3	42.57	5.77	5.56	5.34	5.17	4.99	4.85	4.70	4.46	4.25	4.07	3.92	3.78	3.66	3.56	3.47	3.39	3.31	3.25	3.19	3.14
4.4	43.57	6.00	5.79	5.56	5.38	5.20	5.05	4.90	4.64	4.42	4.24	4.08	3.94	3.82	3.71	3.61	3.53	3.45	3.39	3.32	3.27
4.5	44.56	6.24	6.02	5.78	5.60	5.40	5.25	5.09	4.83	4.60	4.41	4.25	4.10	3.97	3.86	3.76	3.68	3.59	3.53	3.46	3.41
4.6	45.55	6.48	6.25	6.00	5.82	5.62	5.46	5.29	5.02	4.78	4.59	4.41	4.26	4.13	4.01	3.91	3.82	3.74	3.67	3.60	3.54
4.7	46.54	6.72	6.49	6.23	6.04	5.83	5.67	5.49	5.21	4.97	4.76	4.59	4.43	4.29	4.17	4.06	3.97	3.88	3.81	3.74	3.68

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" **Uponor PEX-a** — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	47.53	6.97	6.73	6.46	6.26	6.05	5.88	5.70	5.41	5.16	4.95	4.76	4.60	4.46	4.33	4.22	4.13	4.03	3.96	3.88	3.82
4.9	48.52	7.23	6.97	6.70	6.49	6.27	6.10	5.91	5.61	5.35	5.13	4.94	4.77	4.62	4.49	4.38	4.28	4.18	4.11	4.03	3.97
5.0	49.51	7.48	7.22	6.94	6.73	6.49	6.32	6.12	5.81	5.54	5.32	5.12	4.94	4.79	4.65	4.54	4.44	4.34	4.26	4.18	4.11
5.1	50.50	7.74	7.48	7.18	6.96	6.72	6.54	6.34	6.02	5.74	5.50	5.30	5.12	4.96	4.82	4.70	4.60	4.49	4.42	4.33	4.26
5.2	51.49	8.01	7.73	7.43	7.20	6.96	6.77	6.56	6.22	5.94	5.70	5.49	5.30	5.14	4.99	4.87	4.76	4.65	4.57	4.48	4.41
5.3	52.48	8.28	7.99	7.68	7.45	7.19	6.99	6.78	6.44	6.14	5.89	5.67	5.48	5.31	5.16	5.04	4.93	4.81	4.73	4.64	4.57
5.4	53.47	8.55	8.25	7.93	7.69	7.43	7.23	7.01	6.65	6.35	6.09	5.87	5.67	5.49	5.34	5.21	5.09	4.98	4.89	4.80	4.72
5.5	54.46	8.82	8.52	8.19	7.94	7.67	7.46	7.24	6.87	6.56	6.29	6.06	5.85	5.68	5.52	5.38	5.26	5.14	5.06	4.96	4.88
5.6	55.45	9.10	8.79	8.45	8.20	7.92	7.70	7.47	7.09	6.77	6.50	6.26	6.04	5.86	5.70	5.56	5.44	5.31	5.22	5.12	5.04
5.7	56.44	9.39	9.07	8.72	8.45	8.17	7.95	7.71	7.32	6.98	6.70	6.46	6.24	6.05	5.88	5.74	5.61	5.48	5.39	5.28	5.21
5.8	57.43	9.68	9.35	8.99	8.71	8.42	8.19	7.95	7.55	7.20	6.91	6.66	6.43	6.24	6.07	5.92	5.79	5.66	5.56	5.45	5.37
5.9	58.42	9.97	9.63	9.26	8.98	8.68	8.44	8.19	7.78	7.42	7.13	6.87	6.63	6.43	6.25	6.10	5.97	5.83	5.74	5.62	5.54
6.0	59.41	10.26	9.91	9.53	9.25	8.93	8.69	8.43	8.01	7.65	7.34	7.07	6.83	6.63	6.44	6.29	6.15	6.01	5.91	5.80	5.71
6.1	60.40	10.56	10.20	9.81	9.52	9.20	8.95	8.68	8.25	7.87	7.56	7.28	7.04	6.83	6.64	6.48	6.34	6.19	6.09	5.97	5.88
6.2	61.39	10.86	10.50	10.09	9.79	9.46	9.21	8.93	8.49	8.10	7.78	7.50	7.25	7.03	6.83	6.67	6.52	6.38	6.27	6.15	6.06
6.3	62.38	11.17	10.79	10.38	10.07	9.73	9.47	9.19	8.73	8.34	8.00	7.71	7.45	7.23	7.03	6.86	6.71	6.56	6.45	6.33	6.23
6.4	63.37	11.48	11.09	10.67	10.35	10.00	9.74	9.45	8.98	8.57	8.23	7.93	7.67	7.44	7.23	7.06	6.91	6.75	6.64	6.51	6.41
6.5	64.36	11.79	11.40	10.96	10.64	10.28	10.01	9.71	9.23	8.81	8.46	8.16	7.88	7.65	7.44	7.26	7.10	6.94	6.83	6.69	6.60
6.6	65.35	12.11	11.70	11.26	10.92	10.56	10.28	9.97	9.48	9.05	8.69	8.38	8.10	7.86	7.64	7.46	7.30	7.14	7.02	6.88	6.78
6.7	66.34	12.43	12.01	11.56	11.22	10.84	10.55	10.24	9.73	9.30	8.93	8.61	8.32	8.07	7.85	7.66	7.50	7.33	7.21	7.07	6.97
6.8	67.33	12.76	12.33	11.86	11.51	11.13	10.83	10.51	9.99	9.54	9.17	8.84	8.54	8.29	8.06	7.87	7.70	7.53	7.40	7.26	7.15
6.9	68.32	13.08	12.65	12.17	11.81	11.42	11.11	10.79	10.25	9.79	9.41	9.07	8.77	8.51	8.27	8.08	7.90	7.73	7.60	7.45	7.34
7.0	69.31	13.42	12.97	12.48	12.11	11.71	11.40	11.06	10.52	10.05	9.65	9.30	9.00	8.73	8.49	8.29	8.11	7.93	7.80	7.65	7.54
7.1	70.30	13.75	13.29	12.79	12.41	12.00	11.69	11.34	10.78	10.30	9.90	9.54	9.23	8.95	8.71	8.50	8.32	8.14	8.00	7.85	7.73
7.2	71.29	14.09	13.62	13.11	12.72	12.30	11.98	11.63	11.05	10.56	10.15	9.78	9.46	9.18	8.93	8.72	8.53	8.34	8.20	8.05	7.93
7.3	72.28	14.43	13.95	13.43	13.03	12.60	12.27	11.91	11.33	10.82	10.40	10.03	9.70	9.41	9.15	8.93	8.74	8.55	8.41	8.25	8.13
7.4	73.27	14.78	14.29	13.75	13.35	12.91	12.57	12.20	11.60	11.09	10.65	10.27	9.93	9.64	9.38	9.15	8.96	8.76	8.62	8.45	8.33
7.5	74.26	15.13	14.63	14.08	13.67	13.22	12.87	12.49	11.88	11.36	10.91	10.52	10.17	9.88	9.61	9.38	9.18	8.98	8.83	8.66	8.54
7.6	75.25	15.48	14.97	14.41	13.99	13.53	13.17	12.79	12.16	11.63	11.17	10.77	10.42	10.11	9.84	9.60	9.40	9.20	9.04	8.87	8.74
7.7	76.24	15.84	15.32	14.74	14.31	13.84	13.48	13.09	12.45	11.90	11.43	11.03	10.66	10.35	10.07	9.83	9.62	9.41	9.26	9.08	8.95
7.8	77.23	16.20	15.67	15.08	14.64	14.16	13.79	13.39	12.73	12.17	11.70	11.28	10.91	10.59	10.31	10.06	9.85	9.64	9.48	9.29	9.16
7.9	78.22	16.56	16.02	15.42	14.97	14.48	14.10	13.69	13.02	12.45	11.97	11.54	11.16	10.84	10.54	10.29	10.08	9.86	9.70	9.51	9.38
8.0	79.21	16.93	16.37	15.76	15.31	14.81	14.42	14.00	13.32	12.73	12.24	11.80	11.42	11.09	10.79	10.53	10.31	10.08	9.92	9.73	9.59

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" **Uponor PEX-a** — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
1.5	14.85	1.08	1.03	0.98	0.95	0.91	0.87	0.84	0.79	0.74	0.70	0.67	0.64	0.62	0.59	0.58	0.56	0.54	0.53	0.52	0.51
1.6	15.84	1.20	1.15	1.10	1.06	1.01	0.98	0.94	0.88	0.83	0.79	0.75	0.72	0.69	0.67	0.64	0.63	0.61	0.59	0.58	0.57
1.7	16.83	1.33	1.28	1.22	1.17	1.12	1.08	1.04	0.98	0.92	0.87	0.83	0.80	0.77	0.74	0.72	0.70	0.68	0.66	0.64	0.63
1.8	17.82	1.47	1.41	1.34	1.29	1.23	1.19	1.15	1.08	1.02	0.96	0.92	0.88	0.85	0.82	0.79	0.77	0.75	0.73	0.71	0.70
1.9	18.81	1.61	1.54	1.47	1.41	1.35	1.31	1.26	1.18	1.11	1.06	1.01	0.97	0.93	0.90	0.87	0.85	0.82	0.80	0.78	0.77
2.0	19.80	1.75	1.68	1.60	1.54	1.48	1.43	1.37	1.29	1.22	1.16	1.10	1.06	1.02	0.98	0.95	0.93	0.90	0.88	0.86	0.84
2.1	20.79	1.90	1.82	1.74	1.67	1.60	1.55	1.49	1.40	1.32	1.26	1.20	1.15	1.11	1.07	1.04	1.01	0.98	0.96	0.94	0.92
2.2	21.78	2.06	1.97	1.88	1.81	1.74	1.68	1.62	1.52	1.44	1.36	1.30	1.25	1.20	1.16	1.13	1.09	1.07	1.04	1.02	1.00
2.3	22.77	2.22	2.13	2.03	1.95	1.87	1.81	1.75	1.64	1.55	1.47	1.41	1.35	1.30	1.26	1.22	1.18	1.15	1.12	1.10	1.08
2.4	23.76	2.38	2.28	2.18	2.10	2.02	1.95	1.88	1.77	1.67	1.59	1.52	1.46	1.40	1.35	1.31	1.28	1.24	1.21	1.19	1.16
2.5	24.75	2.55	2.45	2.34	2.25	2.16	2.09	2.02	1.90	1.79	1.70	1.63	1.56	1.51	1.46	1.41	1.37	1.34	1.30	1.28	1.25
2.6	25.74	2.73	2.62	2.50	2.41	2.31	2.24	2.16	2.03	1.92	1.82	1.74	1.67	1.61	1.56	1.51	1.47	1.43	1.40	1.37	1.34
2.7	26.73	2.91	2.79	2.66	2.57	2.47	2.39	2.30	2.17	2.05	1.95	1.86	1.79	1.72	1.67	1.62	1.57	1.53	1.49	1.46	1.43
2.8	27.72	3.09	2.97	2.84	2.73	2.63	2.54	2.45	2.31	2.18	2.08	1.99	1.91	1.84	1.78	1.72	1.68	1.63	1.59	1.56	1.53
2.9	28.71	3.28	3.15	3.01	2.90	2.79	2.70	2.60	2.45	2.32	2.21	2.11	2.03	1.95	1.89	1.83	1.78	1.74	1.69	1.66	1.63
3.0	29.70	3.48	3.34	3.19	3.08	2.96	2.86	2.76	2.60	2.46	2.34	2.24	2.15	2.07	2.01	1.95	1.89	1.84	1.80	1.76	1.73
3.1	30.69	3.67	3.53	3.37	3.26	3.13	3.03	2.92	2.75	2.60	2.48	2.37	2.28	2.20	2.13	2.06	2.01	1.95	1.91	1.87	1.83
3.2	31.68	3.88	3.73	3.56	3.44	3.30	3.20	3.09	2.91	2.75	2.62	2.51	2.41	2.32	2.25	2.18	2.12	2.07	2.02	1.98	1.94
3.3	32.67	4.09	3.93	3.76	3.62	3.48	3.37	3.26	3.07	2.90	2.77	2.65	2.54	2.45	2.37	2.30	2.24	2.18	2.13	2.09	2.05
3.4	33.66	4.30	4.13	3.95	3.82	3.67	3.55	3.43	3.23	3.06	2.92	2.79	2.68	2.59	2.50	2.43	2.36	2.30	2.25	2.20	2.16
3.5	34.65	4.52	4.34	4.15	4.01	3.85	3.73	3.61	3.40	3.22	3.07	2.94	2.82	2.72	2.63	2.56	2.49	2.42	2.37	2.32	2.27
3.6	35.64	4.74	4.56	4.36	4.21	4.05	3.92	3.79	3.57	3.38	3.22	3.09	2.97	2.86	2.77	2.69	2.62	2.55	2.49	2.44	2.39
3.7	36.63	4.97	4.78	4.57	4.41	4.24	4.11	3.97	3.74	3.55	3.38	3.24	3.11	3.00	2.91	2.82	2.75	2.68	2.61	2.56	2.51
3.8	37.62	5.20	5.00	4.78	4.62	4.44	4.31	4.16	3.92	3.72	3.54	3.39	3.26	3.15	3.05	2.96	2.88	2.81	2.74	2.68	2.63
3.9	38.61	5.43	5.23	5.00	4.83	4.65	4.50	4.35	4.10	3.89	3.71	3.55	3.41	3.30	3.19	3.10	3.01	2.94	2.87	2.81	2.76
4.0	39.60	5.67	5.46	5.22	5.05	4.85	4.71	4.55	4.29	4.06	3.88	3.71	3.57	3.45	3.34	3.24	3.15	3.07	3.00	2.94	2.88
4.1	40.59	5.92	5.70	5.45	5.27	5.07	4.91	4.74	4.47	4.24	4.05	3.88	3.73	3.60	3.48	3.38	3.29	3.21	3.14	3.07	3.01
4.2	41.58	6.17	5.94	5.68	5.49	5.28	5.12	4.95	4.67	4.43	4.22	4.05	3.89	3.76	3.64	3.53	3.44	3.35	3.27	3.21	3.15
4.3	42.57	6.42	6.18	5.92	5.72	5.50	5.33	5.15	4.86	4.61	4.40	4.22	4.06	3.92	3.79	3.68	3.59	3.50	3.41	3.35	3.28
4.4	43.57	6.68	6.43	6.16	5.95	5.72	5.55	5.36	5.06	4.80	4.58	4.39	4.22	4.08	3.95	3.84	3.74	3.64	3.56	3.49	3.42
4.5	44.56	6.94	6.68	6.40	6.18	5.95	5.77	5.58	5.26	5.00	4.77	4.57	4.40	4.24	4.11	3.99	3.89	3.79	3.70	3.63	3.56
4.6	45.55	7.21	6.94	6.65	6.42	6.18	6.00	5.80	5.47	5.19	4.95	4.75	4.57	4.41	4.27	4.15	4.04	3.94	3.85	3.78	3.70
4.7	46.54	7.48	7.20	6.90	6.67	6.42	6.22	6.02	5.68	5.39	5.14	4.93	4.75	4.58	4.44	4.31	4.20	4.10	4.00	3.92	3.85

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

2½" **Uponor PEX-a** — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7.2°C	50°F 10°C	55°F 12.8°C	60°F 15.6°C	65°F 18.3°C	70°F 21.1°C	80°F 26.7°C	90°F 32.2°C	100°F 37.8°C	110°F 43.3°C	120°F 48.9°C	130°F 54.4°C	140°F 60°C	150°F 65.6°C	160°F 71.1°C	170°F 76.7°C	180°F 82.2°C	190°F 87.8°C	200°F 93.3°C
4.8	47.53	7.76	7.47	7.15	6.91	6.66	6.46	6.24	5.89	5.59	5.34	5.12	4.93	4.76	4.61	4.48	4.36	4.25	4.15	4.07	3.99
4.9	48.52	8.03	7.74	7.41	7.17	6.90	6.69	6.47	6.11	5.80	5.54	5.31	5.11	4.94	4.78	4.64	4.52	4.41	4.31	4.23	4.14
5.0	49.51	8.32	8.01	7.68	7.42	7.14	6.93	6.70	6.33	6.01	5.74	5.50	5.30	5.12	4.96	4.81	4.69	4.57	4.47	4.38	4.30
5.1	50.50	8.61	8.29	7.94	7.68	7.39	7.17	6.94	6.55	6.22	5.94	5.70	5.48	5.30	5.13	4.99	4.86	4.74	4.63	4.54	4.45
5.2	51.49	8.90	8.57	8.21	7.94	7.65	7.42	7.18	6.78	6.44	6.15	5.90	5.68	5.48	5.31	5.16	5.03	4.91	4.79	4.70	4.61
5.3	52.48	9.19	8.86	8.49	8.21	7.91	7.67	7.42	7.01	6.66	6.36	6.10	5.87	5.67	5.50	5.34	5.20	5.08	4.96	4.86	4.77
5.4	53.47	9.49	9.15	8.77	8.48	8.17	7.93	7.66	7.24	6.88	6.57	6.30	6.07	5.86	5.68	5.52	5.38	5.25	5.13	5.03	4.93
5.5	54.46	9.80	9.44	9.05	8.75	8.43	8.18	7.91	7.48	7.10	6.79	6.51	6.27	6.06	5.87	5.70	5.56	5.42	5.30	5.20	5.10
5.6	55.45	10.11	9.74	9.34	9.03	8.70	8.44	8.17	7.72	7.33	7.00	6.72	6.47	6.25	6.06	5.89	5.74	5.60	5.47	5.37	5.27
5.7	56.44	10.42	10.04	9.63	9.31	8.97	8.71	8.42	7.96	7.56	7.23	6.93	6.68	6.45	6.25	6.08	5.92	5.78	5.65	5.54	5.44
5.8	57.43	10.74	10.35	9.92	9.60	9.25	8.98	8.68	8.21	7.80	7.45	7.15	6.89	6.66	6.45	6.27	6.11	5.96	5.83	5.72	5.61
5.9	58.42	11.06	10.66	10.22	9.89	9.53	9.25	8.95	8.46	8.04	7.68	7.37	7.10	6.86	6.65	6.47	6.30	6.15	6.01	5.89	5.78
6.0	59.41	11.38	10.97	10.52	10.18	9.81	9.52	9.21	8.71	8.28	7.91	7.59	7.31	7.07	6.85	6.66	6.49	6.34	6.19	6.07	5.96
6.1	60.40	11.71	11.29	10.83	10.48	10.10	9.80	9.48	8.97	8.52	8.15	7.82	7.53	7.28	7.06	6.86	6.69	6.53	6.38	6.26	6.14
6.2	61.39	12.05	11.61	11.14	10.78	10.39	10.08	9.76	9.23	8.77	8.38	8.05	7.75	7.49	7.26	7.06	6.88	6.72	6.57	6.44	6.32
6.3	62.38	12.38	11.94	11.45	11.08	10.68	10.37	10.03	9.49	9.02	8.62	8.28	7.98	7.71	7.47	7.27	7.08	6.91	6.76	6.63	6.50
6.4	63.37	12.72	12.27	11.77	11.39	10.98	10.66	10.31	9.75	9.28	8.87	8.51	8.20	7.93	7.69	7.47	7.29	7.11	6.95	6.82	6.69
6.5	64.36	13.07	12.60	12.09	11.70	11.28	10.95	10.60	10.02	9.53	9.11	8.75	8.43	8.15	7.90	7.68	7.49	7.31	7.15	7.01	6.88
6.6	65.35	13.42	12.94	12.41	12.02	11.58	11.25	10.88	10.30	9.79	9.36	8.99	8.66	8.38	8.12	7.90	7.70	7.51	7.35	7.21	7.07
6.7	66.34	13.77	13.28	12.74	12.33	11.89	11.55	11.17	10.57	10.06	9.61	9.23	8.90	8.60	8.34	8.11	7.91	7.72	7.55	7.40	7.27
6.8	67.33	14.13	13.63	13.07	12.66	12.20	11.85	11.47	10.85	10.32	9.87	9.48	9.13	8.83	8.56	8.33	8.12	7.93	7.75	7.60	7.46
6.9	68.32	14.49	13.97	13.41	12.98	12.52	12.16	11.77	11.13	10.59	10.13	9.73	9.37	9.07	8.79	8.55	8.34	8.14	7.96	7.81	7.66
7.0	69.31	14.85	14.33	13.75	13.31	12.83	12.47	12.07	11.42	10.86	10.39	9.98	9.62	9.30	9.02	8.77	8.55	8.35	8.16	8.01	7.86
7.1	70.30	15.22	14.68	14.09	13.64	13.16	12.78	12.37	11.71	11.14	10.65	10.23	9.86	9.54	9.25	9.00	8.77	8.56	8.37	8.22	8.06
7.2	71.29	15.60	15.04	14.44	13.98	13.48	13.10	12.68	12.00	11.42	10.92	10.49	10.11	9.78	9.48	9.22	9.00	8.78	8.59	8.43	8.27
7.3	72.28	15.97	15.41	14.79	14.32	13.81	13.42	12.99	12.29	11.70	11.19	10.75	10.36	10.02	9.72	9.46	9.22	9.00	8.80	8.64	8.48
7.4	73.27	16.35	15.78	15.14	14.66	14.14	13.74	13.30	12.59	11.98	11.46	11.01	10.62	10.27	9.96	9.69	9.45	9.22	9.02	8.85	8.69
7.5	74.26	16.74	16.15	15.50	15.01	14.48	14.07	13.62	12.89	12.27	11.74	11.28	10.87	10.52	10.20	9.92	9.68	9.45	9.24	9.07	8.90
7.6	75.25	17.13	16.52	15.86	15.36	14.82	14.40	13.94	13.20	12.56	12.02	11.54	11.13	10.77	10.45	10.16	9.91	9.68	9.46	9.29	9.11
7.7	76.24	17.52	16.90	16.23	15.72	15.16	14.73	14.26	13.50	12.85	12.30	11.82	11.39	11.02	10.69	10.40	10.14	9.90	9.69	9.51	9.33
7.8	77.23	17.91	17.29	16.60	16.07	15.50	15.07	14.59	13.81	13.15	12.58	12.09	11.66	11.28	10.94	10.64	10.38	10.14	9.91	9.73	9.55
7.9	78.22	18.31	17.67	16.97	16.44	15.85	15.41	14.92	14.13	13.45	12.87	12.37	11.93	11.54	11.19	10.89	10.62	10.37	10.14	9.96	9.77
8.0	79.21	18.72	18.06	17.34	16.80	16.21	15.75	15.25	14.44	13.75	13.16	12.65	12.20	11.80	11.45	11.14	10.86	10.61	10.38	10.18	10.00

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	21.12	0.49	0.47	0.45	0.44	0.43	0.42	0.42	0.40	0.39	0.38	0.37	0.37	0.36	0.35	0.35	0.34	0.34	0.33	0.33	0.32
1.6	22.53	0.55	0.53	0.50	0.49	0.48	0.47	0.47	0.45	0.44	0.43	0.42	0.41	0.40	0.40	0.39	0.38	0.38	0.37	0.37	0.36
1.7	23.93	0.61	0.59	0.56	0.55	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.43	0.42	0.42	0.41	0.40
1.8	25.34	0.68	0.65	0.61	0.60	0.59	0.58	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.47	0.46	0.45	0.45
1.9	26.75	0.74	0.71	0.68	0.66	0.65	0.64	0.63	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.51	0.50	0.49
2.0	28.16	0.81	0.78	0.74	0.73	0.71	0.70	0.69	0.67	0.65	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.54
2.1	29.57	0.89	0.85	0.81	0.79	0.78	0.77	0.75	0.73	0.71	0.70	0.68	0.67	0.66	0.64	0.63	0.62	0.61	0.61	0.60	0.59
2.2	30.97	0.96	0.92	0.88	0.86	0.85	0.83	0.82	0.80	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64
2.3	32.38	1.04	1.00	0.95	0.93	0.91	0.90	0.89	0.86	0.84	0.82	0.80	0.79	0.77	0.76	0.75	0.73	0.72	0.71	0.71	0.70
2.4	33.79	1.12	1.07	1.02	1.00	0.99	0.97	0.96	0.93	0.91	0.88	0.87	0.85	0.83	0.82	0.80	0.79	0.78	0.77	0.76	0.75
2.5	35.20	1.21	1.16	1.10	1.08	1.06	1.04	1.03	1.00	0.97	0.95	0.93	0.91	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81
2.6	36.60	1.29	1.24	1.18	1.16	1.14	1.12	1.10	1.07	1.04	1.02	1.00	0.98	0.96	0.94	0.93	0.92	0.90	0.89	0.88	0.87
2.7	38.01	1.38	1.32	1.26	1.24	1.22	1.20	1.18	1.15	1.12	1.09	1.07	1.05	1.03	1.01	0.99	0.98	0.97	0.95	0.94	0.93
2.8	39.42	1.47	1.41	1.34	1.32	1.30	1.28	1.26	1.22	1.19	1.16	1.14	1.12	1.10	1.08	1.06	1.05	1.03	1.02	1.00	0.99
2.9	40.83	1.57	1.50	1.43	1.40	1.38	1.36	1.34	1.30	1.27	1.24	1.21	1.19	1.17	1.15	1.13	1.11	1.10	1.08	1.07	1.06
3.0	42.24	1.66	1.59	1.52	1.49	1.47	1.44	1.42	1.38	1.35	1.32	1.29	1.26	1.24	1.22	1.20	1.18	1.17	1.15	1.14	1.13
3.1	43.64	1.76	1.69	1.61	1.58	1.55	1.53	1.51	1.47	1.43	1.40	1.37	1.34	1.32	1.29	1.27	1.26	1.24	1.22	1.21	1.19
3.2	45.05	1.86	1.79	1.70	1.67	1.64	1.62	1.60	1.55	1.51	1.48	1.45	1.42	1.39	1.37	1.35	1.33	1.31	1.29	1.28	1.26
3.3	46.46	1.97	1.89	1.80	1.77	1.74	1.71	1.69	1.64	1.60	1.56	1.53	1.50	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.34
3.4	47.87	2.07	1.99	1.89	1.86	1.83	1.80	1.78	1.73	1.69	1.65	1.61	1.58	1.55	1.53	1.51	1.48	1.46	1.44	1.43	1.41
3.5	49.28	2.18	2.09	1.99	1.96	1.93	1.90	1.87	1.82	1.78	1.74	1.70	1.67	1.64	1.61	1.59	1.56	1.54	1.52	1.50	1.49
3.6	50.68	2.29	2.20	2.10	2.06	2.03	2.00	1.97	1.92	1.87	1.83	1.79	1.75	1.72	1.69	1.67	1.64	1.62	1.60	1.58	1.56
3.7	52.09	2.41	2.31	2.20	2.17	2.13	2.10	2.07	2.01	1.96	1.92	1.88	1.84	1.81	1.78	1.75	1.73	1.70	1.68	1.66	1.64
3.8	53.50	2.52	2.42	2.31	2.27	2.23	2.20	2.17	2.11	2.06	2.01	1.97	1.93	1.90	1.87	1.84	1.81	1.79	1.77	1.74	1.72
3.9	54.91	2.64	2.54	2.42	2.38	2.34	2.31	2.27	2.21	2.16	2.11	2.07	2.03	1.99	1.96	1.93	1.90	1.87	1.85	1.83	1.81
4.0	56.31	2.76	2.65	2.53	2.49	2.45	2.41	2.38	2.31	2.26	2.21	2.16	2.12	2.08	2.05	2.02	1.99	1.96	1.94	1.91	1.89
4.1	57.72	2.89	2.77	2.64	2.60	2.56	2.52	2.48	2.42	2.36	2.31	2.26	2.22	2.18	2.14	2.11	2.08	2.05	2.03	2.00	1.98
4.2	59.13	3.01	2.90	2.76	2.72	2.67	2.63	2.59	2.52	2.46	2.41	2.36	2.31	2.27	2.24	2.20	2.17	2.14	2.12	2.09	2.07
4.3	60.54	3.14	3.02	2.88	2.83	2.78	2.74	2.70	2.63	2.57	2.51	2.46	2.42	2.37	2.33	2.30	2.27	2.24	2.21	2.18	2.16
4.4	61.95	3.27	3.14	3.00	2.95	2.90	2.86	2.82	2.74	2.68	2.62	2.57	2.52	2.47	2.43	2.40	2.36	2.33	2.30	2.27	2.25
4.5	63.35	3.41	3.27	3.12	3.07	3.02	2.98	2.93	2.86	2.79	2.73	2.67	2.62	2.58	2.53	2.50	2.46	2.43	2.40	2.37	2.34
4.6	64.76	3.54	3.40	3.24	3.19	3.14	3.10	3.05	2.97	2.90	2.84	2.78	2.73	2.68	2.64	2.60	2.56	2.53	2.49	2.47	2.44
4.7	66.17	3.68	3.54	3.37	3.32	3.26	3.22	3.17	3.09	3.01	2.95	2.89	2.83	2.79	2.74	2.70	2.66	2.63	2.59	2.56	2.54

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	67.58	3.82	3.67	3.50	3.45	3.39	3.34	3.29	3.21	3.13	3.06	3.00	2.94	2.89	2.85	2.80	2.77	2.73	2.69	2.66	2.63
4.9	68.99	3.96	3.81	3.63	3.58	3.52	3.47	3.42	3.33	3.25	3.18	3.11	3.06	3.00	2.96	2.91	2.87	2.83	2.80	2.76	2.73
5.0	70.39	4.11	3.95	3.77	3.71	3.65	3.60	3.54	3.45	3.37	3.30	3.23	3.17	3.12	3.07	3.02	2.98	2.94	2.90	2.87	2.84
5.1	71.80	4.25	4.09	3.90	3.84	3.78	3.73	3.67	3.57	3.49	3.41	3.35	3.28	3.23	3.18	3.13	3.09	3.04	3.01	2.97	2.94
5.2	73.21	4.40	4.23	4.04	3.98	3.91	3.86	3.80	3.70	3.61	3.54	3.47	3.40	3.34	3.29	3.24	3.20	3.15	3.12	3.08	3.05
5.3	74.62	4.56	4.38	4.18	4.11	4.05	3.99	3.93	3.83	3.74	3.66	3.59	3.52	3.46	3.41	3.36	3.31	3.26	3.23	3.19	3.15
5.4	76.02	4.71	4.53	4.32	4.25	4.18	4.13	4.07	3.96	3.87	3.79	3.71	3.64	3.58	3.52	3.47	3.42	3.38	3.34	3.30	3.26
5.5	77.43	4.87	4.68	4.46	4.40	4.32	4.26	4.20	4.09	4.00	3.91	3.83	3.76	3.70	3.64	3.59	3.54	3.49	3.45	3.41	3.37
5.6	78.84	5.02	4.83	4.61	4.54	4.47	4.40	4.34	4.23	4.13	4.04	3.96	3.89	3.82	3.76	3.71	3.66	3.61	3.56	3.52	3.49
5.7	80.25	5.19	4.99	4.76	4.69	4.61	4.55	4.48	4.37	4.26	4.17	4.09	4.02	3.95	3.89	3.83	3.78	3.73	3.68	3.64	3.60
5.8	81.66	5.35	5.14	4.91	4.83	4.76	4.69	4.62	4.50	4.40	4.31	4.22	4.14	4.07	4.01	3.95	3.90	3.84	3.80	3.76	3.72
5.9	83.06	5.51	5.30	5.06	4.99	4.90	4.84	4.77	4.65	4.54	4.44	4.35	4.27	4.20	4.14	4.07	4.02	3.97	3.92	3.87	3.83
6.0	84.47	5.68	5.47	5.22	5.14	5.05	4.99	4.91	4.79	4.68	4.58	4.49	4.41	4.33	4.26	4.20	4.14	4.09	4.04	3.99	3.95
6.1	85.88	5.85	5.63	5.37	5.29	5.21	5.14	5.06	4.93	4.82	4.72	4.62	4.54	4.46	4.39	4.33	4.27	4.21	4.16	4.12	4.07
6.2	87.29	6.02	5.79	5.53	5.45	5.36	5.29	5.21	5.08	4.96	4.86	4.76	4.67	4.60	4.52	4.46	4.40	4.34	4.29	4.24	4.19
6.3	88.70	6.20	5.96	5.69	5.61	5.52	5.44	5.36	5.23	5.11	5.00	4.90	4.81	4.73	4.66	4.59	4.53	4.47	4.41	4.36	4.32
6.4	90.10	6.37	6.13	5.86	5.77	5.67	5.60	5.52	5.38	5.25	5.14	5.04	4.95	4.87	4.79	4.72	4.66	4.60	4.54	4.49	4.44
6.5	91.51	6.55	6.30	6.02	5.93	5.83	5.76	5.67	5.53	5.40	5.29	5.19	5.09	5.01	4.93	4.86	4.79	4.73	4.67	4.62	4.57
6.6	92.92	6.73	6.48	6.19	6.09	6.00	5.92	5.83	5.68	5.55	5.44	5.33	5.23	5.15	5.07	4.99	4.93	4.86	4.80	4.75	4.70
6.7	94.33	6.92	6.66	6.36	6.26	6.16	6.08	5.99	5.84	5.71	5.59	5.48	5.38	5.29	5.21	5.13	5.06	5.00	4.94	4.88	4.83
6.8	95.73	7.10	6.83	6.53	6.43	6.33	6.24	6.15	6.00	5.86	5.74	5.63	5.52	5.43	5.35	5.27	5.20	5.13	5.07	5.02	4.96
6.9	97.14	7.29	7.02	6.70	6.60	6.50	6.41	6.32	6.16	6.02	5.89	5.78	5.67	5.58	5.49	5.41	5.34	5.27	5.21	5.15	5.10
7.0	98.55	7.48	7.20	6.88	6.77	6.67	6.58	6.48	6.32	6.17	6.05	5.93	5.82	5.73	5.64	5.56	5.48	5.41	5.35	5.29	5.23
7.1	99.96	7.67	7.38	7.05	6.95	6.84	6.75	6.65	6.48	6.34	6.20	6.08	5.97	5.87	5.78	5.70	5.62	5.55	5.49	5.43	5.37
7.2	101.37	7.86	7.57	7.23	7.13	7.01	6.92	6.82	6.65	6.50	6.36	6.24	6.13	6.03	5.93	5.85	5.77	5.70	5.63	5.57	5.51
7.3	102.77	8.06	7.76	7.41	7.30	7.19	7.09	6.99	6.82	6.66	6.52	6.40	6.28	6.18	6.08	6.00	5.92	5.84	5.77	5.71	5.65
7.4	104.18	8.26	7.95	7.60	7.48	7.37	7.27	7.16	6.99	6.83	6.68	6.56	6.44	6.33	6.24	6.15	6.06	5.99	5.92	5.85	5.79
7.5	105.59	8.46	8.14	7.78	7.67	7.55	7.44	7.34	7.16	6.99	6.85	6.72	6.60	6.49	6.39	6.30	6.21	6.13	6.06	6.00	5.93
7.6	107.00	8.66	8.34	7.97	7.85	7.73	7.62	7.52	7.33	7.16	7.01	6.88	6.76	6.65	6.55	6.45	6.37	6.28	6.21	6.14	6.08
7.7	108.41	8.87	8.54	8.16	8.04	7.91	7.81	7.70	7.50	7.33	7.18	7.04	6.92	6.81	6.70	6.61	6.52	6.44	6.36	6.29	6.23
7.8	109.81	9.07	8.74	8.35	8.23	8.10	7.99	7.88	7.68	7.51	7.35	7.21	7.08	6.97	6.86	6.76	6.67	6.59	6.51	6.44	6.37
7.9	111.22	9.28	8.94	8.54	8.42	8.28	8.17	8.06	7.86	7.68	7.52	7.38	7.25	7.13	7.02	6.92	6.83	6.74	6.67	6.59	6.52
8.0	112.63	9.49	9.14	8.74	8.61	8.47	8.36	8.24	8.04	7.86	7.70	7.55	7.42	7.29	7.18	7.08	6.99	6.90	6.82	6.74	6.68

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40ºF 4ºC	45ºF 7ºC	50ºF 10ºC	55ºF 13ºC	60ºF 16ºC	65ºF 18ºC	70ºF 21ºC	80ºF 27ºC	90ºF 32ºC	100ºF 38ºC	110ºF 43ºC	120ºF 49ºC	130ºF 54ºC	140ºF 60ºC	150ºF 66ºC	160ºF 71ºC	170ºF 77ºC	180ºF 82ºC	190ºF 88ºC	200ºF 93ºC
1.5	21.12	0.65	0.63	0.61	0.59	0.57	0.56	0.54	0.52	0.49	0.48	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37
1.6	22.53	0.73	0.71	0.68	0.66	0.64	0.63	0.61	0.58	0.55	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41
1.7	23.93	0.81	0.78	0.76	0.74	0.71	0.70	0.68	0.64	0.62	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46
1.8	25.34	0.89	0.87	0.84	0.81	0.79	0.77	0.75	0.71	0.68	0.65	0.63	0.61	0.59	0.58	0.56	0.55	0.54	0.53	0.52	0.51
1.9	26.75	0.98	0.95	0.92	0.89	0.87	0.84	0.82	0.78	0.75	0.72	0.69	0.67	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.56
2.0	28.16	1.07	1.04	1.00	0.98	0.95	0.92	0.90	0.85	0.82	0.79	0.76	0.74	0.71	0.70	0.68	0.66	0.65	0.64	0.63	0.62
2.1	29.57	1.16	1.13	1.09	1.06	1.03	1.00	0.98	0.93	0.89	0.86	0.83	0.80	0.78	0.76	0.74	0.72	0.71	0.70	0.68	0.67
2.2	30.97	1.26	1.22	1.18	1.15	1.12	1.09	1.06	1.01	0.97	0.93	0.90	0.87	0.85	0.82	0.80	0.79	0.77	0.76	0.74	0.73
2.3	32.38	1.36	1.32	1.28	1.24	1.21	1.18	1.14	1.09	1.05	1.01	0.97	0.94	0.92	0.89	0.87	0.85	0.83	0.82	0.80	0.79
2.4	33.79	1.47	1.42	1.38	1.34	1.30	1.27	1.23	1.18	1.13	1.09	1.05	1.02	0.99	0.96	0.94	0.92	0.90	0.88	0.87	0.85
2.5	35.20	1.57	1.53	1.48	1.44	1.39	1.36	1.32	1.26	1.21	1.17	1.13	1.09	1.06	1.03	1.01	0.99	0.97	0.95	0.93	0.92
2.6	36.60	1.68	1.63	1.58	1.54	1.49	1.46	1.42	1.35	1.30	1.25	1.21	1.17	1.14	1.11	1.08	1.06	1.04	1.02	1.00	0.99
2.7	38.01	1.80	1.75	1.69	1.64	1.60	1.56	1.51	1.45	1.39	1.34	1.29	1.25	1.22	1.18	1.16	1.13	1.11	1.09	1.07	1.06
2.8	39.42	1.91	1.86	1.80	1.75	1.70	1.66	1.61	1.54	1.48	1.42	1.38	1.33	1.30	1.26	1.24	1.21	1.18	1.16	1.14	1.13
2.9	40.83	2.03	1.98	1.91	1.86	1.81	1.76	1.72	1.64	1.57	1.52	1.46	1.42	1.38	1.34	1.32	1.29	1.26	1.24	1.22	1.20
3.0	42.24	2.16	2.10	2.03	1.97	1.92	1.87	1.82	1.74	1.67	1.61	1.55	1.51	1.47	1.43	1.40	1.37	1.34	1.31	1.29	1.27
3.1	43.64	2.28	2.22	2.15	2.09	2.03	1.98	1.93	1.84	1.77	1.70	1.65	1.60	1.55	1.51	1.48	1.45	1.42	1.39	1.37	1.35
3.2	45.05	2.41	2.34	2.27	2.21	2.15	2.10	2.04	1.95	1.87	1.80	1.74	1.69	1.64	1.60	1.57	1.53	1.50	1.48	1.45	1.43
3.3	46.46	2.55	2.47	2.39	2.33	2.27	2.21	2.15	2.06	1.98	1.90	1.84	1.79	1.74	1.69	1.66	1.62	1.59	1.56	1.53	1.51
3.4	47.87	2.68	2.61	2.52	2.46	2.39	2.33	2.27	2.17	2.08	2.01	1.94	1.88	1.83	1.78	1.75	1.71	1.67	1.64	1.62	1.59
3.5	49.28	2.82	2.74	2.65	2.59	2.51	2.45	2.39	2.28	2.19	2.11	2.04	1.98	1.93	1.88	1.84	1.80	1.76	1.73	1.70	1.68
3.6	50.68	2.96	2.88	2.79	2.72	2.64	2.58	2.51	2.40	2.30	2.22	2.15	2.08	2.03	1.98	1.93	1.89	1.85	1.82	1.79	1.77
3.7	52.09	3.11	3.02	2.92	2.85	2.77	2.70	2.63	2.52	2.42	2.33	2.25	2.19	2.13	2.07	2.03	1.99	1.95	1.91	1.88	1.86
3.8	53.50	3.26	3.16	3.06	2.99	2.90	2.83	2.76	2.64	2.54	2.44	2.36	2.30	2.23	2.18	2.13	2.08	2.04	2.01	1.97	1.95
3.9	54.91	3.41	3.31	3.21	3.12	3.04	2.97	2.89	2.76	2.66	2.56	2.48	2.40	2.34	2.28	2.23	2.18	2.14	2.10	2.07	2.04
4.0	56.31	3.56	3.46	3.35	3.27	3.18	3.10	3.02	2.89	2.78	2.68	2.59	2.51	2.45	2.38	2.33	2.29	2.24	2.20	2.16	2.13
4.1	57.72	3.72	3.61	3.50	3.41	3.32	3.24	3.16	3.02	2.90	2.80	2.71	2.63	2.56	2.49	2.44	2.39	2.34	2.30	2.26	2.23
4.2	59.13	3.88	3.77	3.65	3.56	3.46	3.38	3.29	3.15	3.03	2.92	2.82	2.74	2.67	2.60	2.55	2.49	2.44	2.40	2.36	2.33
4.3	60.54	4.04	3.93	3.80	3.71	3.61	3.52	3.43	3.28	3.16	3.04	2.95	2.86	2.78	2.71	2.66	2.60	2.55	2.51	2.46	2.43
4.4	61.95	4.20	4.09	3.96	3.86	3.75	3.67	3.57	3.42	3.29	3.17	3.07	2.98	2.90	2.83	2.77	2.71	2.66	2.61	2.57	2.53
4.5	63.35	4.37	4.25	4.12	4.02	3.91	3.82	3.72	3.56	3.42	3.30	3.19	3.10	3.02	2.94	2.88	2.82	2.77	2.72	2.67	2.64
4.6	64.76	4.54	4.42	4.28	4.17	4.06	3.97	3.87	3.70	3.56	3.43	3.32	3.23	3.14	3.06	3.00	2.94	2.88	2.83	2.78	2.74
4.7	66.17	4.72	4.59	4.45	4.34	4.22	4.12	4.02	3.84	3.70	3.57	3.45	3.35	3.26	3.18	3.12	3.05	2.99	2.94	2.89	2.85

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	67.58	4.89	4.76	4.61	4.50	4.38	4.28	4.17	3.99	3.84	3.70	3.58	3.48	3.39	3.30	3.24	3.17	3.11	3.05	3.00	2.96
4.9	68.99	5.07	4.93	4.78	4.67	4.54	4.43	4.32	4.14	3.98	3.84	3.72	3.61	3.52	3.43	3.36	3.29	3.22	3.17	3.12	3.08
5.0	70.39	5.26	5.11	4.96	4.83	4.70	4.59	4.48	4.29	4.12	3.98	3.85	3.74	3.64	3.55	3.48	3.41	3.34	3.29	3.23	3.19
5.1	71.80	5.44	5.29	5.13	5.01	4.87	4.76	4.64	4.44	4.27	4.12	3.99	3.88	3.78	3.68	3.61	3.53	3.46	3.41	3.35	3.31
5.2	73.21	5.63	5.48	5.31	5.18	5.04	4.92	4.80	4.60	4.42	4.27	4.13	4.02	3.91	3.81	3.73	3.66	3.59	3.53	3.47	3.42
5.3	74.62	5.82	5.66	5.49	5.36	5.21	5.09	4.97	4.76	4.57	4.42	4.28	4.15	4.05	3.95	3.86	3.78	3.71	3.65	3.59	3.54
5.4	76.02	6.02	5.85	5.67	5.54	5.39	5.26	5.13	4.92	4.73	4.57	4.42	4.30	4.18	4.08	4.00	3.91	3.84	3.77	3.71	3.66
5.5	77.43	6.21	6.04	5.86	5.72	5.56	5.44	5.30	5.08	4.89	4.72	4.57	4.44	4.32	4.22	4.13	4.05	3.97	3.90	3.84	3.79
5.6	78.84	6.41	6.24	6.05	5.90	5.74	5.61	5.47	5.24	5.05	4.87	4.72	4.58	4.46	4.35	4.27	4.18	4.10	4.03	3.96	3.91
5.7	80.25	6.61	6.43	6.24	6.09	5.92	5.79	5.65	5.41	5.21	5.03	4.87	4.73	4.61	4.50	4.40	4.31	4.23	4.16	4.09	4.04
5.8	81.66	6.82	6.63	6.43	6.28	6.11	5.97	5.82	5.58	5.37	5.19	5.02	4.88	4.75	4.64	4.54	4.45	4.36	4.29	4.22	4.17
5.9	83.06	7.03	6.84	6.63	6.47	6.30	6.15	6.00	5.75	5.54	5.35	5.18	5.03	4.90	4.78	4.69	4.59	4.50	4.43	4.35	4.30
6.0	84.47	7.24	7.04	6.83	6.66	6.49	6.34	6.18	5.93	5.70	5.51	5.34	5.19	5.05	4.93	4.83	4.73	4.64	4.56	4.49	4.43
6.1	85.88	7.45	7.25	7.03	6.86	6.68	6.53	6.37	6.10	5.87	5.67	5.50	5.34	5.20	5.08	4.97	4.87	4.78	4.70	4.62	4.57
6.2	87.29	7.67	7.46	7.24	7.06	6.87	6.72	6.55	6.28	6.05	5.84	5.66	5.50	5.36	5.23	5.12	5.02	4.92	4.84	4.76	4.70
6.3	88.70	7.88	7.67	7.44	7.26	7.07	6.91	6.74	6.46	6.22	6.01	5.82	5.66	5.51	5.38	5.27	5.16	5.07	4.98	4.90	4.84
6.4	90.10	8.10	7.89	7.65	7.47	7.27	7.11	6.93	6.65	6.40	6.18	5.99	5.82	5.67	5.53	5.42	5.31	5.21	5.13	5.04	4.98
6.5	91.51	8.33	8.11	7.87	7.68	7.47	7.31	7.13	6.83	6.58	6.35	6.16	5.99	5.83	5.69	5.58	5.46	5.36	5.27	5.18	5.12
6.6	92.92	8.56	8.33	8.08	7.89	7.68	7.51	7.32	7.02	6.76	6.53	6.33	6.15	5.99	5.85	5.73	5.62	5.51	5.42	5.33	5.26
6.7	94.33	8.78	8.55	8.30	8.10	7.88	7.71	7.52	7.21	6.94	6.71	6.50	6.32	6.16	6.01	5.89	5.77	5.66	5.57	5.48	5.41
6.8	95.73	9.02	8.78	8.52	8.31	8.09	7.91	7.72	7.41	7.13	6.89	6.67	6.49	6.32	6.17	6.05	5.93	5.81	5.72	5.62	5.55
6.9	97.14	9.25	9.01	8.74	8.53	8.30	8.12	7.92	7.60	7.32	7.07	6.85	6.66	6.49	6.33	6.21	6.08	5.97	5.87	5.77	5.70
7.0	98.55	9.49	9.24	8.96	8.75	8.52	8.33	8.13	7.80	7.51	7.25	7.03	6.84	6.66	6.50	6.37	6.24	6.12	6.03	5.93	5.85
7.1	99.96	9.73	9.47	9.19	8.97	8.74	8.54	8.34	8.00	7.70	7.44	7.21	7.01	6.83	6.67	6.54	6.40	6.28	6.18	6.08	6.01
7.2	101.37	9.97	9.71	9.42	9.20	8.95	8.76	8.55	8.20	7.89	7.63	7.39	7.19	7.01	6.84	6.70	6.57	6.44	6.34	6.24	6.16
7.3	102.77	10.21	9.95	9.65	9.42	9.18	8.97	8.76	8.40	8.09	7.82	7.58	7.37	7.18	7.01	6.87	6.73	6.61	6.50	6.39	6.31
7.4	104.18	10.46	10.19	9.89	9.65	9.40	9.19	8.97	8.61	8.29	8.01	7.76	7.55	7.36	7.18	7.04	6.90	6.77	6.66	6.55	6.47
7.5	105.59	10.71	10.43	10.13	9.89	9.63	9.42	9.19	8.82	8.49	8.21	7.95	7.74	7.54	7.36	7.21	7.07	6.94	6.82	6.71	6.63
7.6	107.00	10.97	10.68	10.36	10.12	9.86	9.64	9.41	9.03	8.69	8.40	8.14	7.92	7.72	7.54	7.39	7.24	7.10	6.99	6.88	6.79
7.7	108.41	11.22	10.93	10.61	10.36	10.09	9.87	9.63	9.24	8.90	8.60	8.34	8.11	7.90	7.72	7.56	7.41	7.27	7.16	7.04	6.95
7.8	109.81	11.48	11.18	10.85	10.60	10.32	10.09	9.85	9.45	9.11	8.80	8.53	8.30	8.09	7.90	7.74	7.59	7.45	7.33	7.21	7.12
7.9	111.22	11.74	11.43	11.10	10.84	10.56	10.33	10.08	9.67	9.32	9.00	8.73	8.49	8.28	8.08	7.92	7.76	7.62	7.50	7.38	7.29
8.0	112.63	12.00	11.69	11.35	11.08	10.79	10.56	10.31	9.89	9.53	9.21	8.93	8.69	8.47	8.27	8.10	7.94	7.79	7.67	7.54	7.45

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	21.12	0.76	0.73	0.70	0.67	0.65	0.63	0.60	0.57	0.54	0.52	0.49	0.48	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.39
1.6	22.53	0.85	0.81	0.78	0.75	0.72	0.70	0.68	0.64	0.60	0.58	0.55	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43
1.7	23.93	0.94	0.90	0.86	0.83	0.80	0.78	0.75	0.71	0.67	0.64	0.62	0.59	0.57	0.55	0.54	0.53	0.51	0.50	0.49	0.48
1.8	25.34	1.03	0.99	0.95	0.92	0.88	0.86	0.83	0.78	0.74	0.71	0.68	0.65	0.63	0.61	0.60	0.58	0.57	0.56	0.54	0.54
1.9	26.75	1.13	1.09	1.04	1.01	0.97	0.94	0.91	0.86	0.82	0.78	0.75	0.72	0.70	0.67	0.66	0.64	0.62	0.61	0.60	0.59
2.0	28.16	1.24	1.19	1.14	1.10	1.06	1.03	0.99	0.94	0.89	0.85	0.82	0.79	0.76	0.74	0.72	0.70	0.68	0.67	0.66	0.65
2.1	29.57	1.34	1.29	1.24	1.20	1.15	1.12	1.08	1.02	0.97	0.93	0.89	0.86	0.83	0.80	0.78	0.76	0.75	0.73	0.72	0.70
2.2	30.97	1.46	1.40	1.34	1.30	1.25	1.21	1.17	1.11	1.05	1.01	0.97	0.93	0.90	0.87	0.85	0.83	0.81	0.79	0.78	0.77
2.3	32.38	1.57	1.51	1.45	1.40	1.35	1.31	1.27	1.20	1.14	1.09	1.05	1.01	0.97	0.94	0.92	0.90	0.88	0.86	0.84	0.83
2.4	33.79	1.69	1.63	1.56	1.51	1.45	1.41	1.36	1.29	1.23	1.17	1.13	1.09	1.05	1.02	0.99	0.97	0.95	0.93	0.91	0.89
2.5	35.20	1.81	1.74	1.67	1.62	1.56	1.51	1.46	1.38	1.32	1.26	1.21	1.17	1.13	1.10	1.07	1.04	1.02	1.00	0.98	0.96
2.6	36.60	1.94	1.87	1.79	1.73	1.67	1.62	1.57	1.48	1.41	1.35	1.30	1.25	1.21	1.17	1.14	1.12	1.09	1.07	1.05	1.03
2.7	38.01	2.07	1.99	1.91	1.85	1.78	1.73	1.67	1.58	1.51	1.44	1.39	1.34	1.29	1.26	1.22	1.19	1.17	1.14	1.12	1.10
2.8	39.42	2.20	2.12	2.03	1.97	1.90	1.84	1.78	1.69	1.61	1.54	1.48	1.42	1.38	1.34	1.30	1.27	1.24	1.22	1.20	1.18
2.9	40.83	2.34	2.25	2.16	2.09	2.02	1.96	1.90	1.79	1.71	1.64	1.57	1.52	1.47	1.42	1.39	1.36	1.32	1.30	1.27	1.25
3.0	42.24	2.48	2.39	2.29	2.22	2.14	2.08	2.01	1.90	1.81	1.74	1.67	1.61	1.56	1.51	1.47	1.44	1.41	1.38	1.35	1.33
3.1	43.64	2.62	2.53	2.42	2.35	2.26	2.20	2.13	2.02	1.92	1.84	1.77	1.71	1.65	1.60	1.56	1.53	1.49	1.46	1.43	1.41
3.2	45.05	2.77	2.67	2.56	2.48	2.39	2.32	2.25	2.13	2.03	1.95	1.87	1.80	1.75	1.70	1.65	1.62	1.58	1.55	1.52	1.49
3.3	46.46	2.92	2.81	2.70	2.62	2.52	2.45	2.37	2.25	2.14	2.05	1.98	1.91	1.85	1.79	1.75	1.71	1.67	1.64	1.60	1.58
3.4	47.87	3.07	2.96	2.84	2.75	2.66	2.58	2.50	2.37	2.26	2.16	2.08	2.01	1.95	1.89	1.84	1.80	1.76	1.73	1.69	1.67
3.5	49.28	3.23	3.12	2.99	2.90	2.79	2.72	2.63	2.49	2.38	2.28	2.19	2.11	2.05	1.99	1.94	1.90	1.85	1.82	1.78	1.75
3.6	50.68	3.39	3.27	3.14	3.04	2.94	2.85	2.76	2.62	2.50	2.39	2.30	2.22	2.15	2.09	2.04	1.99	1.95	1.91	1.87	1.84
3.7	52.09	3.55	3.43	3.29	3.19	3.08	2.99	2.90	2.75	2.62	2.51	2.42	2.33	2.26	2.20	2.14	2.09	2.04	2.01	1.97	1.94
3.8	53.50	3.72	3.59	3.45	3.34	3.23	3.14	3.04	2.88	2.75	2.63	2.53	2.45	2.37	2.30	2.24	2.19	2.14	2.11	2.06	2.03
3.9	54.91	3.89	3.76	3.61	3.50	3.38	3.28	3.18	3.02	2.88	2.76	2.65	2.56	2.48	2.41	2.35	2.30	2.25	2.21	2.16	2.13
4.0	56.31	4.07	3.93	3.77	3.65	3.53	3.43	3.32	3.15	3.01	2.88	2.78	2.68	2.60	2.52	2.46	2.41	2.35	2.31	2.26	2.23
4.1	57.72	4.24	4.10	3.94	3.81	3.68	3.58	3.47	3.29	3.14	3.01	2.90	2.80	2.71	2.64	2.57	2.51	2.46	2.41	2.37	2.33
4.2	59.13	4.42	4.27	4.10	3.98	3.84	3.74	3.62	3.44	3.28	3.14	3.03	2.92	2.83	2.75	2.68	2.62	2.56	2.52	2.47	2.43
4.3	60.54	4.61	4.45	4.28	4.14	4.00	3.89	3.77	3.58	3.42	3.28	3.16	3.05	2.95	2.87	2.80	2.74	2.67	2.63	2.58	2.54
4.4	61.95	4.80	4.63	4.45	4.31	4.17	4.05	3.93	3.73	3.56	3.41	3.29	3.17	3.08	2.99	2.92	2.85	2.79	2.74	2.68	2.64
4.5	63.35	4.99	4.82	4.63	4.49	4.33	4.22	4.09	3.88	3.70	3.55	3.42	3.30	3.20	3.11	3.04	2.97	2.90	2.85	2.79	2.75
4.6	64.76	5.18	5.00	4.81	4.66	4.50	4.38	4.25	4.03	3.85	3.69	3.56	3.44	3.33	3.24	3.16	3.09	3.02	2.97	2.91	2.86

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.7	66.17	5.38	5.19	4.99	4.84	4.68	4.55	4.41	4.19	4.00	3.84	3.69	3.57	3.46	3.36	3.28	3.21	3.14	3.08	3.02	2.98
4.8	67.58	5.58	5.39	5.18	5.02	4.85	4.72	4.58	4.35	4.15	3.98	3.84	3.71	3.59	3.49	3.41	3.33	3.26	3.20	3.14	3.09
4.9	68.99	5.78	5.58	5.37	5.21	5.03	4.89	4.75	4.51	4.30	4.13	3.98	3.84	3.73	3.62	3.53	3.46	3.38	3.32	3.26	3.21
5.0	70.39	5.99	5.78	5.56	5.39	5.21	5.07	4.92	4.67	4.46	4.28	4.12	3.98	3.86	3.76	3.66	3.59	3.50	3.44	3.38	3.33
5.1	71.80	6.20	5.99	5.76	5.58	5.39	5.25	5.09	4.84	4.62	4.43	4.27	4.13	4.00	3.89	3.80	3.71	3.63	3.57	3.50	3.45
5.2	73.21	6.41	6.19	5.95	5.78	5.58	5.43	5.27	5.01	4.78	4.59	4.42	4.27	4.14	4.03	3.93	3.85	3.76	3.70	3.62	3.57
5.3	74.62	6.62	6.40	6.16	5.97	5.77	5.62	5.45	5.18	4.94	4.75	4.57	4.42	4.29	4.17	4.07	3.98	3.89	3.82	3.75	3.70
5.4	76.02	6.84	6.61	6.36	6.17	5.96	5.80	5.63	5.35	5.11	4.91	4.73	4.57	4.43	4.31	4.21	4.12	4.02	3.96	3.88	3.82
5.5	77.43	7.06	6.83	6.57	6.37	6.16	5.99	5.82	5.53	5.28	5.07	4.89	4.72	4.58	4.45	4.35	4.25	4.16	4.09	4.01	3.95
5.6	78.84	7.29	7.04	6.78	6.58	6.36	6.19	6.00	5.71	5.45	5.23	5.04	4.88	4.73	4.60	4.49	4.39	4.30	4.22	4.14	4.08
5.7	80.25	7.52	7.27	6.99	6.78	6.56	6.38	6.19	5.89	5.62	5.40	5.21	5.03	4.88	4.75	4.63	4.53	4.43	4.36	4.27	4.21
5.8	81.66	7.75	7.49	7.21	6.99	6.76	6.58	6.39	6.07	5.80	5.57	5.37	5.19	5.04	4.90	4.78	4.68	4.57	4.50	4.41	4.35
5.9	83.06	7.98	7.72	7.42	7.20	6.97	6.78	6.58	6.26	5.98	5.74	5.54	5.35	5.19	5.05	4.93	4.82	4.72	4.64	4.55	4.48
6.0	84.47	8.22	7.95	7.65	7.42	7.17	6.98	6.78	6.44	6.16	5.92	5.70	5.51	5.35	5.20	5.08	4.97	4.86	4.78	4.69	4.62
6.1	85.88	8.46	8.18	7.87	7.64	7.39	7.19	6.98	6.64	6.34	6.09	5.87	5.68	5.51	5.36	5.23	5.12	5.01	4.92	4.83	4.76
6.2	87.29	8.70	8.41	8.10	7.86	7.60	7.40	7.18	6.83	6.53	6.27	6.05	5.85	5.67	5.52	5.39	5.27	5.16	5.07	4.97	4.90
6.3	88.70	8.95	8.65	8.33	8.08	7.82	7.61	7.39	7.03	6.72	6.45	6.22	6.02	5.84	5.68	5.54	5.43	5.31	5.22	5.12	5.05
6.4	90.10	9.20	8.89	8.56	8.31	8.04	7.82	7.60	7.22	6.91	6.63	6.40	6.19	6.01	5.84	5.70	5.58	5.46	5.37	5.27	5.19
6.5	91.51	9.45	9.14	8.80	8.54	8.26	8.04	7.81	7.43	7.10	6.82	6.58	6.36	6.18	6.01	5.86	5.74	5.61	5.52	5.42	5.34
6.6	92.92	9.70	9.38	9.03	8.77	8.48	8.26	8.02	7.63	7.29	7.01	6.76	6.54	6.35	6.17	6.03	5.90	5.77	5.68	5.57	5.49
6.7	94.33	9.96	9.63	9.27	9.00	8.71	8.48	8.24	7.83	7.49	7.20	6.94	6.72	6.52	6.34	6.19	6.06	5.93	5.83	5.72	5.64
6.8	95.73	10.22	9.89	9.52	9.24	8.94	8.71	8.45	8.04	7.69	7.39	7.13	6.90	6.69	6.51	6.36	6.22	6.09	5.99	5.87	5.79
6.9	97.14	10.49	10.14	9.77	9.48	9.17	8.93	8.68	8.25	7.89	7.59	7.32	7.08	6.87	6.69	6.53	6.39	6.25	6.15	6.03	5.95
7.0	98.55	10.75	10.40	10.01	9.72	9.41	9.16	8.90	8.47	8.10	7.78	7.51	7.26	7.05	6.86	6.70	6.56	6.42	6.31	6.19	6.10
7.1	99.96	11.02	10.66	10.27	9.97	9.65	9.40	9.12	8.68	8.30	7.98	7.70	7.45	7.23	7.04	6.87	6.73	6.58	6.47	6.35	6.26
7.2	101.37	11.29	10.93	10.52	10.22	9.89	9.63	9.35	8.90	8.51	8.18	7.89	7.64	7.42	7.22	7.05	6.90	6.75	6.64	6.51	6.42
7.3	102.77	11.57	11.19	10.78	10.47	10.13	9.87	9.58	9.12	8.72	8.39	8.09	7.83	7.60	7.40	7.22	7.07	6.92	6.81	6.68	6.58
7.4	104.18	11.85	11.46	11.04	10.72	10.38	10.11	9.82	9.34	8.94	8.59	8.29	8.02	7.79	7.58	7.40	7.25	7.09	6.98	6.84	6.75
7.5	105.59	12.13	11.74	11.30	10.98	10.62	10.35	10.05	9.57	9.15	8.80	8.49	8.22	7.98	7.77	7.58	7.42	7.27	7.15	7.01	6.91
7.6	107.00	12.41	12.01	11.57	11.24	10.87	10.59	10.29	9.80	9.37	9.01	8.69	8.41	8.17	7.95	7.77	7.60	7.44	7.32	7.18	7.08
7.7	108.41	12.70	12.29	11.84	11.50	11.13	10.84	10.53	10.02	9.59	9.22	8.90	8.61	8.36	8.14	7.95	7.78	7.62	7.49	7.35	7.25
7.8	109.81	12.99	12.57	12.11	11.76	11.38	11.09	10.77	10.26	9.81	9.44	9.11	8.81	8.56	8.33	8.14	7.97	7.80	7.67	7.53	7.42
7.9	111.22	13.28	12.85	12.38	12.03	11.64	11.34	11.02	10.49	10.04	9.65	9.32	9.02	8.76	8.52	8.33	8.15	7.98	7.85	7.70	7.59
8.0	112.63	13.58	13.14	12.66	12.30	11.90	11.60	11.27	10.73	10.27	9.87	9.53	9.22	8.96	8.72	8.52	8.34	8.16	8.03	7.88	7.77

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	21.12	0.86	0.82	0.78	0.75	0.72	0.70	0.67	0.63	0.59	0.56	0.54	0.51	0.49	0.48	0.46	0.45	0.44	0.43	0.42	0.41
1.6	22.53	0.95	0.91	0.87	0.84	0.80	0.78	0.75	0.70	0.66	0.63	0.60	0.57	0.55	0.53	0.52	0.50	0.49	0.48	0.47	0.46
1.7	23.93	1.06	1.01	0.97	0.93	0.89	0.86	0.83	0.78	0.74	0.70	0.67	0.64	0.62	0.59	0.58	0.56	0.54	0.53	0.52	0.51
1.8	25.34	1.16	1.12	1.06	1.02	0.98	0.95	0.92	0.86	0.81	0.77	0.74	0.71	0.68	0.66	0.64	0.62	0.60	0.59	0.57	0.56
1.9	26.75	1.27	1.22	1.17	1.12	1.08	1.04	1.00	0.94	0.89	0.85	0.81	0.78	0.75	0.72	0.70	0.68	0.66	0.65	0.63	0.62
2.0	28.16	1.39	1.33	1.27	1.23	1.18	1.14	1.10	1.03	0.97	0.93	0.88	0.85	0.82	0.79	0.77	0.74	0.72	0.71	0.69	0.68
2.1	29.57	1.51	1.45	1.38	1.33	1.28	1.24	1.19	1.12	1.06	1.01	0.96	0.92	0.89	0.86	0.83	0.81	0.79	0.77	0.75	0.74
2.2	30.97	1.63	1.57	1.50	1.44	1.38	1.34	1.29	1.21	1.15	1.09	1.05	1.00	0.97	0.93	0.91	0.88	0.86	0.84	0.82	0.80
2.3	32.38	1.76	1.69	1.61	1.56	1.49	1.45	1.40	1.31	1.24	1.18	1.13	1.08	1.05	1.01	0.98	0.95	0.93	0.90	0.89	0.87
2.4	33.79	1.89	1.82	1.74	1.67	1.61	1.56	1.50	1.41	1.34	1.27	1.22	1.17	1.13	1.09	1.06	1.03	1.00	0.98	0.96	0.94
2.5	35.20	2.03	1.95	1.86	1.80	1.72	1.67	1.61	1.52	1.44	1.37	1.31	1.26	1.21	1.17	1.13	1.10	1.08	1.05	1.03	1.01
2.6	36.60	2.17	2.08	1.99	1.92	1.84	1.79	1.72	1.62	1.54	1.46	1.40	1.34	1.30	1.25	1.22	1.18	1.15	1.12	1.10	1.08
2.7	38.01	2.31	2.22	2.12	2.05	1.97	1.91	1.84	1.73	1.64	1.56	1.50	1.44	1.39	1.34	1.30	1.27	1.23	1.20	1.18	1.15
2.8	39.42	2.46	2.36	2.26	2.18	2.10	2.03	1.96	1.85	1.75	1.67	1.59	1.53	1.48	1.43	1.39	1.35	1.31	1.28	1.26	1.23
2.9	40.83	2.61	2.51	2.40	2.32	2.23	2.16	2.08	1.96	1.86	1.77	1.70	1.63	1.57	1.52	1.48	1.44	1.40	1.37	1.34	1.31
3.0	42.24	2.77	2.66	2.54	2.46	2.36	2.29	2.21	2.08	1.97	1.88	1.80	1.73	1.67	1.61	1.57	1.52	1.49	1.45	1.42	1.39
3.1	43.64	2.92	2.81	2.69	2.60	2.50	2.42	2.34	2.20	2.09	1.99	1.91	1.83	1.77	1.71	1.66	1.62	1.57	1.54	1.51	1.48
3.2	45.05	3.09	2.97	2.84	2.74	2.64	2.56	2.47	2.33	2.21	2.10	2.02	1.94	1.87	1.81	1.76	1.71	1.67	1.63	1.59	1.56
3.3	46.46	3.25	3.13	3.00	2.89	2.78	2.70	2.61	2.46	2.33	2.22	2.13	2.05	1.97	1.91	1.86	1.81	1.76	1.72	1.68	1.65
3.4	47.87	3.42	3.30	3.15	3.05	2.93	2.84	2.74	2.59	2.45	2.34	2.24	2.16	2.08	2.01	1.96	1.90	1.86	1.81	1.78	1.74
3.5	49.28	3.60	3.46	3.31	3.20	3.08	2.99	2.89	2.72	2.58	2.46	2.36	2.27	2.19	2.12	2.06	2.00	1.95	1.91	1.87	1.83
3.6	50.68	3.78	3.63	3.48	3.36	3.23	3.14	3.03	2.86	2.71	2.59	2.48	2.39	2.30	2.23	2.16	2.11	2.05	2.01	1.97	1.93
3.7	52.09	3.96	3.81	3.65	3.53	3.39	3.29	3.18	3.00	2.85	2.71	2.60	2.50	2.42	2.34	2.27	2.21	2.16	2.11	2.07	2.03
3.8	53.50	4.14	3.99	3.82	3.69	3.55	3.45	3.33	3.14	2.98	2.84	2.73	2.62	2.53	2.45	2.38	2.32	2.26	2.21	2.17	2.12
3.9	54.91	4.33	4.17	3.99	3.86	3.72	3.60	3.48	3.29	3.12	2.98	2.85	2.75	2.65	2.57	2.50	2.43	2.37	2.31	2.27	2.23
4.0	56.31	4.52	4.36	4.17	4.03	3.88	3.77	3.64	3.44	3.26	3.11	2.99	2.87	2.77	2.69	2.61	2.54	2.48	2.42	2.37	2.33
4.1	57.72	4.72	4.55	4.35	4.21	4.05	3.93	3.80	3.59	3.41	3.25	3.12	3.00	2.90	2.81	2.73	2.66	2.59	2.53	2.48	2.43
4.2	59.13	4.92	4.74	4.54	4.39	4.23	4.10	3.96	3.74	3.55	3.39	3.25	3.13	3.03	2.93	2.85	2.77	2.70	2.64	2.59	2.54
4.3	60.54	5.12	4.93	4.73	4.57	4.40	4.27	4.13	3.90	3.70	3.54	3.39	3.26	3.15	3.06	2.97	2.89	2.82	2.76	2.70	2.65
4.4	61.95	5.33	5.13	4.92	4.76	4.58	4.45	4.30	4.06	3.86	3.68	3.53	3.40	3.29	3.18	3.09	3.01	2.94	2.87	2.82	2.76
4.5	63.35	5.54	5.34	5.11	4.95	4.76	4.62	4.47	4.22	4.01	3.83	3.68	3.54	3.42	3.31	3.22	3.14	3.06	2.99	2.93	2.88
4.6	64.76	5.75	5.54	5.31	5.14	4.95	4.80	4.64	4.39	4.17	3.98	3.82	3.68	3.55	3.44	3.35	3.26	3.18	3.11	3.05	2.99
4.7	66.17	5.97	5.75	5.51	5.33	5.14	4.99	4.82	4.56	4.33	4.14	3.97	3.82	3.69	3.58	3.48	3.39	3.31	3.23	3.17	3.11

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	67.58	6.19	5.96	5.72	5.53	5.33	5.17	5.00	4.73	4.49	4.29	4.12	3.97	3.83	3.72	3.61	3.52	3.43	3.36	3.29	3.23
4.9	68.99	6.41	6.18	5.93	5.73	5.52	5.36	5.19	4.90	4.66	4.45	4.27	4.11	3.98	3.85	3.75	3.65	3.56	3.48	3.41	3.35
5.0	70.39	6.64	6.40	6.14	5.94	5.72	5.55	5.37	5.08	4.83	4.61	4.43	4.26	4.12	4.00	3.88	3.78	3.69	3.61	3.54	3.47
5.1	71.80	6.87	6.62	6.35	6.15	5.92	5.75	5.56	5.26	5.00	4.78	4.59	4.42	4.27	4.14	4.02	3.92	3.83	3.74	3.67	3.60
5.2	73.21	7.11	6.85	6.57	6.36	6.13	5.95	5.75	5.44	5.17	4.94	4.75	4.57	4.42	4.28	4.16	4.06	3.96	3.87	3.80	3.73
5.3	74.62	7.34	7.08	6.79	6.57	6.33	6.15	5.95	5.63	5.35	5.11	4.91	4.73	4.57	4.43	4.31	4.20	4.10	4.01	3.93	3.86
5.4	76.02	7.58	7.31	7.01	6.79	6.54	6.35	6.15	5.81	5.53	5.28	5.07	4.89	4.73	4.58	4.46	4.34	4.24	4.14	4.06	3.99
5.5	77.43	7.83	7.55	7.24	7.01	6.75	6.56	6.35	6.00	5.71	5.46	5.24	5.05	4.88	4.73	4.60	4.49	4.38	4.28	4.20	4.12
5.6	78.84	8.07	7.79	7.47	7.23	6.97	6.77	6.55	6.20	5.89	5.64	5.41	5.21	5.04	4.89	4.75	4.63	4.52	4.42	4.34	4.26
5.7	80.25	8.33	8.03	7.70	7.46	7.19	6.98	6.76	6.39	6.08	5.81	5.58	5.38	5.20	5.05	4.91	4.78	4.67	4.56	4.48	4.39
5.8	81.66	8.58	8.27	7.94	7.69	7.41	7.20	6.97	6.59	6.27	6.00	5.76	5.55	5.37	5.20	5.06	4.93	4.82	4.71	4.62	4.53
5.9	83.06	8.84	8.52	8.18	7.92	7.64	7.42	7.18	6.79	6.46	6.18	5.94	5.72	5.53	5.37	5.22	5.09	4.97	4.86	4.76	4.68
6.0	84.47	9.10	8.78	8.42	8.15	7.86	7.64	7.39	7.00	6.66	6.37	6.12	5.89	5.70	5.53	5.38	5.24	5.12	5.00	4.91	4.82
6.1	85.88	9.36	9.03	8.67	8.39	8.09	7.86	7.61	7.20	6.85	6.56	6.30	6.07	5.87	5.69	5.54	5.40	5.27	5.16	5.06	4.96
6.2	87.29	9.63	9.29	8.92	8.63	8.33	8.09	7.83	7.41	7.05	6.75	6.48	6.25	6.04	5.86	5.70	5.56	5.43	5.31	5.21	5.11
6.3	88.70	9.90	9.55	9.17	8.88	8.56	8.32	8.05	7.62	7.26	6.94	6.67	6.43	6.22	6.03	5.87	5.72	5.59	5.46	5.36	5.26
6.4	90.10	10.17	9.81	9.42	9.13	8.80	8.55	8.28	7.84	7.46	7.14	6.86	6.61	6.40	6.20	6.03	5.89	5.75	5.62	5.51	5.41
6.5	91.51	10.45	10.08	9.68	9.38	9.04	8.79	8.51	8.06	7.67	7.34	7.05	6.80	6.58	6.38	6.20	6.05	5.91	5.78	5.67	5.57
6.6	92.92	10.73	10.35	9.94	9.63	9.29	9.02	8.74	8.28	7.88	7.54	7.24	6.98	6.76	6.55	6.38	6.22	6.07	5.94	5.83	5.72
6.7	94.33	11.01	10.63	10.20	9.88	9.53	9.27	8.97	8.50	8.09	7.74	7.44	7.17	6.94	6.73	6.55	6.39	6.24	6.10	5.99	5.88
6.8	95.73	11.30	10.90	10.47	10.14	9.79	9.51	9.21	8.72	8.30	7.95	7.64	7.36	7.13	6.91	6.73	6.56	6.41	6.27	6.15	6.04
6.9	97.14	11.59	11.18	10.74	10.41	10.04	9.76	9.45	8.95	8.52	8.15	7.84	7.56	7.31	7.10	6.90	6.73	6.58	6.43	6.31	6.20
7.0	98.55	11.88	11.47	11.01	10.67	10.29	10.00	9.69	9.18	8.74	8.37	8.04	7.75	7.50	7.28	7.08	6.91	6.75	6.60	6.48	6.36
7.1	99.96	12.18	11.75	11.29	10.94	10.55	10.26	9.93	9.41	8.96	8.58	8.25	7.95	7.70	7.47	7.27	7.09	6.92	6.77	6.65	6.52
7.2	101.37	12.48	12.04	11.57	11.21	10.82	10.51	10.18	9.65	9.19	8.79	8.45	8.15	7.89	7.66	7.45	7.27	7.10	6.94	6.82	6.69
7.3	102.77	12.78	12.34	11.85	11.48	11.08	10.77	10.43	9.88	9.42	9.01	8.66	8.36	8.09	7.85	7.64	7.45	7.28	7.12	6.99	6.86
7.4	104.18	13.08	12.63	12.13	11.76	11.35	11.03	10.68	10.12	9.64	9.23	8.88	8.56	8.29	8.04	7.83	7.63	7.46	7.29	7.16	7.03
7.5	105.59	13.39	12.93	12.42	12.04	11.62	11.29	10.94	10.37	9.88	9.45	9.09	8.77	8.49	8.24	8.02	7.82	7.64	7.47	7.34	7.20
7.6	107.00	13.70	13.23	12.71	12.32	11.89	11.56	11.20	10.61	10.11	9.68	9.31	8.98	8.69	8.43	8.21	8.01	7.82	7.65	7.51	7.38
7.7	108.41	14.02	13.54	13.01	12.60	12.17	11.83	11.46	10.86	10.35	9.91	9.53	9.19	8.90	8.63	8.40	8.20	8.01	7.84	7.69	7.55
7.8	109.81	14.34	13.84	13.30	12.89	12.44	12.10	11.72	11.11	10.59	10.14	9.75	9.40	9.10	8.84	8.60	8.39	8.20	8.02	7.87	7.73
7.9	111.22	14.66	14.15	13.60	13.18	12.72	12.37	11.99	11.36	10.83	10.37	9.97	9.62	9.31	9.04	8.80	8.59	8.39	8.21	8.06	7.91
8.0	112.63	14.98	14.47	13.90	13.48	13.01	12.65	12.26	11.62	11.07	10.60	10.20	9.84	9.53	9.25	9.00	8.78	8.58	8.39	8.24	8.09

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	28.46	0.41	0.39	0.37	0.36	0.36	0.35	0.35	0.34	0.33	0.32	0.31	0.31	0.30	0.29	0.29	0.29	0.28	0.28	0.27	0.27
1.6	30.36	0.46	0.44	0.42	0.41	0.40	0.39	0.39	0.38	0.37	0.36	0.35	0.34	0.34	0.33	0.32	0.32	0.32	0.31	0.31	0.30
1.7	32.26	0.51	0.49	0.46	0.45	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.37	0.36	0.36	0.35	0.35	0.34	0.34
1.8	34.16	0.56	0.54	0.51	0.50	0.49	0.49	0.48	0.46	0.45	0.44	0.43	0.42	0.42	0.41	0.40	0.40	0.39	0.38	0.38	0.37
1.9	36.05	0.62	0.59	0.56	0.55	0.54	0.53	0.53	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.44	0.43	0.42	0.42	0.41
2.0	37.95	0.68	0.65	0.62	0.61	0.59	0.59	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.48	0.47	0.46	0.46	0.45
2.1	39.85	0.74	0.71	0.67	0.66	0.65	0.64	0.63	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.51	0.50	0.49
2.2	41.75	0.80	0.77	0.73	0.72	0.70	0.69	0.68	0.66	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.57	0.56	0.55	0.54	0.54
2.3	43.64	0.87	0.83	0.79	0.78	0.76	0.75	0.74	0.72	0.70	0.68	0.67	0.66	0.64	0.63	0.62	0.61	0.60	0.60	0.59	0.58
2.4	45.54	0.93	0.89	0.85	0.84	0.82	0.81	0.80	0.77	0.76	0.74	0.72	0.71	0.69	0.68	0.67	0.66	0.65	0.64	0.64	0.63
2.5	47.44	1.00	0.96	0.91	0.90	0.88	0.87	0.86	0.83	0.81	0.79	0.78	0.76	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.68
2.6	49.34	1.07	1.03	0.98	0.96	0.95	0.93	0.92	0.89	0.87	0.85	0.83	0.82	0.80	0.79	0.78	0.76	0.75	0.74	0.74	0.73
2.7	51.23	1.15	1.10	1.05	1.03	1.01	1.00	0.98	0.96	0.93	0.91	0.89	0.87	0.86	0.84	0.83	0.82	0.81	0.80	0.79	0.78
2.8	53.13	1.22	1.17	1.12	1.10	1.08	1.06	1.05	1.02	0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.87	0.86	0.85	0.84	0.83
2.9	55.03	1.30	1.25	1.19	1.17	1.15	1.13	1.12	1.09	1.06	1.03	1.01	0.99	0.98	0.96	0.94	0.93	0.92	0.91	0.90	0.88
3.0	56.93	1.38	1.33	1.26	1.24	1.22	1.20	1.19	1.15	1.13	1.10	1.08	1.06	1.04	1.02	1.00	0.99	0.98	0.96	0.95	0.94
3.1	58.82	1.47	1.41	1.34	1.32	1.29	1.28	1.26	1.22	1.19	1.17	1.14	1.12	1.10	1.08	1.07	1.05	1.04	1.02	1.01	1.00
3.2	60.72	1.55	1.49	1.42	1.39	1.37	1.35	1.33	1.29	1.26	1.23	1.21	1.19	1.16	1.15	1.13	1.11	1.10	1.08	1.07	1.06
3.3	62.62	1.64	1.57	1.50	1.47	1.45	1.43	1.41	1.37	1.33	1.30	1.28	1.25	1.23	1.21	1.19	1.18	1.16	1.14	1.13	1.12
3.4	64.52	1.73	1.66	1.58	1.55	1.53	1.50	1.48	1.44	1.41	1.38	1.35	1.32	1.30	1.28	1.26	1.24	1.22	1.21	1.19	1.18
3.5	66.42	1.82	1.74	1.66	1.64	1.61	1.58	1.56	1.52	1.48	1.45	1.42	1.39	1.37	1.35	1.33	1.31	1.29	1.27	1.26	1.24
3.6	68.31	1.91	1.83	1.75	1.72	1.69	1.67	1.64	1.60	1.56	1.53	1.49	1.47	1.44	1.42	1.39	1.37	1.36	1.34	1.32	1.31
3.7	70.21	2.00	1.93	1.83	1.81	1.78	1.75	1.72	1.68	1.64	1.60	1.57	1.54	1.51	1.49	1.47	1.44	1.43	1.41	1.39	1.38
3.8	72.11	2.10	2.02	1.92	1.89	1.86	1.84	1.81	1.76	1.72	1.68	1.65	1.62	1.59	1.56	1.54	1.52	1.50	1.48	1.46	1.44
3.9	74.01	2.20	2.11	2.02	1.98	1.95	1.92	1.89	1.84	1.80	1.76	1.73	1.69	1.66	1.64	1.61	1.59	1.57	1.55	1.53	1.51
4.0	75.90	2.30	2.21	2.11	2.08	2.04	2.01	1.98	1.93	1.88	1.84	1.81	1.77	1.74	1.71	1.69	1.66	1.64	1.62	1.60	1.58
4.1	77.80	2.40	2.31	2.20	2.17	2.13	2.10	2.07	2.02	1.97	1.93	1.89	1.85	1.82	1.79	1.76	1.74	1.72	1.69	1.68	1.66
4.2	79.70	2.51	2.41	2.30	2.26	2.23	2.20	2.16	2.11	2.06	2.01	1.97	1.93	1.90	1.87	1.84	1.82	1.79	1.77	1.75	1.73
4.3	81.60	2.62	2.52	2.40	2.36	2.32	2.29	2.26	2.20	2.15	2.10	2.06	2.02	1.98	1.95	1.92	1.90	1.87	1.85	1.83	1.81
4.4	83.49	2.73	2.62	2.50	2.46	2.42	2.39	2.35	2.29	2.24	2.19	2.14	2.10	2.07	2.04	2.00	1.98	1.95	1.93	1.90	1.88
4.5	85.39	2.84	2.73	2.60	2.56	2.52	2.48	2.45	2.38	2.33	2.28	2.23	2.19	2.15	2.12	2.09	2.06	2.03	2.01	1.98	1.96
4.6	87.29	2.95	2.84	2.71	2.66	2.62	2.58	2.55	2.48	2.42	2.37	2.32	2.28	2.24	2.21	2.17	2.14	2.11	2.09	2.06	2.04
4.7	89.19	3.07	2.95	2.81	2.77	2.72	2.69	2.65	2.58	2.52	2.46	2.41	2.37	2.33	2.29	2.26	2.23	2.20	2.17	2.15	2.12

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" **Uponor PEX-a** — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	91.08	3.18	3.06	2.92	2.88	2.83	2.79	2.75	2.68	2.62	2.56	2.51	2.46	2.42	2.38	2.35	2.31	2.28	2.26	2.23	2.21
4.9	92.98	3.30	3.17	3.03	2.98	2.93	2.89	2.85	2.78	2.71	2.66	2.60	2.56	2.51	2.47	2.44	2.40	2.37	2.34	2.31	2.29
5.0	94.88	3.42	3.29	3.14	3.09	3.04	3.00	2.96	2.88	2.81	2.75	2.70	2.65	2.61	2.56	2.53	2.49	2.46	2.43	2.40	2.38
5.1	96.78	3.55	3.41	3.25	3.21	3.15	3.11	3.06	2.99	2.92	2.85	2.80	2.75	2.70	2.66	2.62	2.58	2.55	2.52	2.49	2.46
5.2	98.67	3.67	3.53	3.37	3.32	3.26	3.22	3.17	3.09	3.02	2.96	2.90	2.84	2.80	2.75	2.71	2.68	2.64	2.61	2.58	2.55
5.3	100.57	3.80	3.65	3.49	3.43	3.38	3.33	3.28	3.20	3.13	3.06	3.00	2.94	2.89	2.85	2.81	2.77	2.73	2.70	2.67	2.64
5.4	102.47	3.93	3.78	3.61	3.55	3.49	3.45	3.40	3.31	3.23	3.16	3.10	3.05	2.99	2.95	2.90	2.86	2.83	2.79	2.76	2.73
5.5	104.37	4.06	3.90	3.73	3.67	3.61	3.56	3.51	3.42	3.34	3.27	3.21	3.15	3.10	3.05	3.00	2.96	2.92	2.89	2.86	2.83
5.6	106.26	4.19	4.03	3.85	3.79	3.73	3.68	3.63	3.53	3.45	3.38	3.31	3.25	3.20	3.15	3.10	3.06	3.02	2.98	2.95	2.92
5.7	108.16	4.32	4.16	3.97	3.91	3.85	3.80	3.74	3.65	3.56	3.49	3.42	3.36	3.30	3.25	3.20	3.16	3.12	3.08	3.05	3.02
5.8	110.06	4.46	4.29	4.10	4.04	3.97	3.92	3.86	3.76	3.68	3.60	3.53	3.47	3.41	3.36	3.31	3.26	3.22	3.18	3.15	3.11
5.9	111.96	4.60	4.42	4.23	4.16	4.10	4.04	3.98	3.88	3.79	3.71	3.64	3.57	3.52	3.46	3.41	3.36	3.32	3.28	3.24	3.21
6.0	113.85	4.74	4.56	4.35	4.29	4.22	4.16	4.10	4.00	3.91	3.83	3.75	3.69	3.62	3.57	3.52	3.47	3.42	3.38	3.35	3.31
6.1	115.75	4.88	4.70	4.49	4.42	4.35	4.29	4.23	4.12	4.03	3.94	3.87	3.80	3.73	3.68	3.62	3.57	3.53	3.49	3.45	3.41
6.2	117.65	5.02	4.83	4.62	4.55	4.48	4.42	4.35	4.24	4.15	4.06	3.98	3.91	3.85	3.79	3.73	3.68	3.63	3.59	3.55	3.51
6.3	119.55	5.17	4.97	4.75	4.68	4.61	4.55	4.48	4.37	4.27	4.18	4.10	4.03	3.96	3.90	3.84	3.79	3.74	3.70	3.66	3.62
6.4	121.45	5.32	5.12	4.89	4.82	4.74	4.68	4.61	4.49	4.39	4.30	4.22	4.14	4.07	4.01	3.95	3.90	3.85	3.81	3.76	3.72
6.5	123.34	5.46	5.26	5.03	4.95	4.87	4.81	4.74	4.62	4.52	4.42	4.34	4.26	4.19	4.13	4.07	4.01	3.96	3.91	3.87	3.83
6.6	125.24	5.62	5.41	5.17	5.09	5.01	4.94	4.87	4.75	4.64	4.55	4.46	4.38	4.31	4.24	4.18	4.12	4.07	4.02	3.98	3.94
6.7	127.14	5.77	5.55	5.31	5.23	5.15	5.08	5.01	4.88	4.77	4.67	4.58	4.50	4.43	4.36	4.30	4.24	4.19	4.14	4.09	4.05
6.8	129.04	5.92	5.70	5.45	5.37	5.29	5.22	5.14	5.01	4.90	4.80	4.71	4.62	4.55	4.48	4.41	4.35	4.30	4.25	4.20	4.16
6.9	130.93	6.08	5.85	5.60	5.51	5.43	5.35	5.28	5.15	5.03	4.93	4.83	4.75	4.67	4.60	4.53	4.47	4.42	4.36	4.32	4.27
7.0	132.83	6.24	6.01	5.74	5.66	5.57	5.49	5.42	5.28	5.16	5.06	4.96	4.87	4.79	4.72	4.65	4.59	4.53	4.48	4.43	4.38
7.1	134.73	6.40	6.16	5.89	5.80	5.71	5.64	5.56	5.42	5.30	5.19	5.09	5.00	4.92	4.84	4.77	4.71	4.65	4.60	4.55	4.50
7.2	136.63	6.56	6.32	6.04	5.95	5.86	5.78	5.70	5.56	5.43	5.32	5.22	5.13	5.04	4.97	4.90	4.83	4.77	4.72	4.66	4.62
7.3	138.52	6.72	6.48	6.19	6.10	6.01	5.93	5.84	5.70	5.57	5.46	5.35	5.26	5.17	5.09	5.02	4.96	4.89	4.84	4.78	4.73
7.4	140.42	6.89	6.64	6.35	6.25	6.15	6.07	5.99	5.84	5.71	5.59	5.49	5.39	5.30	5.22	5.15	5.08	5.02	4.96	4.90	4.85
7.5	142.32	7.06	6.80	6.50	6.40	6.30	6.22	6.13	5.98	5.85	5.73	5.62	5.52	5.43	5.35	5.27	5.21	5.14	5.08	5.02	4.97
7.6	144.22	7.23	6.96	6.66	6.56	6.46	6.37	6.28	6.13	5.99	5.87	5.76	5.66	5.56	5.48	5.40	5.33	5.27	5.20	5.15	5.09
7.7	146.11	7.40	7.13	6.82	6.72	6.61	6.52	6.43	6.28	6.13	6.01	5.90	5.79	5.70	5.61	5.53	5.46	5.39	5.33	5.27	5.22
7.8	148.01	7.57	7.29	6.98	6.87	6.77	6.68	6.58	6.42	6.28	6.15	6.04	5.93	5.83	5.75	5.66	5.59	5.52	5.46	5.40	5.34
7.9	149.91	7.75	7.46	7.14	7.03	6.92	6.83	6.74	6.57	6.43	6.29	6.18	6.07	5.97	5.88	5.80	5.72	5.65	5.59	5.52	5.47
8.0	151.81	7.92	7.63	7.30	7.19	7.08	6.99	6.89	6.72	6.57	6.44	6.32	6.21	6.11	6.02	5.93	5.85	5.78	5.71	5.65	5.60

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	28.46	0.54	0.52	0.50	0.49	0.48	0.46	0.45	0.43	0.41	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.32	0.31	0.31
1.6	30.36	0.60	0.58	0.56	0.55	0.53	0.52	0.50	0.48	0.46	0.44	0.43	0.41	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.35
1.7	32.26	0.67	0.65	0.63	0.61	0.59	0.58	0.56	0.53	0.51	0.49	0.47	0.46	0.45	0.43	0.42	0.41	0.41	0.40	0.39	0.39
1.8	34.16	0.74	0.72	0.69	0.67	0.65	0.64	0.62	0.59	0.57	0.54	0.52	0.51	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.43
1.9	36.05	0.81	0.79	0.76	0.74	0.72	0.70	0.68	0.65	0.62	0.60	0.58	0.56	0.54	0.53	0.52	0.51	0.49	0.49	0.48	0.47
2.0	37.95	0.89	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.68	0.65	0.63	0.61	0.60	0.58	0.57	0.55	0.54	0.53	0.52	0.52
2.1	39.85	0.96	0.93	0.90	0.88	0.85	0.83	0.81	0.77	0.74	0.71	0.69	0.67	0.65	0.63	0.62	0.60	0.59	0.58	0.57	0.56
2.2	41.75	1.04	1.01	0.98	0.95	0.93	0.90	0.88	0.84	0.80	0.77	0.75	0.73	0.70	0.69	0.67	0.66	0.64	0.63	0.62	0.61
2.3	43.64	1.13	1.09	1.06	1.03	1.00	0.98	0.95	0.91	0.87	0.84	0.81	0.78	0.76	0.74	0.73	0.71	0.70	0.68	0.67	0.66
2.4	45.54	1.21	1.18	1.14	1.11	1.08	1.05	1.02	0.98	0.94	0.90	0.87	0.85	0.82	0.80	0.78	0.77	0.75	0.74	0.72	0.71
2.5	47.44	1.30	1.26	1.22	1.19	1.16	1.13	1.10	1.05	1.01	0.97	0.94	0.91	0.88	0.86	0.84	0.82	0.81	0.79	0.78	0.77
2.6	49.34	1.39	1.35	1.31	1.28	1.24	1.21	1.18	1.12	1.08	1.04	1.00	0.97	0.95	0.92	0.90	0.88	0.87	0.85	0.84	0.82
2.7	51.23	1.49	1.45	1.40	1.36	1.32	1.29	1.26	1.20	1.15	1.11	1.07	1.04	1.01	0.99	0.97	0.95	0.93	0.91	0.89	0.88
2.8	53.13	1.59	1.54	1.49	1.45	1.41	1.38	1.34	1.28	1.23	1.19	1.15	1.11	1.08	1.05	1.03	1.01	0.99	0.97	0.95	0.94
2.9	55.03	1.69	1.64	1.59	1.54	1.50	1.46	1.43	1.36	1.31	1.26	1.22	1.18	1.15	1.12	1.10	1.07	1.05	1.03	1.02	1.00
3.0	56.93	1.79	1.74	1.68	1.64	1.59	1.55	1.51	1.45	1.39	1.34	1.30	1.26	1.22	1.19	1.17	1.14	1.12	1.10	1.08	1.07
3.1	58.82	1.89	1.84	1.78	1.74	1.69	1.65	1.60	1.53	1.47	1.42	1.37	1.33	1.30	1.26	1.24	1.21	1.19	1.17	1.15	1.13
3.2	60.72	2.00	1.94	1.88	1.83	1.78	1.74	1.70	1.62	1.56	1.50	1.45	1.41	1.37	1.34	1.31	1.28	1.26	1.23	1.21	1.20
3.3	62.62	2.11	2.05	1.99	1.94	1.88	1.84	1.79	1.71	1.64	1.59	1.53	1.49	1.45	1.41	1.38	1.35	1.33	1.30	1.28	1.26
3.4	64.52	2.22	2.16	2.09	2.04	1.98	1.94	1.89	1.81	1.73	1.67	1.62	1.57	1.53	1.49	1.46	1.43	1.40	1.38	1.35	1.33
3.5	66.42	2.34	2.27	2.20	2.15	2.09	2.04	1.99	1.90	1.83	1.76	1.70	1.65	1.61	1.57	1.54	1.50	1.47	1.45	1.42	1.41
3.6	68.31	2.46	2.39	2.31	2.26	2.19	2.14	2.09	2.00	1.92	1.85	1.79	1.74	1.69	1.65	1.62	1.58	1.55	1.52	1.50	1.48
3.7	70.21	2.58	2.51	2.43	2.37	2.30	2.25	2.19	2.10	2.01	1.94	1.88	1.83	1.78	1.73	1.70	1.66	1.63	1.60	1.57	1.55
3.8	72.11	2.70	2.62	2.54	2.48	2.41	2.36	2.30	2.20	2.11	2.04	1.97	1.92	1.86	1.82	1.78	1.74	1.71	1.68	1.65	1.63
3.9	74.01	2.83	2.75	2.66	2.60	2.52	2.47	2.40	2.30	2.21	2.13	2.07	2.01	1.95	1.90	1.86	1.83	1.79	1.76	1.73	1.71
4.0	75.90	2.95	2.87	2.78	2.71	2.64	2.58	2.51	2.41	2.31	2.23	2.16	2.10	2.04	1.99	1.95	1.91	1.87	1.84	1.81	1.79
4.1	77.80	3.08	3.00	2.91	2.83	2.76	2.69	2.63	2.51	2.42	2.33	2.26	2.19	2.14	2.08	2.04	2.00	1.96	1.93	1.89	1.87
4.2	79.70	3.22	3.13	3.03	2.96	2.88	2.81	2.74	2.62	2.52	2.43	2.36	2.29	2.23	2.17	2.13	2.09	2.04	2.01	1.98	1.95
4.3	81.60	3.35	3.26	3.16	3.08	3.00	2.93	2.86	2.74	2.63	2.54	2.46	2.39	2.33	2.27	2.22	2.18	2.13	2.10	2.06	2.04
4.4	83.49	3.49	3.39	3.29	3.21	3.12	3.05	2.97	2.85	2.74	2.64	2.56	2.49	2.42	2.36	2.31	2.27	2.22	2.19	2.15	2.12
4.5	85.39	3.63	3.53	3.42	3.34	3.25	3.17	3.09	2.96	2.85	2.75	2.67	2.59	2.52	2.46	2.41	2.36	2.31	2.28	2.24	2.21
4.6	87.29	3.77	3.67	3.56	3.47	3.38	3.30	3.22	3.08	2.97	2.86	2.77	2.69	2.62	2.56	2.51	2.46	2.41	2.37	2.33	2.30
4.7	89.19	3.92	3.81	3.69	3.60	3.51	3.43	3.34	3.20	3.08	2.97	2.88	2.80	2.73	2.66	2.61	2.55	2.50	2.46	2.42	2.39

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" **Uponor PEX-a** — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	91.08	4.06	3.95	3.83	3.74	3.64	3.56	3.47	3.32	3.20	3.09	2.99	2.91	2.83	2.76	2.71	2.65	2.60	2.56	2.51	2.48
4.9	92.98	4.21	4.10	3.98	3.88	3.77	3.69	3.60	3.45	3.32	3.20	3.10	3.02	2.94	2.87	2.81	2.75	2.70	2.65	2.61	2.58
5.0	94.88	4.37	4.25	4.12	4.02	3.91	3.82	3.73	3.57	3.44	3.32	3.22	3.13	3.05	2.97	2.91	2.85	2.80	2.75	2.71	2.67
5.1	96.78	4.52	4.40	4.27	4.16	4.05	3.96	3.86	3.70	3.56	3.44	3.33	3.24	3.16	3.08	3.02	2.96	2.90	2.85	2.80	2.77
5.2	98.67	4.68	4.55	4.41	4.31	4.19	4.10	4.00	3.83	3.69	3.56	3.45	3.35	3.27	3.19	3.12	3.06	3.00	2.95	2.91	2.87
5.3	100.57	4.84	4.71	4.57	4.45	4.34	4.24	4.14	3.96	3.82	3.69	3.57	3.47	3.38	3.30	3.23	3.17	3.11	3.06	3.01	2.97
5.4	102.47	5.00	4.86	4.72	4.60	4.48	4.38	4.27	4.10	3.94	3.81	3.69	3.59	3.50	3.41	3.34	3.28	3.21	3.16	3.11	3.07
5.5	104.37	5.16	5.02	4.87	4.76	4.63	4.53	4.42	4.23	4.08	3.94	3.81	3.71	3.61	3.53	3.46	3.39	3.32	3.27	3.21	3.17
5.6	106.26	5.33	5.18	5.03	4.91	4.78	4.67	4.56	4.37	4.21	4.07	3.94	3.83	3.73	3.64	3.57	3.50	3.43	3.38	3.32	3.28
5.7	108.16	5.49	5.35	5.19	5.07	4.93	4.82	4.70	4.51	4.34	4.20	4.07	3.95	3.85	3.76	3.69	3.61	3.54	3.49	3.43	3.39
5.8	110.06	5.67	5.51	5.35	5.22	5.09	4.97	4.85	4.65	4.48	4.33	4.19	4.08	3.98	3.88	3.80	3.73	3.66	3.60	3.54	3.49
5.9	111.96	5.84	5.68	5.52	5.38	5.24	5.13	5.00	4.80	4.62	4.46	4.33	4.21	4.10	4.00	3.92	3.84	3.77	3.71	3.65	3.60
6.0	113.85	6.01	5.85	5.68	5.55	5.40	5.28	5.15	4.94	4.76	4.60	4.46	4.34	4.22	4.12	4.04	3.96	3.89	3.82	3.76	3.72
6.1	115.75	6.19	6.03	5.85	5.71	5.56	5.44	5.31	5.09	4.90	4.74	4.59	4.47	4.35	4.25	4.16	4.08	4.00	3.94	3.88	3.83
6.2	117.65	6.37	6.20	6.02	5.88	5.72	5.60	5.46	5.24	5.05	4.88	4.73	4.60	4.48	4.37	4.29	4.20	4.12	4.06	3.99	3.94
6.3	119.55	6.55	6.38	6.19	6.05	5.89	5.76	5.62	5.39	5.19	5.02	4.86	4.73	4.61	4.50	4.41	4.33	4.24	4.18	4.11	4.06
6.4	121.45	6.74	6.56	6.37	6.22	6.05	5.92	5.78	5.55	5.34	5.16	5.00	4.87	4.74	4.63	4.54	4.45	4.37	4.30	4.23	4.18
6.5	123.34	6.92	6.74	6.54	6.39	6.22	6.09	5.94	5.70	5.49	5.31	5.14	5.00	4.88	4.76	4.67	4.58	4.49	4.42	4.35	4.30
6.6	125.24	7.11	6.93	6.72	6.56	6.39	6.25	6.10	5.86	5.64	5.45	5.29	5.14	5.01	4.90	4.80	4.70	4.62	4.54	4.47	4.42
6.7	127.14	7.30	7.11	6.90	6.74	6.57	6.42	6.27	6.02	5.80	5.60	5.43	5.28	5.15	5.03	4.93	4.83	4.74	4.67	4.59	4.54
6.8	129.04	7.50	7.30	7.09	6.92	6.74	6.59	6.44	6.18	5.95	5.75	5.58	5.43	5.29	5.17	5.06	4.96	4.87	4.79	4.72	4.66
6.9	130.93	7.69	7.49	7.27	7.10	6.92	6.77	6.61	6.34	6.11	5.91	5.73	5.57	5.43	5.30	5.20	5.10	5.00	4.92	4.84	4.79
7.0	132.83	7.89	7.68	7.46	7.29	7.10	6.94	6.78	6.51	6.27	6.06	5.88	5.72	5.57	5.44	5.34	5.23	5.13	5.05	4.97	4.91
7.1	134.73	8.09	7.88	7.65	7.47	7.28	7.12	6.95	6.67	6.43	6.22	6.03	5.86	5.72	5.58	5.47	5.37	5.27	5.18	5.10	5.04
7.2	136.63	8.29	8.08	7.84	7.66	7.46	7.30	7.13	6.84	6.59	6.37	6.18	6.01	5.86	5.73	5.61	5.50	5.40	5.32	5.23	5.17
7.3	138.52	8.50	8.28	8.04	7.85	7.65	7.48	7.30	7.01	6.76	6.53	6.34	6.17	6.01	5.87	5.76	5.64	5.54	5.45	5.37	5.30
7.4	140.42	8.70	8.48	8.23	8.04	7.83	7.66	7.48	7.18	6.92	6.69	6.49	6.32	6.16	6.02	5.90	5.78	5.68	5.59	5.50	5.43
7.5	142.32	8.91	8.68	8.43	8.23	8.02	7.85	7.66	7.36	7.09	6.86	6.65	6.47	6.31	6.16	6.04	5.93	5.82	5.73	5.63	5.57
7.6	144.22	9.12	8.89	8.63	8.43	8.21	8.04	7.85	7.53	7.26	7.02	6.81	6.63	6.46	6.31	6.19	6.07	5.96	5.86	5.77	5.70
7.7	146.11	9.33	9.09	8.83	8.63	8.41	8.23	8.03	7.71	7.43	7.19	6.97	6.79	6.62	6.46	6.34	6.21	6.10	6.00	5.91	5.84
7.8	148.01	9.55	9.30	9.04	8.83	8.60	8.42	8.22	7.89	7.61	7.36	7.14	6.95	6.77	6.61	6.49	6.36	6.24	6.15	6.05	5.98
7.9	149.91	9.77	9.52	9.24	9.03	8.80	8.61	8.41	8.07	7.78	7.53	7.30	7.11	6.93	6.77	6.64	6.51	6.39	6.29	6.19	6.12
8.0	151.81	9.99	9.73	9.45	9.23	9.00	8.80	8.60	8.26	7.96	7.70	7.47	7.27	7.09	6.92	6.79	6.66	6.54	6.44	6.33	6.26

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	28.46	0.62	0.60	0.57	0.55	0.53	0.52	0.50	0.47	0.45	0.43	0.41	0.39	0.38	0.37	0.36	0.35	0.34	0.34	0.33	0.32
1.6	30.36	0.70	0.67	0.64	0.62	0.60	0.58	0.56	0.53	0.50	0.48	0.46	0.44	0.43	0.41	0.40	0.39	0.38	0.38	0.37	0.36
1.7	32.26	0.77	0.74	0.71	0.69	0.66	0.64	0.62	0.59	0.56	0.53	0.51	0.49	0.48	0.46	0.45	0.44	0.43	0.42	0.41	0.40
1.8	34.16	0.85	0.82	0.78	0.76	0.73	0.71	0.69	0.65	0.62	0.59	0.56	0.54	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.45
1.9	36.05	0.93	0.90	0.86	0.83	0.80	0.78	0.75	0.71	0.68	0.65	0.62	0.60	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49
2.0	37.95	1.02	0.98	0.94	0.91	0.88	0.85	0.82	0.78	0.74	0.71	0.68	0.65	0.63	0.61	0.60	0.58	0.57	0.56	0.55	0.54
2.1	39.85	1.11	1.07	1.02	0.99	0.95	0.93	0.90	0.85	0.81	0.77	0.74	0.71	0.69	0.67	0.65	0.64	0.62	0.61	0.60	0.59
2.2	41.75	1.20	1.16	1.11	1.07	1.03	1.00	0.97	0.92	0.87	0.84	0.80	0.77	0.75	0.73	0.71	0.69	0.67	0.66	0.65	0.64
2.3	43.64	1.30	1.25	1.20	1.16	1.12	1.08	1.05	0.99	0.94	0.90	0.87	0.84	0.81	0.79	0.77	0.75	0.73	0.72	0.70	0.69
2.4	45.54	1.39	1.34	1.29	1.25	1.20	1.17	1.13	1.07	1.02	0.97	0.94	0.90	0.87	0.85	0.83	0.81	0.79	0.77	0.76	0.75
2.5	47.44	1.50	1.44	1.38	1.34	1.29	1.25	1.21	1.15	1.09	1.05	1.01	0.97	0.94	0.91	0.89	0.87	0.85	0.83	0.81	0.80
2.6	49.34	1.60	1.54	1.48	1.43	1.38	1.34	1.30	1.23	1.17	1.12	1.08	1.04	1.01	0.98	0.95	0.93	0.91	0.89	0.87	0.86
2.7	51.23	1.71	1.65	1.58	1.53	1.47	1.43	1.39	1.31	1.25	1.20	1.15	1.11	1.08	1.04	1.02	0.99	0.97	0.95	0.93	0.92
2.8	53.13	1.82	1.75	1.68	1.63	1.57	1.53	1.48	1.40	1.33	1.28	1.23	1.19	1.15	1.11	1.09	1.06	1.04	1.02	1.00	0.98
2.9	55.03	1.93	1.86	1.79	1.73	1.67	1.62	1.57	1.49	1.42	1.36	1.31	1.26	1.22	1.19	1.16	1.13	1.10	1.08	1.06	1.05
3.0	56.93	2.05	1.97	1.89	1.84	1.77	1.72	1.67	1.58	1.51	1.44	1.39	1.34	1.30	1.26	1.23	1.20	1.17	1.15	1.13	1.11
3.1	58.82	2.17	2.09	2.01	1.94	1.87	1.82	1.77	1.67	1.60	1.53	1.47	1.42	1.38	1.34	1.30	1.27	1.24	1.22	1.20	1.18
3.2	60.72	2.29	2.21	2.12	2.05	1.98	1.93	1.87	1.77	1.69	1.62	1.56	1.50	1.46	1.41	1.38	1.35	1.32	1.29	1.27	1.25
3.3	62.62	2.41	2.33	2.24	2.17	2.09	2.03	1.97	1.87	1.78	1.71	1.64	1.59	1.54	1.49	1.46	1.42	1.39	1.37	1.34	1.32
3.4	64.52	2.54	2.45	2.35	2.28	2.20	2.14	2.08	1.97	1.88	1.80	1.73	1.67	1.62	1.57	1.53	1.50	1.47	1.44	1.41	1.39
3.5	66.42	2.67	2.58	2.48	2.40	2.32	2.25	2.18	2.07	1.98	1.89	1.82	1.76	1.71	1.66	1.62	1.58	1.54	1.52	1.49	1.46
3.6	68.31	2.80	2.71	2.60	2.52	2.43	2.37	2.29	2.18	2.08	1.99	1.92	1.85	1.79	1.74	1.70	1.66	1.62	1.60	1.56	1.54
3.7	70.21	2.94	2.84	2.73	2.64	2.55	2.48	2.41	2.28	2.18	2.09	2.01	1.94	1.88	1.83	1.78	1.75	1.71	1.68	1.64	1.62
3.8	72.11	3.08	2.97	2.86	2.77	2.67	2.60	2.52	2.39	2.28	2.19	2.11	2.04	1.98	1.92	1.87	1.83	1.79	1.76	1.72	1.70
3.9	74.01	3.22	3.11	2.99	2.90	2.80	2.72	2.64	2.51	2.39	2.29	2.21	2.13	2.07	2.01	1.96	1.92	1.87	1.84	1.81	1.78
4.0	75.90	3.37	3.25	3.12	3.03	2.93	2.85	2.76	2.62	2.50	2.40	2.31	2.23	2.16	2.10	2.05	2.01	1.96	1.93	1.89	1.86
4.1	77.80	3.51	3.39	3.26	3.16	3.05	2.97	2.88	2.74	2.61	2.51	2.41	2.33	2.26	2.20	2.14	2.10	2.05	2.01	1.97	1.95
4.2	79.70	3.66	3.54	3.40	3.30	3.19	3.10	3.01	2.86	2.73	2.62	2.52	2.43	2.36	2.29	2.24	2.19	2.14	2.10	2.06	2.03
4.3	81.60	3.81	3.69	3.54	3.44	3.32	3.23	3.13	2.98	2.84	2.73	2.63	2.54	2.46	2.39	2.33	2.28	2.23	2.19	2.15	2.12
4.4	83.49	3.97	3.84	3.69	3.58	3.46	3.36	3.26	3.10	2.96	2.84	2.74	2.64	2.57	2.49	2.43	2.38	2.33	2.29	2.24	2.21
4.5	85.39	4.13	3.99	3.84	3.72	3.60	3.50	3.39	3.22	3.08	2.96	2.85	2.75	2.67	2.60	2.53	2.48	2.42	2.38	2.33	2.30
4.6	87.29	4.29	4.14	3.99	3.87	3.74	3.64	3.53	3.35	3.20	3.07	2.96	2.86	2.78	2.70	2.63	2.58	2.52	2.48	2.43	2.39

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Recommended head loss design range

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3½" **Uponor PEX-a** — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.7	89.19	4.45	4.30	4.14	4.01	3.88	3.78	3.66	3.48	3.33	3.19	3.08	2.97	2.89	2.81	2.74	2.68	2.62	2.57	2.52	2.49
4.8	91.08	4.62	4.46	4.29	4.17	4.03	3.92	3.80	3.61	3.45	3.31	3.20	3.09	3.00	2.91	2.84	2.78	2.72	2.67	2.62	2.58
4.9	92.98	4.79	4.63	4.45	4.32	4.18	4.06	3.94	3.75	3.58	3.44	3.31	3.20	3.11	3.02	2.95	2.89	2.82	2.77	2.72	2.68
5.0	94.88	4.96	4.79	4.61	4.47	4.33	4.21	4.09	3.88	3.71	3.56	3.44	3.32	3.22	3.13	3.06	2.99	2.93	2.88	2.82	2.78
5.1	96.78	5.13	4.96	4.77	4.63	4.48	4.36	4.23	4.02	3.84	3.69	3.56	3.44	3.34	3.25	3.17	3.10	3.03	2.98	2.92	2.88
5.2	98.67	5.31	5.13	4.94	4.79	4.63	4.51	4.38	4.16	3.98	3.82	3.68	3.56	3.46	3.36	3.28	3.21	3.14	3.09	3.03	2.98
5.3	100.57	5.49	5.31	5.11	4.96	4.79	4.67	4.53	4.31	4.11	3.95	3.81	3.69	3.58	3.48	3.40	3.32	3.25	3.20	3.13	3.09
5.4	102.47	5.67	5.48	5.28	5.12	4.95	4.82	4.68	4.45	4.25	4.09	3.94	3.81	3.70	3.60	3.51	3.44	3.36	3.30	3.24	3.19
5.5	104.37	5.85	5.66	5.45	5.29	5.11	4.98	4.83	4.60	4.39	4.22	4.07	3.94	3.82	3.72	3.63	3.55	3.47	3.42	3.35	3.30
5.6	106.26	6.04	5.84	5.62	5.46	5.28	5.14	4.99	4.75	4.54	4.36	4.20	4.07	3.95	3.84	3.75	3.67	3.59	3.53	3.46	3.41
5.7	108.16	6.23	6.02	5.80	5.63	5.45	5.30	5.15	4.90	4.68	4.50	4.34	4.20	4.07	3.96	3.87	3.79	3.70	3.64	3.57	3.52
5.8	110.06	6.42	6.21	5.98	5.80	5.61	5.47	5.31	5.05	4.83	4.64	4.48	4.33	4.20	4.09	3.99	3.91	3.82	3.76	3.69	3.63
5.9	111.96	6.62	6.40	6.16	5.98	5.79	5.64	5.47	5.21	4.98	4.78	4.61	4.46	4.33	4.22	4.12	4.03	3.94	3.88	3.80	3.75
6.0	113.85	6.81	6.59	6.34	6.16	5.96	5.80	5.64	5.36	5.13	4.93	4.75	4.60	4.47	4.34	4.24	4.15	4.06	4.00	3.92	3.86
6.1	115.75	7.01	6.78	6.53	6.34	6.14	5.98	5.80	5.52	5.28	5.08	4.90	4.74	4.60	4.48	4.37	4.28	4.19	4.12	4.04	3.98
6.2	117.65	7.21	6.98	6.72	6.53	6.31	6.15	5.97	5.68	5.44	5.23	5.04	4.88	4.74	4.61	4.50	4.40	4.31	4.24	4.16	4.10
6.3	119.55	7.42	7.18	6.91	6.71	6.49	6.33	6.14	5.85	5.59	5.38	5.19	5.02	4.87	4.74	4.63	4.53	4.44	4.36	4.28	4.22
6.4	121.45	7.63	7.38	7.11	6.90	6.68	6.50	6.32	6.01	5.75	5.53	5.34	5.16	5.01	4.88	4.76	4.66	4.56	4.49	4.40	4.34
6.5	123.34	7.83	7.58	7.30	7.09	6.86	6.69	6.49	6.18	5.91	5.68	5.48	5.31	5.15	5.02	4.90	4.80	4.69	4.62	4.53	4.46
6.6	125.24	8.05	7.79	7.50	7.28	7.05	6.87	6.67	6.35	6.07	5.84	5.64	5.45	5.30	5.15	5.03	4.93	4.82	4.74	4.65	4.59
6.7	127.14	8.26	7.99	7.70	7.48	7.24	7.05	6.85	6.52	6.24	6.00	5.79	5.60	5.44	5.30	5.17	5.06	4.96	4.87	4.78	4.72
6.8	129.04	8.48	8.20	7.90	7.68	7.43	7.24	7.03	6.70	6.41	6.16	5.95	5.75	5.59	5.44	5.31	5.20	5.09	5.01	4.91	4.84
6.9	130.93	8.70	8.42	8.11	7.88	7.62	7.43	7.22	6.87	6.57	6.32	6.10	5.91	5.74	5.58	5.45	5.34	5.23	5.14	5.04	4.97
7.0	132.83	8.92	8.63	8.32	8.08	7.82	7.62	7.40	7.05	6.75	6.49	6.26	6.06	5.89	5.73	5.60	5.48	5.36	5.28	5.18	5.10
7.1	134.73	9.14	8.85	8.53	8.28	8.02	7.81	7.59	7.23	6.92	6.65	6.42	6.22	6.04	5.88	5.74	5.62	5.50	5.41	5.31	5.24
7.2	136.63	9.37	9.07	8.74	8.49	8.22	8.01	7.78	7.41	7.09	6.82	6.58	6.37	6.19	6.03	5.89	5.77	5.64	5.55	5.45	5.37
7.3	138.52	9.60	9.29	8.95	8.70	8.42	8.21	7.97	7.59	7.27	6.99	6.75	6.53	6.35	6.18	6.03	5.91	5.78	5.69	5.58	5.51
7.4	140.42	9.83	9.52	9.17	8.91	8.63	8.41	8.17	7.78	7.45	7.16	6.92	6.69	6.50	6.33	6.18	6.06	5.93	5.83	5.72	5.64
7.5	142.32	10.06	9.74	9.39	9.12	8.83	8.61	8.37	7.97	7.63	7.34	7.08	6.86	6.66	6.49	6.34	6.21	6.07	5.98	5.86	5.78
7.6	144.22	10.30	9.97	9.61	9.34	9.04	8.81	8.56	8.16	7.81	7.51	7.25	7.02	6.82	6.64	6.49	6.36	6.22	6.12	6.01	5.92
7.7	146.11	10.54	10.20	9.83	9.56	9.25	9.02	8.76	8.35	7.99	7.69	7.43	7.19	6.98	6.80	6.64	6.51	6.37	6.27	6.15	6.06
7.8	148.01	10.78	10.44	10.06	9.78	9.47	9.23	8.97	8.54	8.18	7.87	7.60	7.36	7.15	6.96	6.80	6.66	6.52	6.41	6.30	6.21
7.9	149.91	11.02	10.67	10.29	10.00	9.68	9.44	9.17	8.74	8.37	8.05	7.77	7.53	7.31	7.12	6.96	6.81	6.67	6.56	6.44	6.35
8.0	151.81	11.27	10.91	10.52	10.22	9.90	9.65	9.38	8.94	8.56	8.23	7.95	7.70	7.48	7.28	7.12	6.97	6.82	6.71	6.59	6.50

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" **Uponor PEX-a** — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	28.46	0.70	0.67	0.64	0.62	0.59	0.57	0.55	0.52	0.49	0.47	0.44	0.43	0.41	0.40	0.38	0.37	0.36	0.35	0.35	0.34
1.6	30.36	0.78	0.75	0.72	0.69	0.66	0.64	0.62	0.58	0.55	0.52	0.50	0.48	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.38
1.7	32.26	0.87	0.83	0.79	0.77	0.73	0.71	0.68	0.64	0.61	0.58	0.55	0.53	0.51	0.49	0.48	0.46	0.45	0.44	0.43	0.42
1.8	34.16	0.96	0.92	0.88	0.84	0.81	0.78	0.76	0.71	0.67	0.64	0.61	0.59	0.56	0.55	0.53	0.51	0.50	0.49	0.48	0.47
1.9	36.05	1.05	1.01	0.96	0.93	0.89	0.86	0.83	0.78	0.74	0.70	0.67	0.64	0.62	0.60	0.58	0.57	0.55	0.54	0.53	0.51
2.0	37.95	1.14	1.10	1.05	1.01	0.97	0.94	0.91	0.85	0.81	0.77	0.73	0.70	0.68	0.66	0.64	0.62	0.60	0.59	0.58	0.56
2.1	39.85	1.24	1.19	1.14	1.10	1.06	1.02	0.99	0.93	0.88	0.84	0.80	0.77	0.74	0.72	0.69	0.67	0.66	0.64	0.63	0.61
2.2	41.75	1.34	1.29	1.23	1.19	1.14	1.11	1.07	1.01	0.95	0.91	0.87	0.83	0.80	0.78	0.75	0.73	0.71	0.70	0.68	0.67
2.3	43.64	1.45	1.39	1.33	1.28	1.23	1.20	1.15	1.09	1.03	0.98	0.94	0.90	0.87	0.84	0.81	0.79	0.77	0.75	0.74	0.72
2.4	45.54	1.56	1.50	1.43	1.38	1.33	1.29	1.24	1.17	1.11	1.06	1.01	0.97	0.94	0.91	0.88	0.85	0.83	0.81	0.80	0.78
2.5	47.44	1.67	1.61	1.54	1.48	1.42	1.38	1.33	1.26	1.19	1.13	1.08	1.04	1.01	0.97	0.94	0.92	0.90	0.87	0.86	0.84
2.6	49.34	1.79	1.72	1.64	1.59	1.52	1.48	1.43	1.34	1.27	1.21	1.16	1.12	1.08	1.04	1.01	0.98	0.96	0.94	0.92	0.90
2.7	51.23	1.90	1.83	1.75	1.69	1.63	1.58	1.52	1.44	1.36	1.30	1.24	1.19	1.15	1.11	1.08	1.05	1.03	1.00	0.98	0.96
2.8	53.13	2.03	1.95	1.87	1.80	1.73	1.68	1.62	1.53	1.45	1.38	1.32	1.27	1.23	1.19	1.15	1.12	1.09	1.07	1.05	1.03
2.9	55.03	2.15	2.07	1.98	1.91	1.84	1.78	1.72	1.63	1.54	1.47	1.41	1.35	1.31	1.26	1.23	1.20	1.17	1.14	1.12	1.09
3.0	56.93	2.28	2.19	2.10	2.03	1.95	1.89	1.83	1.72	1.64	1.56	1.49	1.44	1.39	1.34	1.30	1.27	1.24	1.21	1.18	1.16
3.1	58.82	2.41	2.32	2.22	2.15	2.07	2.00	1.94	1.83	1.73	1.65	1.58	1.52	1.47	1.42	1.38	1.35	1.31	1.28	1.26	1.23
3.2	60.72	2.55	2.45	2.35	2.27	2.18	2.12	2.05	1.93	1.83	1.75	1.67	1.61	1.56	1.51	1.46	1.42	1.39	1.36	1.33	1.30
3.3	62.62	2.69	2.58	2.48	2.39	2.30	2.23	2.16	2.04	1.93	1.84	1.77	1.70	1.64	1.59	1.54	1.50	1.47	1.43	1.40	1.38
3.4	64.52	2.83	2.72	2.61	2.52	2.42	2.35	2.27	2.15	2.04	1.94	1.86	1.79	1.73	1.68	1.63	1.59	1.55	1.51	1.48	1.45
3.5	66.42	2.97	2.86	2.74	2.65	2.55	2.47	2.39	2.26	2.14	2.05	1.96	1.89	1.82	1.77	1.72	1.67	1.63	1.59	1.56	1.53
3.6	68.31	3.12	3.00	2.88	2.78	2.68	2.60	2.51	2.37	2.25	2.15	2.06	1.98	1.92	1.86	1.80	1.76	1.71	1.67	1.64	1.61
3.7	70.21	3.27	3.15	3.02	2.92	2.81	2.72	2.63	2.49	2.36	2.26	2.16	2.08	2.01	1.95	1.89	1.84	1.80	1.76	1.72	1.69
3.8	72.11	3.42	3.30	3.16	3.05	2.94	2.85	2.76	2.61	2.48	2.36	2.27	2.18	2.11	2.04	1.99	1.93	1.89	1.84	1.81	1.77
3.9	74.01	3.58	3.45	3.30	3.19	3.08	2.99	2.89	2.73	2.59	2.47	2.37	2.29	2.21	2.14	2.08	2.03	1.98	1.93	1.89	1.86
4.0	75.90	3.74	3.60	3.45	3.34	3.21	3.12	3.02	2.85	2.71	2.59	2.48	2.39	2.31	2.24	2.18	2.12	2.07	2.02	1.98	1.94
4.1	77.80	3.90	3.76	3.60	3.48	3.36	3.26	3.15	2.98	2.83	2.70	2.59	2.50	2.41	2.34	2.27	2.21	2.16	2.11	2.07	2.03
4.2	79.70	4.06	3.92	3.75	3.63	3.50	3.40	3.29	3.11	2.95	2.82	2.71	2.61	2.52	2.44	2.37	2.31	2.26	2.20	2.16	2.12
4.3	81.60	4.23	4.08	3.91	3.78	3.65	3.54	3.42	3.24	3.08	2.94	2.82	2.72	2.63	2.55	2.47	2.41	2.35	2.30	2.26	2.21
4.4	83.49	4.40	4.24	4.07	3.94	3.79	3.68	3.56	3.37	3.20	3.06	2.94	2.83	2.74	2.65	2.58	2.51	2.45	2.40	2.35	2.31
4.5	85.39	4.58	4.41	4.23	4.10	3.95	3.83	3.71	3.51	3.33	3.19	3.06	2.95	2.85	2.76	2.68	2.62	2.55	2.49	2.45	2.40
4.6	87.29	4.75	4.58	4.40	4.25	4.10	3.98	3.85	3.64	3.46	3.31	3.18	3.06	2.96	2.87	2.79	2.72	2.65	2.59	2.55	2.50
4.7	89.19	4.93	4.76	4.56	4.42	4.26	4.13	4.00	3.78	3.60	3.44	3.30	3.18	3.08	2.98	2.90	2.83	2.76	2.70	2.65	2.60

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

3½" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	91.08	5.12	4.93	4.73	4.58	4.42	4.29	4.15	3.93	3.73	3.57	3.43	3.30	3.19	3.10	3.01	2.93	2.86	2.80	2.75	2.70
4.9	92.98	5.30	5.11	4.91	4.75	4.58	4.45	4.30	4.07	3.87	3.70	3.56	3.43	3.31	3.21	3.12	3.05	2.97	2.91	2.85	2.80
5.0	94.88	5.49	5.30	5.08	4.92	4.74	4.61	4.46	4.22	4.01	3.84	3.68	3.55	3.43	3.33	3.24	3.16	3.08	3.01	2.96	2.90
5.1	96.78	5.68	5.48	5.26	5.09	4.91	4.77	4.62	4.37	4.16	3.97	3.82	3.68	3.56	3.45	3.35	3.27	3.19	3.12	3.06	3.01
5.2	98.67	5.88	5.67	5.44	5.27	5.08	4.93	4.78	4.52	4.30	4.11	3.95	3.81	3.68	3.57	3.47	3.39	3.31	3.23	3.17	3.11
5.3	100.57	6.07	5.86	5.62	5.44	5.25	5.10	4.94	4.67	4.45	4.25	4.09	3.94	3.81	3.69	3.59	3.50	3.42	3.34	3.28	3.22
5.4	102.47	6.27	6.05	5.81	5.62	5.42	5.27	5.10	4.83	4.60	4.40	4.22	4.07	3.94	3.82	3.72	3.62	3.54	3.46	3.39	3.33
5.5	104.37	6.47	6.25	6.00	5.81	5.60	5.44	5.27	4.99	4.75	4.54	4.36	4.21	4.07	3.95	3.84	3.74	3.66	3.57	3.51	3.44
5.6	106.26	6.68	6.45	6.19	5.99	5.78	5.62	5.44	5.15	4.90	4.69	4.51	4.34	4.20	4.08	3.97	3.87	3.78	3.69	3.62	3.56
5.7	108.16	6.89	6.65	6.38	6.18	5.96	5.79	5.61	5.31	5.06	4.84	4.65	4.48	4.34	4.21	4.09	3.99	3.90	3.81	3.74	3.67
5.8	110.06	7.10	6.85	6.58	6.37	6.15	5.97	5.78	5.48	5.22	4.99	4.79	4.62	4.47	4.34	4.22	4.12	4.02	3.93	3.86	3.79
5.9	111.96	7.31	7.06	6.78	6.56	6.33	6.15	5.96	5.65	5.38	5.14	4.94	4.77	4.61	4.47	4.35	4.25	4.15	4.06	3.98	3.91
6.0	113.85	7.53	7.27	6.98	6.76	6.52	6.34	6.14	5.82	5.54	5.30	5.09	4.91	4.75	4.61	4.49	4.38	4.27	4.18	4.10	4.03
6.1	115.75	7.75	7.48	7.18	6.96	6.71	6.52	6.32	5.99	5.70	5.46	5.24	5.06	4.89	4.75	4.62	4.51	4.40	4.31	4.23	4.15
6.2	117.65	7.97	7.69	7.39	7.16	6.91	6.71	6.50	6.16	5.87	5.62	5.40	5.21	5.04	4.89	4.76	4.64	4.53	4.43	4.35	4.27
6.3	119.55	8.19	7.91	7.60	7.36	7.10	6.90	6.69	6.34	6.04	5.78	5.55	5.36	5.19	5.03	4.90	4.78	4.66	4.56	4.48	4.40
6.4	121.45	8.42	8.13	7.81	7.57	7.30	7.10	6.88	6.52	6.21	5.94	5.71	5.51	5.33	5.18	5.04	4.91	4.80	4.69	4.61	4.52
6.5	123.34	8.65	8.35	8.02	7.77	7.50	7.29	7.07	6.70	6.38	6.11	5.87	5.66	5.48	5.32	5.18	5.05	4.93	4.83	4.74	4.65
6.6	125.24	8.88	8.58	8.24	7.99	7.71	7.49	7.26	6.88	6.55	6.27	6.03	5.82	5.63	5.47	5.32	5.19	5.07	4.96	4.87	4.78
6.7	127.14	9.12	8.80	8.46	8.20	7.91	7.69	7.45	7.06	6.73	6.44	6.20	5.98	5.79	5.62	5.47	5.33	5.21	5.10	5.00	4.91
6.8	129.04	9.36	9.03	8.68	8.41	8.12	7.90	7.65	7.25	6.91	6.62	6.36	6.14	5.94	5.77	5.61	5.48	5.35	5.23	5.14	5.05
6.9	130.93	9.60	9.27	8.91	8.63	8.33	8.10	7.85	7.44	7.09	6.79	6.53	6.30	6.10	5.92	5.76	5.62	5.49	5.37	5.28	5.18
7.0	132.83	9.84	9.50	9.13	8.85	8.54	8.31	8.05	7.63	7.27	6.97	6.70	6.46	6.26	6.08	5.91	5.77	5.64	5.52	5.42	5.32
7.1	134.73	10.08	9.74	9.36	9.07	8.76	8.52	8.25	7.83	7.46	7.14	6.87	6.63	6.42	6.23	6.07	5.92	5.78	5.66	5.56	5.45
7.2	136.63	10.33	9.98	9.59	9.30	8.98	8.73	8.46	8.02	7.65	7.32	7.04	6.80	6.58	6.39	6.22	6.07	5.93	5.80	5.70	5.59
7.3	138.52	10.58	10.22	9.83	9.53	9.20	8.94	8.67	8.22	7.84	7.51	7.22	6.97	6.75	6.55	6.38	6.22	6.08	5.95	5.84	5.73
7.4	140.42	10.84	10.47	10.06	9.76	9.42	9.16	8.88	8.42	8.03	7.69	7.40	7.14	6.91	6.71	6.53	6.38	6.23	6.10	5.99	5.88
7.5	142.32	11.09	10.72	10.30	9.99	9.65	9.38	9.09	8.62	8.22	7.87	7.58	7.31	7.08	6.87	6.69	6.53	6.38	6.24	6.13	6.02
7.6	144.22	11.35	10.97	10.54	10.22	9.87	9.60	9.31	8.83	8.42	8.06	7.76	7.49	7.25	7.04	6.85	6.69	6.54	6.40	6.28	6.17
7.7	146.11	11.61	11.22	10.79	10.46	10.10	9.82	9.52	9.03	8.61	8.25	7.94	7.66	7.42	7.21	7.02	6.85	6.69	6.55	6.43	6.31
7.8	148.01	11.88	11.48	11.03	10.70	10.33	10.05	9.74	9.24	8.81	8.44	8.12	7.84	7.60	7.37	7.18	7.01	6.85	6.70	6.58	6.46
7.9	149.91	12.14	11.73	11.28	10.94	10.57	10.28	9.96	9.45	9.01	8.64	8.31	8.02	7.77	7.55	7.35	7.17	7.01	6.86	6.73	6.61
8.0	151.81	12.41	11.99	11.53	11.19	10.80	10.51	10.19	9.67	9.22	8.83	8.50	8.21	7.95	7.72	7.51	7.34	7.17	7.02	6.89	6.77

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	36.88	0.35	0.33	0.32	0.31	0.30	0.30	0.29	0.29	0.28	0.27	0.27	0.26	0.26	0.25	0.25	0.24	0.24	0.24	0.23	0.23
1.6	39.34	0.39	0.37	0.35	0.35	0.34	0.34	0.33	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.28	0.27	0.27	0.27	0.26	0.26
1.7	41.80	0.43	0.41	0.39	0.39	0.38	0.37	0.37	0.36	0.35	0.34	0.33	0.33	0.32	0.31	0.31	0.30	0.30	0.30	0.29	0.29
1.8	44.26	0.48	0.46	0.44	0.43	0.42	0.41	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.35	0.34	0.34	0.33	0.33	0.32	0.32
1.9	46.72	0.53	0.50	0.48	0.47	0.46	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.37	0.36	0.36	0.35
2.0	49.17	0.58	0.55	0.52	0.52	0.51	0.50	0.49	0.48	0.47	0.45	0.45	0.44	0.43	0.42	0.41	0.41	0.40	0.40	0.39	0.39
2.1	51.63	0.63	0.60	0.57	0.56	0.55	0.54	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.45	0.44	0.43	0.43	0.42
2.2	54.09	0.68	0.65	0.62	0.61	0.60	0.59	0.58	0.57	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.48	0.47	0.47	0.46
2.3	56.55	0.74	0.71	0.67	0.66	0.65	0.64	0.63	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.52	0.51	0.50	0.50
2.4	59.01	0.79	0.76	0.73	0.71	0.70	0.69	0.68	0.66	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.57	0.56	0.55	0.54	0.54
2.5	61.47	0.85	0.82	0.78	0.77	0.75	0.74	0.73	0.71	0.69	0.68	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.59	0.58
2.6	63.93	0.92	0.88	0.84	0.82	0.81	0.80	0.78	0.76	0.74	0.73	0.71	0.70	0.69	0.67	0.66	0.65	0.65	0.64	0.63	0.62
2.7	66.38	0.98	0.94	0.89	0.88	0.86	0.85	0.84	0.82	0.80	0.78	0.76	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.67
2.8	68.84	1.04	1.00	0.95	0.94	0.92	0.91	0.90	0.87	0.85	0.83	0.81	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71
2.9	71.30	1.11	1.07	1.02	1.00	0.98	0.97	0.95	0.93	0.91	0.88	0.87	0.85	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76
3.0	73.76	1.18	1.13	1.08	1.06	1.04	1.03	1.01	0.99	0.96	0.94	0.92	0.90	0.89	0.87	0.86	0.85	0.84	0.82	0.82	0.81
3.1	76.22	1.25	1.20	1.14	1.12	1.11	1.09	1.07	1.05	1.02	1.00	0.98	0.96	0.94	0.93	0.91	0.90	0.89	0.88	0.86	0.86
3.2	78.68	1.32	1.27	1.21	1.19	1.17	1.15	1.14	1.11	1.08	1.06	1.03	1.01	1.00	0.98	0.97	0.95	0.94	0.93	0.92	0.91
3.3	81.14	1.40	1.34	1.28	1.26	1.24	1.22	1.20	1.17	1.14	1.12	1.09	1.07	1.05	1.04	1.02	1.01	0.99	0.98	0.97	0.96
3.4	83.60	1.47	1.41	1.35	1.33	1.30	1.29	1.27	1.23	1.20	1.18	1.15	1.13	1.11	1.09	1.08	1.06	1.05	1.03	1.02	1.01
3.5	86.05	1.55	1.49	1.42	1.40	1.37	1.35	1.33	1.30	1.27	1.24	1.22	1.19	1.17	1.15	1.14	1.12	1.10	1.09	1.08	1.07
3.6	88.51	1.63	1.57	1.49	1.47	1.44	1.42	1.40	1.37	1.33	1.30	1.28	1.25	1.23	1.21	1.19	1.18	1.16	1.15	1.13	1.12
3.7	90.97	1.71	1.64	1.57	1.54	1.52	1.50	1.47	1.44	1.40	1.37	1.34	1.32	1.30	1.27	1.26	1.24	1.22	1.21	1.19	1.18
3.8	93.43	1.79	1.72	1.64	1.62	1.59	1.57	1.55	1.51	1.47	1.44	1.41	1.38	1.36	1.34	1.32	1.30	1.28	1.27	1.25	1.24
3.9	95.89	1.88	1.80	1.72	1.69	1.67	1.64	1.62	1.58	1.54	1.51	1.48	1.45	1.42	1.40	1.38	1.36	1.34	1.33	1.31	1.30
4.0	98.35	1.96	1.89	1.80	1.77	1.74	1.72	1.69	1.65	1.61	1.58	1.55	1.52	1.49	1.47	1.45	1.42	1.41	1.39	1.37	1.36
4.1	100.81	2.05	1.97	1.88	1.85	1.82	1.80	1.77	1.73	1.69	1.65	1.62	1.59	1.56	1.53	1.51	1.49	1.47	1.45	1.44	1.42
4.2	103.27	2.14	2.06	1.97	1.94	1.90	1.88	1.85	1.80	1.76	1.72	1.69	1.66	1.63	1.60	1.58	1.56	1.54	1.52	1.50	1.48
4.3	105.72	2.23	2.15	2.05	2.02	1.99	1.96	1.93	1.88	1.84	1.80	1.76	1.73	1.70	1.67	1.65	1.62	1.60	1.58	1.57	1.55
4.4	108.18	2.33	2.24	2.14	2.10	2.07	2.04	2.01	1.96	1.91	1.87	1.84	1.80	1.77	1.74	1.72	1.69	1.67	1.65	1.63	1.61
4.5	110.64	2.42	2.33	2.22	2.19	2.15	2.12	2.09	2.04	1.99	1.95	1.91	1.88	1.84	1.82	1.79	1.76	1.74	1.72	1.70	1.68
4.6	113.10	2.52	2.42	2.31	2.28	2.24	2.21	2.18	2.12	2.07	2.03	1.99	1.95	1.92	1.89	1.86	1.84	1.81	1.79	1.77	1.75
4.7	115.56	2.62	2.52	2.40	2.37	2.33	2.30	2.26	2.21	2.15	2.11	2.07	2.03	2.00	1.96	1.94	1.91	1.88	1.86	1.84	1.82

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 100% Water — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	118.02	2.72	2.61	2.50	2.46	2.42	2.39	2.35	2.29	2.24	2.19	2.15	2.11	2.07	2.04	2.01	1.98	1.96	1.93	1.91	1.89
4.9	120.48	2.82	2.71	2.59	2.55	2.51	2.48	2.44	2.38	2.32	2.27	2.23	2.19	2.15	2.12	2.09	2.06	2.03	2.01	1.98	1.96
5.0	122.94	2.92	2.81	2.69	2.64	2.60	2.57	2.53	2.47	2.41	2.36	2.31	2.27	2.23	2.20	2.16	2.14	2.11	2.08	2.06	2.04
5.1	125.39	3.03	2.91	2.78	2.74	2.70	2.66	2.62	2.56	2.50	2.44	2.40	2.35	2.31	2.28	2.24	2.21	2.18	2.16	2.13	2.11
5.2	127.85	3.13	3.02	2.88	2.84	2.79	2.75	2.71	2.65	2.59	2.53	2.48	2.44	2.40	2.36	2.32	2.29	2.26	2.24	2.21	2.19
5.3	130.31	3.24	3.12	2.98	2.94	2.89	2.85	2.81	2.74	2.68	2.62	2.57	2.52	2.48	2.44	2.41	2.37	2.34	2.32	2.29	2.26
5.4	132.77	3.35	3.23	3.08	3.04	2.99	2.95	2.91	2.83	2.77	2.71	2.66	2.61	2.57	2.53	2.49	2.46	2.42	2.40	2.37	2.34
5.5	135.23	3.46	3.33	3.19	3.14	3.09	3.05	3.00	2.93	2.86	2.80	2.75	2.70	2.65	2.61	2.57	2.54	2.51	2.48	2.45	2.42
5.6	137.69	3.58	3.44	3.29	3.24	3.19	3.15	3.10	3.02	2.96	2.89	2.84	2.79	2.74	2.70	2.66	2.62	2.59	2.56	2.53	2.50
5.7	140.15	3.69	3.55	3.40	3.35	3.29	3.25	3.20	3.12	3.05	2.99	2.93	2.88	2.83	2.79	2.75	2.71	2.67	2.64	2.61	2.59
5.8	142.60	3.81	3.67	3.50	3.45	3.40	3.35	3.30	3.22	3.15	3.08	3.02	2.97	2.92	2.88	2.83	2.80	2.76	2.73	2.70	2.67
5.9	145.06	3.93	3.78	3.61	3.56	3.50	3.46	3.41	3.32	3.25	3.18	3.12	3.06	3.01	2.97	2.92	2.88	2.85	2.81	2.78	2.75
6.0	147.52	4.05	3.90	3.72	3.67	3.61	3.56	3.51	3.42	3.35	3.28	3.21	3.16	3.11	3.06	3.01	2.97	2.94	2.90	2.87	2.84
6.1	149.98	4.17	4.01	3.84	3.78	3.72	3.67	3.62	3.53	3.45	3.38	3.31	3.25	3.20	3.15	3.11	3.06	3.03	2.99	2.96	2.93
6.2	152.44	4.29	4.13	3.95	3.89	3.83	3.78	3.73	3.63	3.55	3.48	3.41	3.35	3.30	3.25	3.20	3.16	3.12	3.08	3.05	3.01
6.3	154.90	4.42	4.25	4.06	4.00	3.94	3.89	3.83	3.74	3.66	3.58	3.51	3.45	3.39	3.34	3.29	3.25	3.21	3.17	3.14	3.10
6.4	157.36	4.54	4.37	4.18	4.12	4.06	4.00	3.95	3.85	3.76	3.68	3.61	3.55	3.49	3.44	3.39	3.34	3.30	3.26	3.23	3.19
6.5	159.82	4.67	4.50	4.30	4.24	4.17	4.11	4.06	3.96	3.87	3.79	3.72	3.65	3.59	3.54	3.49	3.44	3.40	3.36	3.32	3.29
6.6	162.27	4.80	4.62	4.42	4.35	4.29	4.23	4.17	4.07	3.98	3.89	3.82	3.75	3.69	3.64	3.58	3.54	3.49	3.45	3.41	3.38
6.7	164.73	4.93	4.75	4.54	4.47	4.40	4.35	4.28	4.18	4.09	4.00	3.93	3.86	3.79	3.74	3.68	3.64	3.59	3.55	3.51	3.47
6.8	167.19	5.06	4.88	4.66	4.59	4.52	4.46	4.40	4.29	4.20	4.11	4.03	3.96	3.90	3.84	3.78	3.73	3.69	3.65	3.61	3.57
6.9	169.65	5.20	5.01	4.79	4.72	4.64	4.58	4.52	4.41	4.31	4.22	4.14	4.07	4.00	3.94	3.89	3.84	3.79	3.74	3.70	3.66
7.0	172.11	5.33	5.14	4.91	4.84	4.77	4.70	4.64	4.52	4.42	4.33	4.25	4.18	4.11	4.05	3.99	3.94	3.89	3.84	3.80	3.76
7.1	174.57	5.47	5.27	5.04	4.97	4.89	4.82	4.76	4.64	4.54	4.44	4.36	4.29	4.22	4.15	4.09	4.04	3.99	3.94	3.90	3.86
7.2	177.03	5.61	5.40	5.17	5.09	5.01	4.95	4.88	4.76	4.65	4.56	4.47	4.40	4.32	4.26	4.20	4.14	4.09	4.05	4.00	3.96
7.3	179.49	5.75	5.54	5.30	5.22	5.14	5.07	5.00	4.88	4.77	4.67	4.59	4.51	4.43	4.37	4.31	4.25	4.20	4.15	4.10	4.06
7.4	181.94	5.89	5.67	5.43	5.35	5.27	5.20	5.13	5.00	4.89	4.79	4.70	4.62	4.55	4.48	4.41	4.36	4.30	4.25	4.21	4.16
7.5	184.40	6.03	5.81	5.56	5.48	5.40	5.33	5.25	5.12	5.01	4.91	4.82	4.73	4.66	4.59	4.52	4.46	4.41	4.36	4.31	4.27
7.6	186.86	6.18	5.95	5.70	5.61	5.53	5.45	5.38	5.25	5.13	5.03	4.93	4.85	4.77	4.70	4.63	4.57	4.52	4.47	4.42	4.37
7.7	189.32	6.32	6.09	5.83	5.75	5.66	5.59	5.51	5.37	5.26	5.15	5.05	4.97	4.89	4.81	4.75	4.68	4.63	4.57	4.52	4.48
7.8	191.78	6.47	6.24	5.97	5.88	5.79	5.72	5.64	5.50	5.38	5.27	5.17	5.08	5.00	4.93	4.86	4.80	4.74	4.68	4.63	4.58
7.9	194.24	6.62	6.38	6.11	6.02	5.93	5.85	5.77	5.63	5.51	5.39	5.29	5.20	5.12	5.04	4.97	4.91	4.85	4.79	4.74	4.69
8.0	196.70	6.77	6.53	6.25	6.16	6.06	5.98	5.90	5.76	5.63	5.52	5.42	5.32	5.24	5.16	5.09	5.02	4.96	4.90	4.85	4.80

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	36.88	0.46	0.44	0.43	0.42	0.40	0.39	0.38	0.36	0.35	0.34	0.32	0.31	0.30	0.30	0.29	0.28	0.28	0.27	0.27	0.26
1.6	39.34	0.51	0.50	0.48	0.47	0.45	0.44	0.43	0.41	0.39	0.38	0.36	0.35	0.34	0.33	0.33	0.32	0.31	0.31	0.30	0.30
1.7	41.80	0.57	0.55	0.53	0.52	0.50	0.49	0.48	0.45	0.44	0.42	0.40	0.39	0.38	0.37	0.36	0.35	0.35	0.34	0.33	0.33
1.8	44.26	0.63	0.61	0.59	0.57	0.55	0.54	0.53	0.50	0.48	0.46	0.45	0.43	0.42	0.41	0.40	0.39	0.38	0.38	0.37	0.36
1.9	46.72	0.69	0.67	0.64	0.63	0.61	0.59	0.58	0.55	0.53	0.51	0.49	0.48	0.46	0.45	0.44	0.43	0.42	0.41	0.41	0.40
2.0	49.17	0.75	0.73	0.70	0.69	0.67	0.65	0.63	0.60	0.58	0.56	0.54	0.52	0.51	0.49	0.48	0.47	0.46	0.45	0.45	0.44
2.1	51.63	0.82	0.79	0.77	0.75	0.73	0.71	0.69	0.66	0.63	0.61	0.59	0.57	0.55	0.54	0.53	0.52	0.50	0.50	0.49	0.48
2.2	54.09	0.89	0.86	0.83	0.81	0.79	0.77	0.75	0.71	0.68	0.66	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.54	0.53	0.52
2.3	56.55	0.96	0.93	0.90	0.88	0.85	0.83	0.81	0.77	0.74	0.71	0.69	0.67	0.65	0.63	0.62	0.61	0.59	0.58	0.57	0.57
2.4	59.01	1.03	1.00	0.97	0.94	0.92	0.89	0.87	0.83	0.80	0.77	0.74	0.72	0.70	0.68	0.67	0.65	0.64	0.63	0.62	0.61
2.5	61.47	1.11	1.07	1.04	1.01	0.98	0.96	0.94	0.89	0.86	0.83	0.80	0.78	0.75	0.74	0.72	0.70	0.69	0.68	0.67	0.66
2.6	63.93	1.18	1.15	1.11	1.08	1.05	1.03	1.00	0.96	0.92	0.89	0.86	0.83	0.81	0.79	0.77	0.75	0.74	0.73	0.71	0.70
2.7	66.38	1.26	1.23	1.19	1.16	1.13	1.10	1.07	1.02	0.98	0.95	0.92	0.89	0.87	0.84	0.83	0.81	0.79	0.78	0.76	0.75
2.8	68.84	1.35	1.31	1.27	1.24	1.20	1.17	1.14	1.09	1.05	1.01	0.98	0.95	0.92	0.90	0.88	0.86	0.84	0.83	0.82	0.81
2.9	71.30	1.43	1.39	1.35	1.31	1.28	1.25	1.21	1.16	1.12	1.08	1.04	1.01	0.98	0.96	0.94	0.92	0.90	0.88	0.87	0.86
3.0	73.76	1.52	1.48	1.43	1.39	1.35	1.32	1.29	1.23	1.18	1.14	1.11	1.07	1.04	1.02	1.00	0.98	0.96	0.94	0.92	0.91
3.1	76.22	1.61	1.56	1.51	1.48	1.44	1.40	1.37	1.31	1.26	1.21	1.17	1.14	1.11	1.08	1.06	1.03	1.01	1.00	0.98	0.97
3.2	78.68	1.70	1.65	1.60	1.56	1.52	1.48	1.44	1.38	1.33	1.28	1.24	1.20	1.17	1.14	1.12	1.09	1.07	1.05	1.04	1.02
3.3	81.14	1.79	1.74	1.69	1.65	1.60	1.56	1.52	1.46	1.40	1.35	1.31	1.27	1.24	1.21	1.18	1.16	1.13	1.11	1.10	1.08
3.4	83.60	1.89	1.84	1.78	1.74	1.69	1.65	1.61	1.54	1.48	1.43	1.38	1.34	1.31	1.27	1.25	1.22	1.20	1.18	1.16	1.14
3.5	86.05	1.99	1.93	1.87	1.83	1.78	1.74	1.69	1.62	1.56	1.50	1.45	1.41	1.38	1.34	1.31	1.29	1.26	1.24	1.22	1.20
3.6	88.51	2.09	2.03	1.97	1.92	1.87	1.82	1.78	1.70	1.64	1.58	1.53	1.49	1.45	1.41	1.38	1.35	1.33	1.30	1.28	1.27
3.7	90.97	2.19	2.13	2.07	2.01	1.96	1.91	1.87	1.79	1.72	1.66	1.61	1.56	1.52	1.48	1.45	1.42	1.39	1.37	1.35	1.33
3.8	93.43	2.30	2.23	2.16	2.11	2.05	2.01	1.96	1.87	1.80	1.74	1.68	1.64	1.59	1.55	1.52	1.49	1.46	1.44	1.41	1.39
3.9	95.89	2.40	2.34	2.27	2.21	2.15	2.10	2.05	1.96	1.89	1.82	1.76	1.71	1.67	1.63	1.59	1.56	1.53	1.51	1.48	1.46
4.0	98.35	2.51	2.44	2.37	2.31	2.25	2.20	2.14	2.05	1.97	1.91	1.84	1.79	1.75	1.70	1.67	1.63	1.60	1.58	1.55	1.53
4.1	100.81	2.62	2.55	2.47	2.41	2.35	2.29	2.24	2.14	2.06	1.99	1.93	1.87	1.82	1.78	1.74	1.71	1.68	1.65	1.62	1.60
4.2	103.27	2.74	2.66	2.58	2.52	2.45	2.39	2.34	2.24	2.15	2.08	2.01	1.96	1.91	1.86	1.82	1.78	1.75	1.72	1.69	1.67
4.3	105.72	2.85	2.77	2.69	2.62	2.55	2.50	2.43	2.33	2.24	2.17	2.10	2.04	1.99	1.94	1.90	1.86	1.82	1.79	1.77	1.74
4.4	108.18	2.97	2.89	2.80	2.73	2.66	2.60	2.54	2.43	2.34	2.26	2.19	2.13	2.07	2.02	1.98	1.94	1.90	1.87	1.84	1.82
4.5	110.64	3.09	3.00	2.91	2.84	2.77	2.71	2.64	2.53	2.43	2.35	2.28	2.21	2.16	2.10	2.06	2.02	1.98	1.95	1.92	1.89
4.6	113.10	3.21	3.12	3.03	2.96	2.88	2.81	2.74	2.63	2.53	2.44	2.37	2.30	2.24	2.19	2.14	2.10	2.06	2.03	1.99	1.97
4.7	115.56	3.33	3.24	3.15	3.07	2.99	2.92	2.85	2.73	2.63	2.54	2.46	2.39	2.33	2.27	2.23	2.18	2.14	2.11	2.07	2.05

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 30% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	118.02	3.46	3.37	3.27	3.19	3.10	3.03	2.96	2.84	2.73	2.64	2.56	2.48	2.42	2.36	2.31	2.27	2.22	2.19	2.15	2.13
4.9	120.48	3.59	3.49	3.39	3.30	3.22	3.15	3.07	2.94	2.83	2.74	2.65	2.58	2.51	2.45	2.40	2.35	2.31	2.27	2.23	2.21
5.0	122.94	3.72	3.62	3.51	3.42	3.33	3.26	3.18	3.05	2.94	2.84	2.75	2.67	2.60	2.54	2.49	2.44	2.39	2.36	2.32	2.29
5.1	125.39	3.85	3.74	3.63	3.55	3.45	3.38	3.29	3.16	3.04	2.94	2.85	2.77	2.70	2.63	2.58	2.53	2.48	2.44	2.40	2.37
5.2	127.85	3.98	3.88	3.76	3.67	3.57	3.50	3.41	3.27	3.15	3.04	2.95	2.87	2.79	2.73	2.67	2.62	2.57	2.53	2.49	2.46
5.3	130.31	4.12	4.01	3.89	3.80	3.70	3.62	3.53	3.38	3.26	3.15	3.05	2.97	2.89	2.82	2.77	2.71	2.66	2.62	2.57	2.54
5.4	132.77	4.25	4.14	4.02	3.92	3.82	3.74	3.65	3.50	3.37	3.26	3.15	3.07	2.99	2.92	2.86	2.80	2.75	2.71	2.66	2.63
5.5	135.23	4.39	4.28	4.15	4.05	3.95	3.86	3.77	3.61	3.48	3.36	3.26	3.17	3.09	3.02	2.96	2.90	2.84	2.80	2.75	2.72
5.6	137.69	4.54	4.42	4.29	4.18	4.08	3.99	3.89	3.73	3.59	3.47	3.37	3.28	3.19	3.12	3.05	2.99	2.94	2.89	2.84	2.81
5.7	140.15	4.68	4.56	4.42	4.32	4.21	4.11	4.01	3.85	3.71	3.59	3.48	3.38	3.30	3.22	3.15	3.09	3.03	2.99	2.94	2.90
5.8	142.60	4.82	4.70	4.56	4.45	4.34	4.24	4.14	3.97	3.83	3.70	3.59	3.49	3.40	3.32	3.25	3.19	3.13	3.08	3.03	2.99
5.9	145.06	4.97	4.84	4.70	4.59	4.47	4.37	4.27	4.10	3.95	3.81	3.70	3.60	3.51	3.42	3.36	3.29	3.23	3.18	3.13	3.09
6.0	147.52	5.12	4.99	4.84	4.73	4.61	4.51	4.40	4.22	4.07	3.93	3.81	3.71	3.61	3.53	3.46	3.39	3.33	3.28	3.22	3.18
6.1	149.98	5.27	5.14	4.99	4.87	4.74	4.64	4.53	4.35	4.19	4.05	3.93	3.82	3.72	3.64	3.56	3.49	3.43	3.37	3.32	3.28
6.2	152.44	5.43	5.28	5.13	5.01	4.88	4.78	4.66	4.47	4.31	4.17	4.04	3.93	3.83	3.74	3.67	3.60	3.53	3.48	3.42	3.38
6.3	154.90	5.58	5.44	5.28	5.16	5.02	4.91	4.80	4.60	4.44	4.29	4.16	4.05	3.95	3.85	3.78	3.70	3.63	3.58	3.52	3.48
6.4	157.36	5.74	5.59	5.43	5.30	5.16	5.05	4.93	4.74	4.56	4.41	4.28	4.16	4.06	3.96	3.89	3.81	3.74	3.68	3.62	3.58
6.5	159.82	5.90	5.74	5.58	5.45	5.31	5.19	5.07	4.87	4.69	4.54	4.40	4.28	4.17	4.08	4.00	3.92	3.85	3.79	3.73	3.68
6.6	162.27	6.06	5.90	5.73	5.60	5.45	5.34	5.21	5.00	4.82	4.66	4.52	4.40	4.29	4.19	4.11	4.03	3.95	3.89	3.83	3.78
6.7	164.73	6.22	6.06	5.89	5.75	5.60	5.48	5.35	5.14	4.95	4.79	4.64	4.52	4.41	4.30	4.22	4.14	4.06	4.00	3.94	3.89
6.8	167.19	6.39	6.22	6.04	5.90	5.75	5.63	5.50	5.28	5.09	4.92	4.77	4.64	4.53	4.42	4.34	4.25	4.17	4.11	4.04	3.99
6.9	169.65	6.55	6.38	6.20	6.06	5.90	5.78	5.64	5.42	5.22	5.05	4.90	4.77	4.65	4.54	4.45	4.37	4.29	4.22	4.15	4.10
7.0	172.11	6.72	6.55	6.36	6.21	6.06	5.93	5.79	5.56	5.36	5.18	5.03	4.89	4.77	4.66	4.57	4.48	4.40	4.33	4.26	4.21
7.1	174.57	6.89	6.72	6.52	6.37	6.21	6.08	5.93	5.70	5.49	5.31	5.15	5.02	4.89	4.78	4.69	4.60	4.51	4.44	4.37	4.32
7.2	177.03	7.07	6.88	6.69	6.53	6.37	6.23	6.08	5.84	5.63	5.45	5.29	5.15	5.02	4.90	4.81	4.71	4.63	4.56	4.48	4.43
7.3	179.49	7.24	7.05	6.85	6.70	6.52	6.39	6.24	5.99	5.77	5.59	5.42	5.27	5.14	5.03	4.93	4.83	4.75	4.67	4.60	4.54
7.4	181.94	7.42	7.23	7.02	6.86	6.68	6.54	6.39	6.14	5.92	5.72	5.55	5.41	5.27	5.15	5.05	4.95	4.86	4.79	4.71	4.66
7.5	184.40	7.59	7.40	7.19	7.02	6.85	6.70	6.54	6.29	6.06	5.86	5.69	5.54	5.40	5.28	5.18	5.08	4.98	4.91	4.83	4.77
7.6	186.86	7.77	7.58	7.36	7.19	7.01	6.86	6.70	6.44	6.21	6.00	5.83	5.67	5.53	5.40	5.30	5.20	5.10	5.02	4.95	4.89
7.7	189.32	7.96	7.75	7.53	7.36	7.17	7.02	6.86	6.59	6.35	6.15	5.96	5.81	5.66	5.53	5.43	5.32	5.23	5.15	5.06	5.01
7.8	191.78	8.14	7.93	7.71	7.53	7.34	7.19	7.02	6.74	6.50	6.29	6.10	5.94	5.80	5.66	5.56	5.45	5.35	5.27	5.19	5.12
7.9	194.24	8.32	8.11	7.88	7.70	7.51	7.35	7.18	6.90	6.65	6.44	6.25	6.08	5.93	5.80	5.69	5.58	5.48	5.39	5.31	5.24
8.0	196.70	8.51	8.30	8.06	7.88	7.68	7.52	7.34	7.06	6.80	6.58	6.39	6.22	6.07	5.93	5.82	5.70	5.60	5.51	5.43	5.37

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	36.88	0.53	0.51	0.49	0.47	0.45	0.44	0.42	0.40	0.38	0.36	0.35	0.34	0.32	0.31	0.31	0.30	0.29	0.29	0.28	0.28
1.6	39.34	0.59	0.57	0.54	0.52	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.38	0.36	0.35	0.34	0.34	0.33	0.32	0.31	0.31
1.7	41.80	0.65	0.63	0.60	0.58	0.56	0.54	0.53	0.50	0.47	0.45	0.43	0.42	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34
1.8	44.26	0.72	0.69	0.66	0.64	0.62	0.60	0.58	0.55	0.52	0.50	0.48	0.46	0.45	0.43	0.42	0.41	0.40	0.40	0.39	0.38
1.9	46.72	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.60	0.57	0.55	0.53	0.51	0.49	0.48	0.47	0.45	0.44	0.44	0.43	0.42
2.0	49.17	0.86	0.83	0.80	0.77	0.74	0.72	0.70	0.66	0.63	0.60	0.58	0.56	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46
2.1	51.63	0.94	0.90	0.87	0.84	0.81	0.79	0.76	0.72	0.69	0.66	0.63	0.61	0.59	0.57	0.56	0.54	0.53	0.52	0.51	0.50
2.2	54.09	1.02	0.98	0.94	0.91	0.88	0.85	0.82	0.78	0.74	0.71	0.68	0.66	0.64	0.62	0.60	0.59	0.58	0.57	0.55	0.55
2.3	56.55	1.10	1.06	1.01	0.98	0.95	0.92	0.89	0.84	0.80	0.77	0.74	0.71	0.69	0.67	0.65	0.64	0.62	0.61	0.60	0.59
2.4	59.01	1.18	1.14	1.09	1.06	1.02	0.99	0.96	0.91	0.87	0.83	0.80	0.77	0.75	0.72	0.70	0.69	0.67	0.66	0.65	0.64
2.5	61.47	1.27	1.22	1.17	1.14	1.10	1.06	1.03	0.98	0.93	0.89	0.86	0.83	0.80	0.78	0.76	0.74	0.72	0.71	0.70	0.69
2.6	63.93	1.36	1.31	1.25	1.22	1.17	1.14	1.10	1.05	1.00	0.96	0.92	0.89	0.86	0.83	0.81	0.79	0.78	0.76	0.75	0.73
2.7	66.38	1.45	1.40	1.34	1.30	1.25	1.22	1.18	1.12	1.07	1.02	0.98	0.95	0.92	0.89	0.87	0.85	0.83	0.82	0.80	0.79
2.8	68.84	1.54	1.49	1.43	1.38	1.33	1.30	1.26	1.19	1.14	1.09	1.05	1.01	0.98	0.95	0.93	0.91	0.89	0.87	0.85	0.84
2.9	71.30	1.64	1.58	1.52	1.47	1.42	1.38	1.34	1.27	1.21	1.16	1.11	1.08	1.04	1.01	0.99	0.97	0.94	0.93	0.91	0.89
3.0	73.76	1.74	1.67	1.61	1.56	1.50	1.46	1.42	1.34	1.28	1.23	1.18	1.14	1.11	1.08	1.05	1.03	1.00	0.98	0.96	0.95
3.1	76.22	1.84	1.77	1.70	1.65	1.59	1.55	1.50	1.42	1.36	1.30	1.25	1.21	1.17	1.14	1.11	1.09	1.06	1.04	1.02	1.01
3.2	78.68	1.94	1.87	1.80	1.74	1.68	1.64	1.59	1.51	1.44	1.38	1.33	1.28	1.24	1.21	1.18	1.15	1.12	1.10	1.08	1.07
3.3	81.14	2.05	1.98	1.90	1.84	1.78	1.73	1.68	1.59	1.52	1.46	1.40	1.35	1.31	1.27	1.24	1.22	1.19	1.17	1.14	1.13
3.4	83.60	2.15	2.08	2.00	1.94	1.87	1.82	1.77	1.68	1.60	1.53	1.48	1.43	1.38	1.34	1.31	1.28	1.25	1.23	1.21	1.19
3.5	86.05	2.27	2.19	2.10	2.04	1.97	1.92	1.86	1.76	1.68	1.61	1.56	1.50	1.46	1.42	1.38	1.35	1.32	1.30	1.27	1.25
3.6	88.51	2.38	2.30	2.21	2.14	2.07	2.01	1.95	1.85	1.77	1.70	1.64	1.58	1.53	1.49	1.45	1.42	1.39	1.36	1.34	1.32
3.7	90.97	2.49	2.41	2.32	2.25	2.17	2.11	2.05	1.95	1.86	1.78	1.72	1.66	1.61	1.56	1.52	1.49	1.46	1.43	1.40	1.38
3.8	93.43	2.61	2.52	2.43	2.35	2.27	2.21	2.15	2.04	1.95	1.87	1.80	1.74	1.69	1.64	1.60	1.56	1.53	1.50	1.47	1.45
3.9	95.89	2.73	2.64	2.54	2.46	2.38	2.32	2.25	2.13	2.04	1.96	1.89	1.82	1.77	1.72	1.68	1.64	1.60	1.58	1.54	1.52
4.0	98.35	2.86	2.76	2.65	2.57	2.49	2.42	2.35	2.23	2.13	2.05	1.97	1.91	1.85	1.80	1.75	1.72	1.68	1.65	1.62	1.59
4.1	100.81	2.98	2.88	2.77	2.69	2.60	2.53	2.45	2.33	2.23	2.14	2.06	1.99	1.93	1.88	1.83	1.79	1.75	1.72	1.69	1.66
4.2	103.27	3.11	3.00	2.89	2.80	2.71	2.64	2.56	2.43	2.32	2.23	2.15	2.08	2.02	1.96	1.91	1.87	1.83	1.80	1.76	1.74
4.3	105.72	3.24	3.13	3.01	2.92	2.83	2.75	2.67	2.54	2.42	2.33	2.24	2.17	2.10	2.05	2.00	1.95	1.91	1.88	1.84	1.81
4.4	108.18	3.37	3.26	3.14	3.04	2.94	2.86	2.78	2.64	2.52	2.42	2.34	2.26	2.19	2.13	2.08	2.03	1.99	1.96	1.92	1.89
4.5	110.64	3.51	3.39	3.26	3.16	3.06	2.98	2.89	2.75	2.63	2.52	2.43	2.35	2.28	2.22	2.16	2.12	2.07	2.04	2.00	1.97
4.6	113.10	3.64	3.52	3.39	3.29	3.18	3.10	3.01	2.86	2.73	2.62	2.53	2.44	2.37	2.31	2.25	2.20	2.16	2.12	2.08	2.05
4.7	115.56	3.78	3.66	3.52	3.42	3.30	3.22	3.12	2.97	2.84	2.72	2.63	2.54	2.47	2.40	2.34	2.29	2.24	2.20	2.16	2.13

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Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.

4" Uponor PEX-a — 40% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
4.8	118.02	3.92	3.79	3.65	3.54	3.43	3.34	3.24	3.08	2.94	2.83	2.73	2.64	2.56	2.49	2.43	2.38	2.33	2.29	2.24	2.21
4.9	120.48	4.07	3.93	3.79	3.67	3.55	3.46	3.36	3.19	3.05	2.93	2.83	2.74	2.66	2.58	2.52	2.47	2.41	2.37	2.33	2.30
5.0	122.94	4.21	4.07	3.92	3.81	3.68	3.59	3.48	3.31	3.17	3.04	2.93	2.84	2.75	2.68	2.62	2.56	2.50	2.46	2.41	2.38
5.1	125.39	4.36	4.22	4.06	3.94	3.81	3.71	3.61	3.43	3.28	3.15	3.04	2.94	2.85	2.78	2.71	2.65	2.59	2.55	2.50	2.47
5.2	127.85	4.51	4.36	4.20	4.08	3.95	3.84	3.73	3.55	3.39	3.26	3.15	3.04	2.95	2.87	2.81	2.75	2.69	2.64	2.59	2.55
5.3	130.31	4.66	4.51	4.34	4.22	4.08	3.97	3.86	3.67	3.51	3.37	3.25	3.15	3.06	2.97	2.90	2.84	2.78	2.73	2.68	2.64
5.4	132.77	4.82	4.66	4.49	4.36	4.22	4.11	3.99	3.79	3.63	3.49	3.37	3.26	3.16	3.08	3.00	2.94	2.88	2.83	2.77	2.73
5.5	135.23	4.97	4.81	4.63	4.50	4.35	4.24	4.12	3.92	3.75	3.60	3.48	3.36	3.27	3.18	3.10	3.04	2.97	2.92	2.87	2.83
5.6	137.69	5.13	4.97	4.78	4.65	4.50	4.38	4.25	4.05	3.87	3.72	3.59	3.47	3.37	3.28	3.21	3.14	3.07	3.02	2.96	2.92
5.7	140.15	5.29	5.12	4.93	4.79	4.64	4.52	4.39	4.18	4.00	3.84	3.71	3.59	3.48	3.39	3.31	3.24	3.17	3.12	3.06	3.02
5.8	142.60	5.46	5.28	5.09	4.94	4.78	4.66	4.53	4.31	4.12	3.96	3.82	3.70	3.59	3.50	3.41	3.34	3.27	3.22	3.16	3.11
5.9	145.06	5.62	5.44	5.24	5.09	4.93	4.80	4.66	4.44	4.25	4.08	3.94	3.81	3.70	3.61	3.52	3.45	3.37	3.32	3.26	3.21
6.0	147.52	5.79	5.60	5.40	5.24	5.08	4.95	4.80	4.57	4.38	4.21	4.06	3.93	3.82	3.72	3.63	3.55	3.48	3.42	3.36	3.31
6.1	149.98	5.96	5.77	5.56	5.40	5.23	5.09	4.95	4.71	4.51	4.33	4.18	4.05	3.93	3.83	3.74	3.66	3.58	3.52	3.46	3.41
6.2	152.44	6.13	5.94	5.72	5.56	5.38	5.24	5.09	4.85	4.64	4.46	4.31	4.17	4.05	3.94	3.85	3.77	3.69	3.63	3.56	3.51
6.3	154.90	6.31	6.11	5.88	5.72	5.53	5.39	5.24	4.99	4.77	4.59	4.43	4.29	4.17	4.06	3.96	3.88	3.80	3.73	3.66	3.61
6.4	157.36	6.48	6.28	6.05	5.88	5.69	5.54	5.39	5.13	4.91	4.72	4.56	4.41	4.29	4.17	4.08	3.99	3.91	3.84	3.77	3.72
6.5	159.82	6.66	6.45	6.22	6.04	5.85	5.70	5.54	5.27	5.05	4.85	4.69	4.54	4.41	4.29	4.19	4.10	4.02	3.95	3.88	3.82
6.6	162.27	6.84	6.62	6.38	6.20	6.01	5.85	5.69	5.42	5.19	4.99	4.82	4.66	4.53	4.41	4.31	4.22	4.13	4.06	3.99	3.93
6.7	164.73	7.03	6.80	6.56	6.37	6.17	6.01	5.84	5.56	5.33	5.12	4.95	4.79	4.65	4.53	4.43	4.33	4.24	4.17	4.10	4.04
6.8	167.19	7.21	6.98	6.73	6.54	6.33	6.17	6.00	5.71	5.47	5.26	5.08	4.92	4.78	4.65	4.55	4.45	4.36	4.29	4.21	4.15
6.9	169.65	7.40	7.16	6.90	6.71	6.50	6.33	6.15	5.86	5.61	5.40	5.21	5.05	4.91	4.78	4.67	4.57	4.47	4.40	4.32	4.26
7.0	172.11	7.59	7.35	7.08	6.88	6.66	6.50	6.31	6.01	5.76	5.54	5.35	5.18	5.03	4.90	4.79	4.69	4.59	4.52	4.43	4.37
7.1	174.57	7.78	7.53	7.26	7.06	6.83	6.66	6.47	6.17	5.91	5.68	5.49	5.31	5.16	5.03	4.91	4.81	4.71	4.63	4.55	4.49
7.2	177.03	7.97	7.72	7.44	7.23	7.00	6.83	6.64	6.32	6.06	5.83	5.63	5.45	5.30	5.16	5.04	4.93	4.83	4.75	4.67	4.60
7.3	179.49	8.17	7.91	7.62	7.41	7.18	7.00	6.80	6.48	6.21	5.97	5.77	5.59	5.43	5.29	5.16	5.06	4.95	4.87	4.78	4.72
7.4	181.94	8.36	8.10	7.81	7.59	7.35	7.17	6.97	6.64	6.36	6.12	5.91	5.72	5.56	5.42	5.29	5.18	5.08	4.99	4.90	4.84
7.5	184.40	8.56	8.29	8.00	7.77	7.53	7.34	7.14	6.80	6.51	6.27	6.05	5.86	5.70	5.55	5.42	5.31	5.20	5.12	5.02	4.95
7.6	186.86	8.76	8.49	8.19	7.96	7.71	7.51	7.30	6.96	6.67	6.42	6.20	6.00	5.84	5.68	5.55	5.44	5.33	5.24	5.15	5.07
7.7	189.32	8.97	8.69	8.38	8.14	7.89	7.69	7.48	7.13	6.83	6.57	6.35	6.15	5.97	5.82	5.69	5.57	5.45	5.37	5.27	5.20
7.8	191.78	9.17	8.89	8.57	8.33	8.07	7.87	7.65	7.29	6.99	6.72	6.50	6.29	6.11	5.96	5.82	5.70	5.58	5.49	5.39	5.32
7.9	194.24	9.38	9.09	8.76	8.52	8.25	8.05	7.82	7.46	7.15	6.88	6.65	6.44	6.26	6.09	5.96	5.83	5.71	5.62	5.52	5.44
8.0	196.70	9.59	9.29	8.96	8.71	8.44	8.23	8.00	7.63	7.31	7.04	6.80	6.58	6.40	6.23	6.09	5.97	5.84	5.75	5.65	5.57

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

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4" Uponor PEX-a — 50% Propylene glycol — feet of head per 100 feet of piping

Velocity (ft./sec.)	GPM	40°F 4°C	45°F 7°C	50°F 10°C	55°F 13°C	60°F 16°C	65°F 18°C	70°F 21°C	80°F 27°C	90°F 32°C	100°F 38°C	110°F 43°C	120°F 49°C	130°F 54°C	140°F 60°C	150°F 66°C	160°F 71°C	170°F 77°C	180°F 82°C	190°F 88°C	200°F 93°C
1.5	36.88	0.59	0.57	0.54	0.52	0.50	0.49	0.47	0.44	0.42	0.39	0.38	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.29
1.6	39.34	0.66	0.63	0.61	0.58	0.56	0.54	0.52	0.49	0.46	0.44	0.42	0.41	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32
1.7	41.80	0.73	0.70	0.67	0.65	0.62	0.60	0.58	0.55	0.52	0.49	0.47	0.45	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36
1.8	44.26	0.81	0.78	0.74	0.71	0.69	0.66	0.64	0.60	0.57	0.54	0.52	0.50	0.48	0.46	0.45	0.44	0.43	0.42	0.41	0.40
1.9	46.72	0.89	0.85	0.81	0.78	0.75	0.73	0.70	0.66	0.63	0.60	0.57	0.55	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.44
2.0	49.17	0.97	0.93	0.89	0.86	0.82	0.80	0.77	0.72	0.68	0.65	0.62	0.60	0.58	0.56	0.54	0.53	0.51	0.50	0.49	0.48
2.1	51.63	1.05	1.01	0.96	0.93	0.89	0.87	0.84	0.79	0.75	0.71	0.68	0.65	0.63	0.61	0.59	0.58	0.56	0.55	0.54	0.52
2.2	54.09	1.14	1.09	1.04	1.01	0.97	0.94	0.91	0.85	0.81	0.77	0.74	0.71	0.68	0.66	0.64	0.62	0.61	0.59	0.58	0.57
2.3	56.55	1.23	1.18	1.13	1.09	1.05	1.01	0.98	0.92	0.87	0.83	0.80	0.77	0.74	0.72	0.69	0.68	0.66	0.64	0.63	0.62
2.4	59.01	1.32	1.27	1.21	1.17	1.13	1.09	1.05	0.99	0.94	0.90	0.86	0.83	0.80	0.77	0.75	0.73	0.71	0.69	0.68	0.67
2.5	61.47	1.41	1.36	1.30	1.26	1.21	1.17	1.13	1.07	1.01	0.96	0.92	0.89	0.86	0.83	0.81	0.78	0.76	0.75	0.73	0.72
2.6	63.93	1.51	1.45	1.39	1.34	1.29	1.25	1.21	1.14	1.08	1.03	0.99	0.95	0.92	0.89	0.86	0.84	0.82	0.80	0.78	0.77
2.7	66.38	1.61	1.55	1.48	1.43	1.38	1.34	1.29	1.22	1.16	1.10	1.06	1.02	0.98	0.95	0.92	0.90	0.88	0.86	0.84	0.82
2.8	68.84	1.72	1.65	1.58	1.53	1.47	1.43	1.38	1.30	1.23	1.18	1.13	1.08	1.05	1.01	0.98	0.96	0.93	0.91	0.89	0.88
2.9	71.30	1.82	1.75	1.68	1.62	1.56	1.51	1.46	1.38	1.31	1.25	1.20	1.15	1.11	1.08	1.05	1.02	0.99	0.97	0.95	0.93
3.0	73.76	1.93	1.86	1.78	1.72	1.66	1.61	1.55	1.47	1.39	1.33	1.27	1.23	1.18	1.15	1.11	1.08	1.06	1.03	1.01	0.99
3.1	76.22	2.04	1.97	1.88	1.82	1.75	1.70	1.64	1.55	1.47	1.41	1.35	1.30	1.25	1.21	1.18	1.15	1.12	1.09	1.07	1.05
3.2	78.68	2.16	2.08	1.99	1.92	1.85	1.80	1.74	1.64	1.56	1.49	1.43	1.37	1.33	1.28	1.25	1.22	1.19	1.16	1.14	1.11
3.3	81.14	2.27	2.19	2.10	2.03	1.95	1.90	1.83	1.73	1.64	1.57	1.51	1.45	1.40	1.36	1.32	1.28	1.25	1.22	1.20	1.18
3.4	83.60	2.39	2.31	2.21	2.14	2.06	2.00	1.93	1.82	1.73	1.66	1.59	1.53	1.48	1.43	1.39	1.35	1.32	1.29	1.27	1.24
3.5	86.05	2.52	2.42	2.32	2.25	2.16	2.10	2.03	1.92	1.82	1.74	1.67	1.61	1.55	1.51	1.46	1.43	1.39	1.36	1.33	1.31
3.6	88.51	2.64	2.54	2.44	2.36	2.27	2.21	2.13	2.02	1.92	1.83	1.76	1.69	1.63	1.58	1.54	1.50	1.46	1.43	1.40	1.38
3.7	90.97	2.77	2.67	2.56	2.47	2.38	2.31	2.24	2.12	2.01	1.92	1.84	1.78	1.72	1.66	1.62	1.58	1.54	1.50	1.47	1.44
3.8	93.43	2.90	2.79	2.68	2.59	2.50	2.42	2.35	2.22	2.11	2.01	1.93	1.86	1.80	1.74	1.70	1.65	1.61	1.58	1.55	1.52
3.9	95.89	3.03	2.92	2.80	2.71	2.61	2.54	2.45	2.32	2.21	2.11	2.02	1.95	1.88	1.83	1.78	1.73	1.69	1.65	1.62	1.59
4.0	98.35	3.17	3.05	2.93	2.83	2.73	2.65	2.57	2.43	2.31	2.20	2.12	2.04	1.97	1.91	1.86	1.81	1.77	1.73	1.69	1.66
4.1	100.81	3.30	3.19	3.06	2.96	2.85	2.77	2.68	2.53	2.41	2.30	2.21	2.13	2.06	2.00	1.94	1.89	1.85	1.80	1.77	1.74
4.2	103.27	3.45	3.32	3.19	3.08	2.97	2.89	2.79	2.64	2.51	2.40	2.31	2.22	2.15	2.08	2.03	1.98	1.93	1.88	1.85	1.81
4.3	105.72	3.59	3.46	3.32	3.21	3.10	3.01	2.91	2.75	2.62	2.51	2.41	2.32	2.24	2.17	2.11	2.06	2.01	1.97	1.93	1.89
4.4	108.18	3.73	3.60	3.46	3.34	3.22	3.13	3.03	2.87	2.73	2.61	2.51	2.41	2.34	2.26	2.20	2.15	2.10	2.05	2.01	1.97
4.5	110.64	3.88	3.74	3.59	3.48	3.35	3.26	3.15	2.98	2.84	2.71	2.61	2.51	2.43	2.36	2.29	2.23	2.18	2.13	2.09	2.05
4.6	113.10	4.03	3.89	3.73	3.61	3.48	3.39	3.28	3.10	2.95	2.82	2.71	2.61	2.53	2.45	2.38	2.32	2.27	2.22	2.18	2.14
4.7	115.56	4.18	4.04	3.87	3.75	3.62	3.52	3.40	3.22	3.07	2.93	2.82	2.72	2.63	2.55	2.48	2.42	2.36	2.31	2.26	2.22

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4.8	118.02	4.34	4.19	4.02	3.89	3.75	3.65	3.53	3.34	3.18	3.04	2.92	2.82	2.73	2.64	2.57	2.51	2.45	2.39	2.35	2.31
4.9	120.48	4.50	4.34	4.17	4.03	3.89	3.78	3.66	3.47	3.30	3.16	3.03	2.92	2.83	2.74	2.67	2.60	2.54	2.48	2.44	2.39
5.0	122.94	4.66	4.49	4.32	4.18	4.03	3.92	3.79	3.59	3.42	3.27	3.14	3.03	2.93	2.84	2.77	2.70	2.63	2.58	2.53	2.48
5.1	125.39	4.82	4.65	4.47	4.33	4.17	4.06	3.93	3.72	3.54	3.39	3.26	3.14	3.04	2.95	2.87	2.80	2.73	2.67	2.62	2.57
5.2	127.85	4.99	4.81	4.62	4.48	4.32	4.20	4.06	3.85	3.66	3.51	3.37	3.25	3.14	3.05	2.97	2.89	2.83	2.76	2.71	2.66
5.3	130.31	5.15	4.97	4.78	4.63	4.46	4.34	4.20	3.98	3.79	3.63	3.49	3.36	3.25	3.16	3.07	3.00	2.92	2.86	2.81	2.76
5.4	132.77	5.32	5.14	4.93	4.78	4.61	4.48	4.34	4.11	3.92	3.75	3.60	3.48	3.36	3.26	3.18	3.10	3.02	2.96	2.90	2.85
5.5	135.23	5.49	5.30	5.10	4.94	4.76	4.63	4.48	4.25	4.05	3.87	3.72	3.59	3.48	3.37	3.28	3.20	3.13	3.06	3.00	2.95
5.6	137.69	5.67	5.47	5.26	5.09	4.92	4.78	4.63	4.39	4.18	4.00	3.84	3.71	3.59	3.48	3.39	3.31	3.23	3.16	3.10	3.04
5.7	140.15	5.85	5.64	5.42	5.25	5.07	4.93	4.78	4.53	4.31	4.13	3.97	3.83	3.70	3.59	3.50	3.41	3.33	3.26	3.20	3.14
5.8	142.60	6.03	5.82	5.59	5.42	5.23	5.08	4.92	4.67	4.45	4.26	4.09	3.95	3.82	3.71	3.61	3.52	3.44	3.36	3.30	3.24
5.9	145.06	6.21	5.99	5.76	5.58	5.39	5.24	5.07	4.81	4.58	4.39	4.22	4.07	3.94	3.82	3.72	3.63	3.55	3.47	3.41	3.34
6.0	147.52	6.39	6.17	5.93	5.75	5.55	5.39	5.23	4.95	4.72	4.52	4.35	4.19	4.06	3.94	3.84	3.74	3.66	3.58	3.51	3.45
6.1	149.98	6.58	6.35	6.10	5.92	5.71	5.55	5.38	5.10	4.86	4.65	4.48	4.32	4.18	4.06	3.95	3.85	3.77	3.68	3.62	3.55
6.2	152.44	6.77	6.53	6.28	6.09	5.88	5.71	5.54	5.25	5.00	4.79	4.61	4.45	4.30	4.18	4.07	3.97	3.88	3.79	3.72	3.66
6.3	154.90	6.96	6.72	6.46	6.26	6.04	5.88	5.70	5.40	5.15	4.93	4.74	4.58	4.43	4.30	4.19	4.08	3.99	3.90	3.83	3.76
6.4	157.36	7.15	6.91	6.64	6.44	6.21	6.04	5.86	5.55	5.29	5.07	4.88	4.71	4.56	4.42	4.31	4.20	4.10	4.02	3.94	3.87
6.5	159.82	7.35	7.10	6.82	6.61	6.39	6.21	6.02	5.71	5.44	5.21	5.01	4.84	4.68	4.55	4.43	4.32	4.22	4.13	4.06	3.98
6.6	162.27	7.54	7.29	7.01	6.79	6.56	6.38	6.18	5.86	5.59	5.35	5.15	4.97	4.81	4.67	4.55	4.44	4.34	4.25	4.17	4.09
6.7	164.73	7.74	7.48	7.19	6.97	6.73	6.55	6.35	6.02	5.74	5.50	5.29	5.11	4.95	4.80	4.67	4.56	4.46	4.36	4.28	4.21
6.8	167.19	7.95	7.68	7.38	7.16	6.91	6.72	6.52	6.18	5.89	5.65	5.43	5.24	5.08	4.93	4.80	4.69	4.58	4.48	4.40	4.32
6.9	169.65	8.15	7.87	7.57	7.34	7.09	6.90	6.69	6.34	6.05	5.79	5.58	5.38	5.21	5.06	4.93	4.81	4.70	4.60	4.52	4.44
7.0	172.11	8.36	8.08	7.77	7.53	7.27	7.07	6.86	6.51	6.20	5.95	5.72	5.52	5.35	5.19	5.06	4.94	4.82	4.72	4.64	4.55
7.1	174.57	8.57	8.28	7.96	7.72	7.46	7.25	7.03	6.67	6.36	6.10	5.87	5.66	5.49	5.33	5.19	5.06	4.95	4.84	4.76	4.67
7.2	177.03	8.78	8.48	8.16	7.91	7.64	7.43	7.21	6.84	6.52	6.25	6.02	5.81	5.63	5.46	5.32	5.19	5.07	4.97	4.88	4.79
7.3	179.49	8.99	8.69	8.36	8.11	7.83	7.62	7.39	7.01	6.68	6.41	6.16	5.95	5.77	5.60	5.45	5.32	5.20	5.09	5.00	4.91
7.4	181.94	9.21	8.90	8.56	8.30	8.02	7.80	7.57	7.18	6.85	6.56	6.32	6.10	5.91	5.74	5.59	5.45	5.33	5.22	5.12	5.03
7.5	184.40	9.43	9.11	8.76	8.50	8.21	7.99	7.75	7.35	7.01	6.72	6.47	6.25	6.05	5.88	5.72	5.59	5.46	5.35	5.25	5.16
7.6	186.86	9.65	9.32	8.97	8.70	8.41	8.18	7.93	7.53	7.18	6.88	6.62	6.40	6.20	6.02	5.86	5.72	5.59	5.48	5.38	5.28
7.7	189.32	9.87	9.54	9.18	8.90	8.60	8.37	8.12	7.70	7.35	7.04	6.78	6.55	6.34	6.16	6.00	5.86	5.73	5.61	5.51	5.41
7.8	191.78	10.09	9.76	9.39	9.11	8.80	8.56	8.30	7.88	7.52	7.21	6.94	6.70	6.49	6.31	6.14	6.00	5.86	5.74	5.64	5.54
7.9	194.24	10.32	9.98	9.60	9.31	9.00	8.76	8.49	8.06	7.69	7.37	7.10	6.86	6.64	6.45	6.28	6.14	6.00	5.87	5.77	5.66
8.0	196.70	10.55	10.20	9.81	9.52	9.20	8.95	8.68	8.24	7.87	7.54	7.26	7.01	6.79	6.60	6.43	6.28	6.13	6.01	5.90	5.79

Recommended head loss design range

5.5 ft./sec. is an industry standard for velocity limit in hydronic distribution systems.

Velocities in excess of 8 ft./sec. may cause erosion to metal components in the system.