Annex B (informative)
Sizing and capacities of piping and tubing for propane

Note: *This informative annex has been written in mandatory language to facilitate adoption where users of the Code or regulatory authorities wish to adopt it formally as additional requirements to this Code.*

B.1 General

In order to determine the size of piping or tubing to be used in designing a gas piping system, the following factors shall be considered:

a) allowable loss in pressure from point of delivery to equipment;
b) maximum gas demand;
c) length of piping and number of fittings;
d) relative density of the gas; and
e) diversity factor.

B.2 Description of tables

B.2.1 Outlet capacity

The total energy to be provided at each outlet should be determined directly from the manufacturer's Btu/h (kW) input rating of the equipment to be installed.

B.2.2 Propane quality

The tables listed in this annex assume that a gas having a calorific value of 2520 Btu/ft^3 (94 MJ/m^3) and a relative density of 1.52 for propane shall be used.

B.2.3 Table applicability

Capacities for propane in Btu/h (kW) for different sizes and lengths are shown in Tables B.1 to B.5 for iron pipe or equivalent rigid pipe and in Tables B.6 to B.10 for tubing.

B.2.4 Fitting allowance

The formula used to derive Tables B.1, B.2, B.6, and B.7 contains a factor (F = 1.2), which is used to multiply the piping or tubing length to allow for a reasonable number of fittings. Tables B.3 to B.5 and B.8 to B.10 do not contain a fitting allowance (F = 1), and Table B.11 should be utilized to determine equivalent lengths of fittings.

B.2.5 Tubing type

Tables B.6 to B.10 covering tubing are based on Type K tubing. Type K was selected since it has a smaller inside diameter than Types G and L.

B.3 Use of capacity tables

B.3.1 Size determination

To determine the size of each section of propane piping or tubing in a system within the range of the capacity tables, the procedure outlined in Clauses B.3.2 to B.3.9 shall be followed.

B.3.2 Demand determination

The propane demand shall be determined for each appliance to be attached to the piping or tubing system. The propane demand shall be calculated in terms of Btu/h (kW) for each piping system outlet.

B.3.3 Pressure determination

The design system pressure, the allowable loss in pressure (pressure drop), and the relative density of propane to be used in the piping or tubing system shall be determined.

B.3.4 Length determination

The length of piping or tubing shall be measured from the point of delivery to the most remote outlet in the building.

B.3.5 Formulae

In the appropriate capacity table, the row showing the measured length, or the next larger length if the table does not give the exact length, shall be selected. This is the only length used in determining the size of any section of propane piping or tubing.

Capacities may also be determined by using the following formulas, which were used to generate the tables*:

for high pressure [1.5 psig (10.3 kPa) and above]:

$$Q = (K_1)D^{2.623}\left[\frac{(P_1^2 - P_2^2)Y}{Cr \times L \times F}\right]^{0.541} (b \times z)$$

for low pressure [less than 1.5 psig (10.3 kPa)]:

$$Q = (K_2)D^{2.623}\left[\frac{\Delta H}{Cr \times L \times F}\right]^{0.541} (b \times z)$$

where

Q = rate, Btu/h (kW) at 60°F (15.6 °C) and 30 in Hg (101.3 kPa)

K_1 = 2237 for imperial measurements

= 0.3576 for SI (metric) measurements

D = inside diameter of pipe, in (cm)

P_1 = upstream pressure, absolute, psi (kPa)

P_2 = downstream pressure, absolute, psi (kPa)

Y = superexpansibility factor†

= 1/supercompressibility factor

= 1 for intents and purposes

b = calorific value of the propane, Btu/ft^3 (MJ/m^3)

z = factor to convert MJ/h to kW

= 1 for imperial measurements

= 0.2778 for SI (metric) measurements

Cr = factor for viscosity, density, and temperature

$= K_3 ST\left[\frac{Z}{S}\right]^{0.152}$

= 1.260 for propane

where

K_3 = 0.00354 for imperial measurements

= 0.00638 for SI (metric) measurements

S = relative density of propane at 60 °F (15.6 °C) and 30 in Hg (101.3 kPa), (propane = 1.52)

T = absolute temperature, °R = °F + 460 (imperial)

= absolute temperature, K = °C + 273 (metric)

Z = viscosity of propane, centipoise (0.008 for propane)

L = length of pipe, ft (m)

F = fitting allowance factor

= 1.2 for Tables B.1, B.2, B.6, and B.7

= 1 for Tables B.3 to B.5 and B.8 to B.10

K_2 = 2313 for imperial measurements

= 0.1509 for SI (metric) measurements

ΔH = pressure drop, in w.c. (Pa)

* *For further details on the formulas, refer to B.C. Shebeko, Polyflo Flow Computer, 1974, available from Polyflo Computer Company, Box 50126, Dallas, Texas 75250, USA.*

† *For values for natural gas, refer to Manual for Determination of Supercompressibility Factors for Natural Gas, available from the American Gas Association, 1515 Wilson Boulevard, Arlington, Virginia 22209, USA.*

For values for liquefied petroleum gases, refer to Engineering Data Book, available from Gas Processors Association, 1812 First Place, Tulsa, Oklahoma 74102, USA.

B.3.6 Row choice

The horizontal row specified in Clause B.3.5 shall be used to locate all propane demand figures for this particular system of piping.

B.3.7 Column choice

Starting at the most remote outlet, in the horizontal row selected in accordance with Clause B.3.6, the propane demand for that outlet shall be located. If the exact figure of demand is not shown, the next larger figure to the right in the row shall be chosen.

B.3.8 Correct size

In the top row above this demand figure, the correct size of propane piping will be found.

B.3.9 Repeat

The procedure shall be repeated in a similar manner for each outlet and each section of propane piping. For each section of piping, the total propane demand supplied by that section shall be determined.

B.4 Bends, fittings, and valves expressed in equivalent lengths in feet of straight pipe

The equivalent lengths in feet shown in Table B.11* have been computed on the basis that the inside diameter corresponds to that of Schedule 40 (standard-weight) steel pipe, which is close enough for most purposes to that of other schedules of pipe. Where a more specific solution for equivalent length is desired, this may be computed by multiplying the actual inside diameter of the pipe in inches by n/12, or the actual inside diameter in feet by "n" ("n" is a heading in Table B.11). The equivalent length values can be used with reasonable accuracy for copper or brass fittings and bends. For copper or brass valves, however, the equivalent length of pipe should be taken as 45% longer than the values in Table B.11, which are for steel pipe. Resistance per foot of copper or brass pipe is less than that of steel.

* *From Crocker (1945). Table XIV, pp. 100–101. Used by permission of McGraw-Hill Book Company.*

Table B.1 a)
Maximum capacity of propane in thousands of Btu/h for Schedule 40 pipe and plastic pipe, including fittings, for pressures of 11 in w.c. based on a pressure drop of 1 in w.c.

(See Clauses 6.3.2, 6.3.5, B.2.3, B.2.4, and B.3.5.)

	Pipe size (NPS)								
Length of pipe, ft	**1/2**	**3/4**	**1**	**1-1/4**	**1-1/2**	**2**	**2-1/2**	**3**	**4**
10	386	807	1 520	3 121	4 676	9 005	14 353	25 374	51 754
20	265	555	1 045	2 145	3 214	6 189	9 865	17 439	35 571
30	213	445	839	1 722	2 581	4 970	7 922	14 004	28 564
40	182	381	718	1 474	2 209	4 254	6 780	11 986	24 447
50	162	338	636	1 307	1 958	3 770	6 009	10 623	21 667
60	146	306	577	1 184	1 774	3 416	5 445	9 625	19 632
70	135	282	530	1 089	1 632	3 143	5 009	8 855	18 061
80	125	262	493	1 013	1 518	2 924	4 660	8 238	16 803
90	118	246	463	951	1 424	2 743	4 372	7 729	15 765
100	111	232	437	898	1 345	2 591	4 130	7 301	14 892
125	98	206	388	796	1 192	2 297	3 660	6 471	13 198
150	89	186	351	721	1 080	2 081	3 317	5 863	11 959
175	82	172	323	663	994	1 914	3 051	5 394	11 002
200	76	160	301	617	925	1 781	2 839	5 018	10 235
250	68	141	266	547	820	1 578	2 516	4 447	9 071
300	61	128	241	496	743	1 430	2 279	4 030	8 219
350	56	118	222	456	683	1 316	2 097	3 707	7 561
400	52	110	207	424	636	1 224	1 951	3 449	7 035
450	49	103	194	398	596	1 148	1 830	3 236	6 600
500	46	97	183	376	563	1 085	1 729	3 057	6 235

(Continued)

Table B.1 a) (Continued)

	Pipe size (NPS)								
Length of pipe, ft	**1/2**	**3/4**	**1**	**1-1/4**	**1-1/2**	**2**	**2-1/2**	**3**	**4**
600	42	88	166	341	510	983	1 567	2 770	5 649
700	39	81	153	313	470	904	1 441	2 548	5 197
800	36	75	142	292	437	841	1 341	2 370	4 835
900	34	71	133	274	410	789	1 258	2 224	4 536
1 000	32	67	126	258	387	746	1 188	2 101	4 285
1 200	29	61	114	234	351	676	1 077	1 903	3 882
1 400	27	56	105	215	323	622	991	1 751	3 572
1 600	25	52	98	200	300	578	922	1 629	3 323
1 800	23	49	92	188	282	542	865	1 529	3 118
2 000	22	46	86	178	266	512	817	1 444	2 945

Table B.1 b)
Maximum capacity of propane in kW for Schedule 40 pipe and plastic pipe, including fittings, for pressures of 2.7 kPa based on a pressure drop of 250 Pa

	Pipe size (NPS)								
Length of pipe, m	**1/2**	**3/4**	**1**	**1-1/4**	**1-1/2**	**2**	**2-1/2**	**3**	**4**
3	114	239	450	925	1 385	2 668	4 253	7 518	15 334
6	79	164	310	636	952	1 834	2 923	5 167	10 539
9	63	132	249	510	765	1 473	2 347	4 149	8 463
12	54	113	213	437	654	1 260	2 009	3 551	7 243
15	48	100	189	387	580	1 117	1 780	3 147	6 420
18	43	91	171	351	526	1 012	1 613	2 852	5 817
21	40	83	157	323	483	931	1 484	2 624	5 351
24	37	78	146	300	450	866	1 381	2 441	4 978
27	35	73	137	282	422	813	1 295	2 290	4 671
30	33	69	130	266	399	768	1 224	2 163	4 412
35	30	63	119	245	367	706	1 126	1 990	4 059
40	28	59	111	228	341	657	1 047	1 851	3 776
45	26	55	104	214	320	617	983	1 737	3 543
50	25	52	98	202	302	582	928	1 641	3 347
60	23	47	89	183	274	528	841	1 487	3 032
70	21	43	82	168	252	485	774	1 368	2 790
80	19	40	76	157	234	452	720	1 272	2 595
90	18	38	72	147	220	424	675	1 194	2 435
100	17	36	68	139	208	400	638	1 128	2 300
125	15	32	60	123	184	355	565	1 000	2 039

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Table B.1 b) (Continued)

	Pipe size (NPS)								
Length of pipe, m	**1/2**	**3/4**	**1**	**1-1/4**	**1-1/2**	**2**	**2-1/2**	**3**	**4**
150	14	29	54	111	167	321	512	906	1 847
175	13	26	50	102	154	296	471	833	1 699
200	12	25	46	95	143	275	438	775	1 581
250	10	22	41	84	127	244	389	687	1 401
300	9	20	37	77	115	221	352	622	1 270
350	9	18	34	70	106	203	324	573	1 168
400	8	17	32	66	98	189	301	533	1 087
500	7	15	28	58	87	168	267	472	963
600	7	14	26	53	79	152	242	428	873

Table B.2 a)
Maximum capacity of propane in thousands of Btu/h for Schedule 40 pipe and plastic pipe, including fittings, for pressures of 2 psig based on a pressure drop of 1 psig

(See Clauses 6.3.4, 6.3.5, B.2.3, B.2.4, and B.3.5.)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	2 450	5 122	9 649	19 810	29 682	57 165	91 112	161 070	328 531
20	1 684	3 521	6 632	13 616	20 400	39 289	62 621	110 702	225 798
30	1 352	2 827	5 326	10 934	16 382	31 551	50 287	88 898	181 323
40	1 157	2 420	4 558	9 358	14 021	27 003	43 039	76 085	155 189
50	1 026	2 145	4 040	8 294	12 427	23 932	38 145	67 433	137 541
60	929	1 943	3 660	7 515	11 259	21 685	34 562	61 099	124 623
70	855	1 788	3 367	6 913	10 359	19 950	31 796	56 210	114 651
80	795	1 663	3 133	6 432	9 637	18 559	29 580	52 293	106 661
90	746	1 560	2 939	6 035	9 042	17 413	27 754	49 065	100 076
100	705	1 474	2 776	5 700	8 541	16 449	26 217	46 346	94 531
125	625	1 306	2 461	5 052	7 570	14 578	23 235	41 076	83 782
150	566	1 184	2 230	4 578	6 859	13 209	21 053	37 218	75 912
175	521	1 089	2 051	4 211	6 310	12 152	19 368	34 240	69 838
200	484	1 013	1 908	3 918	5 870	11 305	18 018	31 853	64 971
250	429	898	1 691	3 472	5 202	10 019	15 969	28 231	57 583
300	389	813	1 532	3 146	4 714	9 078	14 469	25 579	52 174
350	358	748	1 410	2 894	4 337	8 352	13 312	23 533	47 999
400	333	696	1 312	2 693	4 034	7 770	12 384	21 893	44 654
450	312	653	1 231	2 526	3 785	7 290	11 619	20 541	41 898
500	295	617	1 162	2 386	3 576	6 886	10 976	19 403	39 576

(Continued)

Table B.2 a) (Continued)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
600	267	559	1 053	2 162	3 240	6 240	9 945	17 581	35 859
700	246	514	969	1 989	2 981	5 740	9 149	16 174	32 990
800	229	479	901	1 851	2 773	5 340	8 511	15 047	30 691
900	215	449	846	1 736	2 602	5 011	7 986	14 118	28 796
1 000	203	424	799	1 640	2 458	4 733	7 544	13 336	27 200
1 200	184	384	724	1 486	2 227	4 288	6 835	12 083	24 646
1 400	169	354	666	1 367	2 049	3 945	6 288	11 116	22 674
1 600	157	329	620	1 272	1 906	3 670	5 850	10 342	21 093
1 800	148	309	581	1 193	1 788	3 444	5 489	9 703	19 791
2 000	139	291	549	1 127	1 689	3 253	5 185	9 166	18 695

Table B.2 b)
Maximum capacity of propane in kW for Schedule 40 pipe and plastic pipe, including fittings, for pressures of 14 kPa based on a pressure drop of 7 kPa

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
3	731	1 528	2 879	5 911	8 857	17 057	27 186	48 060	98 026
6	502	1 050	1 979	4 063	6 087	11 723	18 685	33 031	67 373
9	403	844	1 589	3 262	4 888	9 414	15 004	26 525	54 103
12	345	722	1 360	2 792	4 184	8 057	12 842	22 702	46 305
15	306	640	1 205	2 475	3 708	7 141	11 381	20 120	41 039
18	277	580	1 092	2 242	3 360	6 470	10 312	18 231	37 185
21	255	533	1 005	2 063	3 091	5 952	9 487	16 772	34 209
24	237	496	935	1 919	2 875	5 538	8 826	15 603	31 825
27	223	466	877	1 801	2 698	5 196	8 281	14 640	29 860
30	210	440	828	1 701	2 548	4 908	7 822	13 829	28 206
35	193	405	762	1 565	2 344	4 515	7 197	12 722	25 949
40	180	376	709	1 456	2 181	4 201	6 695	11 836	24 141
45	169	353	665	1 366	2 046	3 941	6 282	11 105	22 650
50	160	334	628	1 290	1 933	3 723	5 934	10 490	21 395
60	145	302	569	1 169	1 751	3 373	5 376	9 504	19 386
70	133	278	524	1 075	1 611	3 103	4 946	8 744	17 835
80	124	259	487	1 000	1 499	2 887	4 601	8 134	16 592
90	116	243	457	939	1 407	2 709	4 317	7 632	15 568
100	110	229	432	887	1 329	2 559	4 078	7 209	14 705
125	97	203	383	786	1 177	2 268	3 614	6 390	13 033

(Continued)

Table B.2 b) (Continued)

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
150	88	184	347	712	1 067	2 055	3 275	5 789	11 809
175	81	169	319	655	982	1 890	3 013	5 326	10 864
200	75	158	297	609	913	1 759	2 803	4 955	10 107
250	67	140	263	540	809	1 559	2 484	4 392	8 957
300	61	127	238	489	733	1 412	2 251	3 979	8 116
350	56	116	219	450	675	1 299	2 071	3 661	7 467
400	52	108	204	419	628	1 209	1 926	3 406	6 946
500	46	96	181	371	556	1 071	1 707	3 018	6 156
600	42	87	164	336	504	971	1 547	2 735	5 578

Table B.3 a)
Maximum capacity of propane in thousands of Btu/h for Schedule 40 pipe and plastic pipe for pressures of 5 psig based on a pressure drop of 2.5 psig

(See Clauses 6.3.5, B.2.3, B.2.4, and B.3.5.)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	4 762	9 958	18 757	38 511	57 701	111 127	177 118	313 113	638 651
20	3 273	6 844	12 892	26 468	39 658	76 377	121 732	215 201	438 941
30	2 628	5 496	10 353	21 255	31 846	61 333	97 755	172 814	352 485
40	2 249	4 704	8 861	18 191	27 256	52 493	83 666	147 906	301 682
50	1 994	4 169	7 853	16 123	24 157	46 524	74 151	131 087	267 375
60	1 806	3 777	7 115	14 608	21 888	42 154	67 187	118 774	242 261
70	1 662	3 475	6 546	13 440	20 137	38 781	61 811	109 271	222 877
80	1 546	3 233	6 090	12 503	18 733	36 078	57 503	101 655	207 344
90	1 451	3 033	5 714	11 731	17 577	33 851	53 953	95 380	194 544
100	1 370	2 865	5 397	11 081	16 603	31 976	50 964	90 095	183 765
125	1 214	2 539	4 783	9 821	14 715	28 339	45 168	79 850	162 868
150	1 100	2 301	4 334	8 899	13 333	25 677	40 926	72 350	147 570
175	1 012	2 117	3 987	8 187	12 266	23 623	37 651	66 561	135 763
200	942	1 969	3 710	7 616	11 411	21 977	35 027	61 922	126 301
250	835	1 745	3 288	6 750	10 113	19 477	31 044	54 880	111 938
300	756	1 581	2 979	6 116	9 163	17 648	28 128	49 725	101 424
350	696	1 455	2 741	5 627	8 430	16 236	25 877	45 747	93 309
400	647	1 353	2 550	5 234	7 843	15 104	24 074	42 559	86 806
450	607	1 270	2 392	4 911	7 359	14 172	22 588	39 931	81 447
500	574	1 200	2 260	4 639	6 951	13 387	21 336	37 719	76 934

(Continued)

Table B.3 a) (Continued)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
600	520	1 087	2 047	4 203	6 298	12 129	19 332	34 176	69 708
700	478	1 000	1 884	3 867	5 794	11 159	17 785	31 442	64 131
800	445	930	1 752	3 598	5 390	10 381	16 546	29 250	59 661
900	417	873	1 644	3 375	5 058	9 740	15 524	27 445	55 978
1 000	394	824	1 553	3 188	4 777	9 201	14 664	25 924	52 877
1 200	357	747	1 407	2 889	4 329	8 336	13 287	23 489	47 910
1 400	329	687	1 295	2 658	3 982	7 669	12 224	21 610	44 077
1 600	306	639	1 204	2 473	3 705	7 135	11 372	20 104	41 005
1 800	287	600	1 130	2 320	3 476	6 694	10 670	18 862	38 473
2 000	271	567	1 067	2 191	3 283	6 324	10 079	17 817	36 342

Table B.3 b)
Maximum capacity of propane in kW for Schedule 40 pipe and plastic pipe for pressures of 34 kPa based on a pressure drop of 17 kPa

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
3	1 396	2 918	5 497	11 286	16 910	32 568	51 908	91 764	187 169
6	959	2 006	3 778	7 757	11 622	22 384	35 676	63 069	128 640
9	770	1 611	3 034	6 229	9 333	17 975	28 649	50 647	103 303
12	659	1 379	2 597	5 331	7 988	15 384	24 520	43 347	88 414
15	584	1 222	2 301	4 725	7 080	13 635	21 732	38 418	78 359
18	529	1 107	2 085	4 281	6 415	12 354	19 690	34 809	70 999
21	487	1 018	1 918	3 939	5 901	11 366	18 115	32 024	65 319
24	453	947	1 785	3 664	5 490	10 573	16 852	29 792	60 766
27	425	889	1 675	3 438	5 151	9 921	15 812	27 953	57 015
30	402	840	1 582	3 248	4 866	9 371	14 936	26 404	53 856
35	369	773	1 455	2 988	4 476	8 621	13 741	24 291	49 547
40	344	719	1 354	2 779	4 165	8 020	12 783	22 599	46 094
45	322	674	1 270	2 608	3 907	7 525	11 994	21 203	43 248
50	305	637	1 200	2 463	3 691	7 108	11 330	20 029	40 852
60	276	577	1 087	2 232	3 344	6 441	10 265	18 147	37 015
70	254	531	1 000	2 053	3 077	5 925	9 444	16 695	34 053
80	236	494	930	1 910	2 862	5 512	8 786	15 532	31 680
90	222	463	873	1 792	2 686	5 172	8 243	14 573	29 724
100	209	438	825	1 693	2 537	4 886	7 787	13 766	28 077
125	186	388	731	1 501	2 248	4 330	6 901	12 200	24 884

(Continued)

Table B.3 b) (Continued)

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
150	168	352	662	1 360	2 037	3 923	6 253	11 054	22 547
175	155	323	609	1 251	1 874	3 609	5 753	10 170	20 743
200	144	301	567	1 164	1 743	3 358	5 352	9 461	19 297
250	128	267	502	1 031	1 545	2 976	4 743	8 385	17 103
300	116	242	455	934	1 400	2 696	4 298	7 598	15 497
350	106	222	419	860	1 288	2 481	3 954	6 990	14 257
400	99	207	390	800	1 198	2 308	3 678	6 502	13 263
500	88	183	345	709	1 062	2 045	3 260	5 763	11 755
600	79	166	313	642	962	1 853	2 954	5 222	10 651

Table B.4 a)
Maximum capacity of propane in thousands of Btu/h for Schedule 40 pipe and plastic pipe for pressures of 10 psig based on a pressure drop of 5 psig

(See Clauses 6.3.5, B.2.3, B.2.4, and B.3.5.)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	7 658	16 014	30 166	61 933	92 795	178 714	284 841	503 549	1 027 079
20	5 264	11 006	20 733	42 566	63 777	122 829	195 770	346 086	705 905
30	4 227	8 838	16 649	34 182	51 216	98 636	157 210	277 919	566 867
40	3 618	7 565	14 249	29 256	43 834	84 420	134 551	237 863	485 165
50	3 206	6 704	12 629	25 929	38 849	74 820	119 250	210 814	429 993
60	2 905	6 075	11 443	23 493	35 200	67 792	108 049	191 012	389 604
70	2 673	5 589	10 527	21 613	32 384	62 368	99 404	175 729	358 431
80	2 486	5 199	9 794	20 107	30 127	58 021	92 476	163 482	333 451
90	2 333	4 878	9 189	18 866	28 267	54 439	86 768	153 390	312 866
100	2 204	4 608	8 680	17 821	26 701	51 423	81 960	144 891	295 531
125	1 953	4 084	7 693	15 794	23 664	45 575	72 640	128 414	261 924
150	1 770	3 700	6 970	14 311	21 442	41 295	65 817	116 353	237 322
175	1 628	3 404	6 413	13 166	19 726	37 990	60 551	107 043	218 333
200	1 515	3 167	5 966	12 248	18 351	35 343	56 331	99 583	203 117
250	1 342	2 807	5 287	10 855	16 264	31 324	49 925	88 258	180 019
300	1 216	2 543	4 791	9 836	14 737	28 381	45 236	79 968	163 110
350	1 119	2 340	4 407	9 049	13 558	26 111	41 616	73 570	150 059
400	1 041	2 177	4 100	8 418	12 613	24 291	38 716	68 443	139 601
450	977	2 042	3 847	7 898	11 834	22 791	36 326	64 217	130 983
500	923	1 929	3 634	7 461	11 178	21 529	34 313	60 659	123 726

(Continued)

Table B.4 a) (Continued)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
600	836	1 748	3 293	6 760	10 128	19 506	31 090	54 962	112 105
700	769	1 608	3 029	6 219	9 318	17 946	28 603	50 564	103 135
800	715	1 496	2 818	5 786	8 669	16 695	26 609	47 040	95 947
900	671	1 404	2 644	5 428	8 134	15 664	24 966	44 136	90 024
1 000	634	1 326	2 498	5 128	7 683	14 796	23 583	41 691	85 036
1 200	575	1 201	2 263	4 646	6 961	13 407	21 368	37 775	77 049
1 400	529	1 105	2 082	4 274	6 404	12 334	19 658	34 753	70 884
1 600	492	1 028	1 937	3 976	5 958	11 474	18 288	32 331	65 944
1 800	461	965	1 817	3 731	5 590	10 766	17 159	30 335	61 873
2 000	436	911	1 717	3 524	5 280	10 170	16 209	28 654	58 445

Table B.4 b)
Maximum capacity of propane in kW for Schedule 40 pipe and plastic pipe for pressures of 70 kPa based on a pressure drop of 35 kPa

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
3	2 290	4 788	9 019	18 517	27 745	53 433	85 164	150 555	307 085
6	1 574	3 291	6 199	12 727	19 069	36 724	58 533	103 476	211 058
9	1 264	2 643	4 978	10 220	15 313	29 491	47 004	83 095	169 487
12	1 082	2 262	4 260	8 747	13 106	25 240	40 229	71 118	145 059
15	959	2 005	3 776	7 752	11 615	22 370	35 654	63 031	128 563
18	869	1 816	3 421	7 024	10 524	20 269	32 306	57 111	116 487
21	799	1 671	3 148	6 462	9 682	18 647	29 721	52 541	107 167
24	743	1 554	2 928	6 012	9 008	17 348	27 649	48 879	99 698
27	697	1 458	2 747	5 641	8 451	16 277	25 943	45 862	93 543
30	659	1 378	2 595	5 328	7 983	15 375	24 505	43 321	88 361
35	606	1 267	2 388	4 902	7 344	14 145	22 544	39 855	81 291
40	564	1 179	2 221	4 560	6 833	13 159	20 973	37 077	75 625
45	529	1 106	2 084	4 279	6 411	12 347	19 678	34 788	70 957
50	500	1 045	1 969	4 042	6 056	11 663	18 588	32 861	67 025
60	453	947	1 784	3 662	5 487	10 567	16 842	29 774	60 730
70	417	871	1 641	3 369	5 048	9 722	15 495	27 392	55 871
80	388	810	1 527	3 134	4 696	9 044	14 415	25 483	51 977
90	364	760	1 432	2 941	4 406	8 486	13 525	23 910	48 768
100	343	718	1 353	2 778	4 162	8 016	12 776	22 585	46 066
125	304	637	1 199	2 462	3 689	7 104	11 323	20 017	40 827

(Continued)

Table B.4 b) (Continued)

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
150	276	577	1 086	2 231	3 342	6 437	10 259	18 136	36 993
175	254	531	1 000	2 052	3 075	5 922	9 438	16 685	34 033
200	236	494	930	1 909	2 861	5 509	8 781	15 522	31 661
250	209	438	824	1 692	2 535	4 883	7 782	13 757	28 060
300	190	396	747	1 533	2 297	4 424	7 051	12 465	25 425
350	174	365	687	1 410	2 113	4 070	6 487	11 468	23 391
400	162	339	639	1 312	1 966	3 786	6 035	10 669	21 760
500	144	301	566	1 163	1 742	3 356	5 349	9 455	19 286
600	130	272	513	1 054	1 579	3 041	4 846	8 567	17 474

Table B.5 a)
Maximum capacity of propane in thousands of Btu/h for Schedule 40 pipe and plastic pipe for pressures of 20 psig based on a pressure drop of 10 psig

(See Clauses 6.3.5, B.2.3, B.2.4, and B.3.5.)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	13 043	27 274	51 377	105 482	158 044	304 377	485 128	857 621	1 749 272
20	8 965	18 745	35 311	72 497	108 623	209 196	333 426	589 438	1 202 265
30	7 199	15 053	28 356	58 218	87 228	167 992	267 753	473 339	965 461
40	6 161	12 884	24 269	49 827	74 656	143 780	229 162	405 117	826 310
50	5 461	11 418	21 509	44 160	66 166	127 429	203 102	359 048	732 343
60	4 948	10 346	19 489	40 013	59 951	115 460	184 025	325 323	663 556
70	4 552	9 518	17 930	36 811	55 154	106 222	169 301	299 293	610 463
80	4 235	8 855	16 680	34 246	51 310	98 819	157 501	278 435	567 918
90	3 973	8 308	15 650	32 132	48 143	92 719	147 778	261 246	532 859
100	3 753	7 848	14 783	30 351	45 476	87 581	139 591	246 772	503 335
125	3 326	6 955	13 102	26 900	40 304	77 622	123 717	218 709	446 097
150	3 014	6 302	11 871	24 373	36 518	70 331	112 096	198 166	404 196
175	2 773	5 798	10 922	22 423	33 597	64 704	103 127	182 310	371 855
200	2 579	5 394	10 160	20 860	31 255	60 194	95 940	169 605	345 940
250	2 286	4 780	9 005	18 488	27 701	53 349	85 030	150 318	306 600
300	2 071	4 331	8 159	16 752	25 099	48 338	77 043	136 199	277 802
350	1 906	3 985	7 506	15 411	23 091	44 470	70 879	125 301	255 574
400	1 773	3 707	6 983	14 337	21 481	41 371	65 939	116 568	237 762
450	1 663	3 478	6 552	13 452	20 155	38 817	61 868	109 372	223 085
500	1 571	3 286	6 189	12 707	19 039	36 666	58 440	103 312	210 724

(Continued)

Table B.5 a) (Continued)

Length of pipe, ft	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
600	1 424	2 977	5 608	11 513	17 250	33 222	52 951	93 609	190 932
700	1 310	2 739	5 159	10 592	15 870	30 564	48 715	86 119	175 655
800	1 218	2 548	4 799	9 854	14 764	28 434	45 319	80 117	163 413
900	1 143	2 391	4 503	9 246	13 853	26 679	42 522	75 171	153 325
1 000	1 080	2 258	4 254	8 733	13 085	25 201	40 166	71 006	144 830
1 200	978	2 046	3 854	7 913	11 856	22 834	36 393	64 337	131 226
1 400	900	1 882	3 546	7 280	10 907	21 007	33 481	59 189	120 726
1 600	837	1 751	3 299	6 772	10 147	19 543	31 148	55 064	112 313
1 800	786	1 643	3 095	6 354	9 521	18 336	29 225	51 665	105 379
2 000	742	1 552	2 924	6 002	8 993	17 320	27 606	48 802	99 541

Table B.5 b)
Maximum capacity of propane in kW for Schedule 40 pipe and plastic pipe for pressures of 140 kPa based on a pressure drop of 70 kPa

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
3	3 905	8 166	15 382	31 582	47 319	91 132	145 250	256 776	523 740
6	2 684	5 612	10 572	21 706	32 522	62 634	99 829	176 480	359 964
9	2 155	4 507	8 490	17 431	26 116	50 298	80 166	141 720	289 064
12	1 845	3 857	7 266	14 918	22 352	43 048	68 612	121 294	247 401
15	1 635	3 419	6 440	13 222	19 810	38 153	60 810	107 501	219 267
18	1 481	3 098	5 835	11 980	17 950	34 569	55 098	97 403	198 672
21	1 363	2 850	5 368	11 021	16 513	31 803	50 689	89 610	182 776
24	1 268	2 651	4 994	10 253	15 363	29 587	47 157	83 365	170 037
27	1 190	2 488	4 686	9 620	14 414	27 760	44 246	78 218	159 540
30	1 124	2 350	4 426	9 087	13 616	26 222	41 794	73 885	150 701
35	1 034	2 162	4 072	8 360	12 526	24 124	38 450	67 973	138 643
40	962	2 011	3 788	7 778	11 653	22 443	35 770	63 236	128 981
45	902	1 887	3 554	7 297	10 934	21 057	33 562	59 332	121 018
50	852	1 782	3 357	6 893	10 328	19 891	31 703	56 045	114 313
60	772	1 615	3 042	6 246	9 358	18 022	28 725	50 780	103 576
70	711	1 486	2 799	5 746	8 609	16 580	26 426	46 717	95 289
80	661	1 382	2 604	5 345	8 009	15 425	24 585	43 461	88 648
90	620	1 297	2 443	5 015	7 515	14 473	23 067	40 778	83 175
100	586	1 225	2 308	4 738	7 098	13 671	21 789	38 519	78 567
125	519	1 086	2 045	4 199	6 291	12 116	19 311	34 139	69 632

(Continued)

Table B.5 b) (Continued)

Length of pipe, m	Pipe size (NPS)								
	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
150	470	984	1 853	3 804	5 700	10 978	17 497	30 932	63 092
175	433	905	1 705	3 500	5 244	10 100	16 097	28 457	58 044
200	403	842	1 586	3 256	4 879	9 396	14 975	26 474	53 998
250	357	746	1 406	2 886	4 324	8 327	13 272	23 463	47 858
300	323	676	1 274	2 615	3 918	7 545	12 026	21 260	43 363
350	297	622	1 172	2 406	3 604	6 941	11 064	19 559	39 893
400	277	579	1 090	2 238	3 353	6 458	10 293	18 195	37 113
500	245	513	966	1 983	2 972	5 723	9 122	16 126	32 892
600	222	465	875	1 797	2 693	5 186	8 265	14 612	29 803

Table B.6 a)
Maximum capacity of propane in thousands of Btu/h for copper tubing, including fittings, for pressures of 11 in w.c. based on a pressure drop of 1 in w.c.

(See Clauses 6.3.2, B.2.3, B.2.4, B.2.5, and B.3.5.)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
10	60	123	250	437	619	1323	2382
20	41	84	172	300	426	909	1637
30	33	68	138	241	342	730	1315
40	28	58	118	206	293	625	1125
50	25	51	105	183	259	554	997
60	23	47	95	166	235	502	904
70	21	43	87	152	216	462	831
80	19	40	81	142	201	430	773
90	18	37	76	133	189	403	726
100	17	35	72	126	178	381	685
125	15	31	64	111	158	337	608
150	14	28	58	101	143	306	550
175	13	26	53	93	132	281	506
200	12	24	49	86	123	262	471
250	10	22	44	77	109	232	418
300	9	20	40	69	98	210	378
350	9	18	37	64	91	193	348
400	8	17	34	59	84	180	324
450	8	16	32	56	79	169	304
500	7	15	30	53	75	159	287

(Continued)

Table B.6 a) (Continued)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
600	6	13	27	48	68	144	260
700	6	12	25	44	62	133	239
800	6	11	23	41	58	124	223
900	5	11	22	38	54	116	209
1000	5	10	21	36	51	110	197
1200	4	9	19	33	46	99	179
1400	4	8	17	30	43	91	164
1600	4	8	16	28	40	85	153
1800	4	7	15	26	37	80	144
2000	3	7	14	25	35	75	136

Table B.6 b)
Maximum capacity of propane in kW for copper tubing, including fittings, for pressures of 2.7 kPa based on a pressure drop of 250 Pa

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
3	18	36	74	129	184	392	706
6	12	25	51	89	126	269	485
9	10	20	41	71	101	216	390
12	8	17	35	61	87	185	333
15	7	15	31	54	77	164	296
18	7	14	28	49	70	149	268
21	6	13	26	45	64	137	246
24	6	12	24	42	60	127	229
27	5	11	23	39	56	119	215
30	5	10	21	37	53	113	203
35	5	10	20	34	49	104	187
40	4	9	18	32	45	97	174
45	4	8	17	30	42	91	163
50	4	8	16	28	40	86	154
60	3	7	15	26	36	78	140
70	3	7	13	24	33	71	128
80	3	6	13	22	31	66	119
90	3	6	12	21	29	62	112
100	3	5	11	19	28	59	106
125	2	5	10	17	24	52	94
150	2	4	9	16	22	47	85

(Continued)

Table B.6 b) (Continued)

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
175	2	4	8	14	20	43	78
200	2	4	8	13	19	40	73
250	2	3	7	12	17	36	64
300	1	3	6	11	15	32	58
350	1	3	6	10	14	30	54
400	1	3	5	9	13	28	50
500	1	2	5	8	12	25	44
600	1	2	4	7	10	22	40

Table B.7 a)
Maximum capacity of propane in thousands of Btu/h for copper tubing, including fittings, for pressures of 2 psig based on a pressure drop of 1 psig

(See Clauses 6.3.4, B.2.3, B.2.4, B.2.5, and B.3.5.)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
10	378	780	1 586	2 772	3 932	8 400	15 122
20	260	536	1 090	1 905	2 703	5 773	10 394
30	209	430	875	1 530	2 170	4 636	8 346
40	178	368	749	1 309	1 858	3 968	7 143
50	158	326	664	1 160	1 646	3 517	6 331
60	143	296	602	1 051	1 492	3 186	5 736
70	132	272	553	967	1 372	2 931	5 277
80	123	253	515	900	1 277	2 727	4 910
90	115	237	483	844	1 198	2 559	4 607
100	109	224	456	798	1 132	2 417	4 351
125	96	199	404	707	1 003	2 142	3 857
150	87	180	366	640	909	1 941	3 494
175	80	166	337	589	836	1 786	3 215
200	75	154	314	548	778	1 661	2 991
250	66	137	278	486	689	1 472	2 651
300	60	124	252	440	625	1 334	2 402
350	55	114	232	405	575	1 227	2 209
400	51	106	216	377	534	1 142	2 055
450	48	99	202	353	501	1 071	1 929
500	46	94	191	334	474	1 012	1 822

(Continued)

Table B.7 a) (Continued)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
600	41	85	173	303	429	917	1 651
700	38	78	159	278	395	843	1 519
800	35	73	148	259	367	785	1 413
900	33	68	139	243	345	736	1 325
1 000	31	65	131	229	326	695	1 252
1 200	28	58	119	208	295	630	1 134
1 400	26	54	109	191	271	580	1 044
1 600	24	50	102	178	252	539	971
1 800	23	47	96	167	237	506	911
2 000	22	44	90	158	224	478	861

Table B.7 b)
Maximum capacity of propane in kW for copper tubing, including fittings, for pressures of 14 kPa based on a pressure drop of 7 kPa

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
3	113	233	473	827	1173	2506	4512
6	77	160	325	568	806	1723	3101
9	62	128	261	456	648	1383	2490
12	53	110	224	391	554	1184	2131
15	47	97	198	346	491	1049	1889
18	43	88	180	314	445	951	1712
21	39	81	165	289	409	875	1575
24	37	76	154	269	381	814	1465
27	34	71	144	252	357	763	1374
30	32	67	136	238	338	721	1298
35	30	62	125	219	311	663	1194
40	28	57	117	204	289	617	1111
45	26	54	109	191	271	579	1043
50	25	51	103	181	256	547	985
60	22	46	94	164	232	496	892
70	21	42	86	150	213	456	821
80	19	39	80	140	199	424	764
90	18	37	75	131	186	398	717
100	17	35	71	124	176	376	677
125	15	31	63	110	156	333	600
150	14	28	57	100	141	302	544

(Continued)

Table B.7 b) (Continued)

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
175	12	26	52	92	130	278	500
200	12	24	49	85	121	258	465
250	10	21	43	76	107	229	412
300	9	19	39	68	97	208	374
350	9	18	36	63	89	191	344
400	8	16	34	59	83	178	320
500	7	15	30	52	74	157	283
600	6	13	27	47	67	143	257

Table B.8 a)
Maximum capacity of propane in thousands of Btu/h for copper tubing for pressures of 5 psig based on a pressure drop of 2.5 psig

(See Clauses B.2.3, B.2.4, B.2.5, and B.3.5.)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
10	735	1 516	3 083	5 388	7 644	16 329	29 397
20	505	1 042	2 119	3 703	5 254	11 223	20 205
30	405	836	1 702	2 974	4 219	9 013	16 225
40	347	716	1 456	2 545	3 611	7 714	13 887
50	308	634	1 291	2 256	3 200	6 836	12 307
60	279	575	1 170	2 044	2 900	6 194	11 151
70	256	529	1 076	1 880	2 668	5 699	10 259
80	238	492	1 001	1 749	2 482	5 301	9 544
90	224	462	939	1 641	2 329	4 974	8 955
100	211	436	887	1 550	2 200	4 699	8 459
125	187	386	786	1 374	1 949	4 164	7 497
150	170	350	712	1 245	1 766	3 773	6 793
175	156	322	655	1 145	1 625	3 471	6 249
200	145	300	610	1 066	1 512	3 229	5 814
250	129	266	540	944	1 340	2 862	5 153
300	117	241	490	856	1 214	2 593	4 669
350	107	221	450	787	1 117	2 386	4 295
400	100	206	419	732	1 039	2 220	3 996
450	94	193	393	687	975	2 082	3 749
500	88	183	371	649	921	1 967	3 541

(Continued)

Table B.8 a) (Continued)

Length of tube, ft	Outside diameter (in)						
	3/8	1/2	5/8	3/4	7/8	1-1/8	1-3/8
600	80	165	337	588	834	1 782	3 209
700	74	152	310	541	768	1 640	2 952
800	69	142	288	503	714	1 525	2 746
900	64	133	270	472	670	1 431	2 577
1 000	61	125	255	446	633	1 352	2 434
1 200	55	114	231	404	573	1 225	2 205
1 400	51	105	213	372	528	1 127	2 029
1 600	47	97	198	346	491	1 048	1 887
1 800	44	91	186	325	461	984	1 771
2 000	42	86	175	307	435	929	1 673

Table B.8 b)
Maximum capacity of propane in kW for copper tubing for pressures of 34 kPa based on a pressure drop of 17 kPa

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
3	215	444	904	1579	2240	4786	8615
6	148	305	621	1085	1540	3289	5921
9	119	245	499	872	1236	2641	4755
12	102	210	427	746	1058	2261	4070
15	90	186	378	661	938	2004	3607
18	82	169	343	599	850	1815	3268
21	75	155	315	551	782	1670	3007
24	70	144	293	513	727	1554	2797
27	66	135	275	481	682	1458	2624
30	62	128	260	454	645	1377	2479
35	57	118	239	418	593	1267	2281
40	53	109	223	389	552	1179	2122
45	50	103	209	365	518	1106	1991
50	47	97	197	345	489	1045	1880
60	43	88	179	312	443	946	1704
70	39	81	164	287	408	871	1567
80	36	75	153	267	379	810	1458
90	34	71	143	251	356	760	1368
100	32	67	136	237	336	718	1292
125	29	59	120	210	298	636	1145
150	26	54	109	190	270	576	1038

(Continued)

Table B.8 b) (Continued)

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
175	24	49	100	175	248	530	955
200	22	46	93	163	231	493	888
250	20	41	83	144	205	437	787
300	18	37	75	131	185	396	713
350	16	34	69	120	171	365	656
400	15	31	64	112	159	339	611
500	14	28	57	99	141	301	541
600	12	25	51	90	127	272	490

Table B.9 a)
Maximum capacity of propane in thousands of Btu/h for copper tubing for pressures of 10 psig based on a pressure drop of 5 psig

(See Clauses B.2.3, B.2.4, B.2.5, and B.3.5.)

	Outside diameter (in)						
Length of tube, ft	**3/8**	**1/2**	**5/8**	**3/4**	**7/8**	**1-1/8**	**1-3/8**
10	1 181	2 437	4 958	8 665	12 294	26 261	47 277
20	812	1 675	3 408	5 956	8 449	18 049	32 493
30	652	1 345	2 737	4 783	6 785	14 494	26 093
40	558	1 151	2 342	4 093	5 807	12 405	22 332
50	495	1 020	2 076	3 628	5 147	10 994	19 793
60	448	925	1 881	3 287	4 663	9 962	17 934
70	412	851	1 730	3 024	4 290	9 165	16 499
80	384	791	1 610	2 813	3 991	8 526	15 349
90	360	742	1 510	2 640	3 745	8 000	14 401
100	340	701	1 427	2 493	3 537	7 556	13 603
125	301	622	1 264	2 210	3 135	6 697	12 056
150	273	563	1 146	2 002	2 841	6 068	10 924
175	251	518	1 054	1 842	2 613	5 582	10 050
200	234	482	981	1 714	2 431	5 193	9 350
250	207	427	869	1 519	2 155	4 603	8 286
300	188	387	787	1 376	1 952	4 170	7 508
350	173	356	724	1 266	1 796	3 837	6 907
400	161	331	674	1 178	1 671	3 569	6 426
450	151	311	632	1 105	1 568	3 349	6 029
500	142	294	597	1 044	1 481	3 163	5 695

(Continued)

Table B.9 a) (Continued)

	Outside diameter (in)						
Length of tube, ft	**3/8**	**1/2**	**5/8**	**3/4**	**7/8**	**1-1/8**	**1-3/8**
600	129	266	541	946	1 342	2 866	5 160
700	119	245	498	870	1 234	2 637	4 747
800	110	228	463	810	1 148	2 453	4 416
900	104	214	435	760	1 078	2 302	4 144
1 000	98	202	411	717	1 018	2 174	3 914
1 200	89	183	372	650	922	1 970	3 547
1 400	82	168	342	598	848	1 812	3 263
1 600	76	156	318	556	789	1 686	3 035
1 800	71	147	299	522	741	1 582	2 848
2 000	67	139	282	493	700	1 494	2 690

Table B.9 b)
Maximum capacity of propane in kW for copper tubing for pressures of 70 kPa based on a pressure drop of 35 kPa

	Outside diameter (mm)						
Length of tube, m	**9.5**	**13**	**16**	**19**	**22**	**29**	**35**
3	353	729	1 482	2 591	3 676	7 852	14 135
6	243	501	1 019	1 781	2 526	5 396	9 715
9	195	402	818	1 430	2 029	4 334	7 802
12	167	344	700	1 224	1 736	3 709	6 677
15	148	305	621	1 085	1 539	3 287	5 918
18	134	276	562	983	1 394	2 978	5 362
21	123	254	517	904	1 283	2 740	4 933
24	115	237	481	841	1 193	2 549	4 589
27	108	222	452	789	1 120	2 392	4 306
30	102	210	427	745	1 058	2 259	4 067
35	93	193	392	686	973	2 078	3 742
40	87	179	365	638	905	1 934	3 481
45	82	168	343	599	849	1 814	3 266
50	77	159	324	565	802	1 714	3 085
60	70	144	293	512	727	1 553	2 795
70	64	133	270	471	669	1 429	2 572
80	60	123	251	439	622	1 329	2 393
90	56	116	235	411	584	1 247	2 245
100	53	109	222	389	551	1 178	2 120
125	47	97	197	344	489	1 044	1 879
150	43	88	179	312	443	946	1 703

(Continued)

Table B.9 b) (Continued)

	Outside diameter (mm)						
Length of tube, m	**9.5**	**13**	**16**	**19**	**22**	**29**	**35**
175	39	81	164	287	407	870	1 567
200	36	75	153	267	379	810	1 457
250	32	67	135	237	336	717	1 292
300	29	60	123	215	304	650	1 170
350	27	56	113	197	280	598	1 077
400	25	52	105	184	260	556	1 002
500	22	46	93	163	231	493	888
600	20	41	84	147	209	447	804

Table B.10 a)
Maximum capacity of propane in thousands of Btu/h for copper tubing for pressures of 20 psig based on a pressure drop of 10 psig

(See Clauses B.2.3, B.2.4, B.2.5, and B.3.5.)

	Outside diameter (in)						
Length of tube, ft	**3/8**	**1/2**	**5/8**	**3/4**	**7/8**	**1-1/8**	**1-3/8**
10	2 012	4 151	8 445	14 759	20 938	44 726	80 520
20	1 383	2 853	5 804	10 143	14 391	30 740	55 341
30	1 110	2 291	4 661	8 146	11 556	24 685	44 441
40	950	1 961	3 989	6 972	9 891	21 128	38 035
50	842	1 738	3 535	6 179	8 766	18 725	33 710
60	763	1 575	3 203	5 598	7 943	16 966	30 544
70	702	1 449	2 947	5 150	7 307	15 609	28 100
80	653	1 348	2 742	4 792	6 798	14 521	26 142
90	613	1 264	2 572	4 496	6 378	13 624	24 528
100	579	1 194	2 430	4 247	6 025	12 870	23 169
125	513	1 059	2 154	3 764	5 340	11 406	20 534
150	465	959	1 951	3 410	4 838	10 335	18 605
175	428	882	1 795	3 137	4 451	9 508	17 117
200	398	821	1 670	2 919	4 141	8 845	15 924
250	353	728	1 480	2 587	3 670	7 839	14 113
300	319	659	1 341	2 344	3 325	7 103	12 787
350	294	606	1 234	2 156	3 059	6 535	11 764
400	273	564	1 148	2 006	2 846	6 079	10 944
450	257	529	1 077	1 882	2 670	5 704	10 269
500	242	500	1 017	1 778	2 522	5 388	9 700

(Continued)

Table B.10 a) (Continued)

	Outside diameter (in)						
Length of tube, ft	**3/8**	**1/2**	**5/8**	**3/4**	**7/8**	**1-1/8**	**1-3/8**
600	220	453	922	1 611	2 285	4 882	8 789
700	202	417	848	1 482	2 103	4 491	8 085
800	188	388	789	1 379	1 956	4 178	7 522
900	176	364	740	1 294	1 835	3 920	7 058
1 000	167	344	699	1 222	1 734	3 703	6 667
1 200	151	311	633	1 107	1 571	3 355	6 040
1 400	139	286	583	1 019	1 445	3 087	5 557
1 600	129	267	542	948	1 344	2 872	5 170
1 800	121	250	509	889	1 261	2 694	4 851
2 000	114	236	481	840	1 191	2 545	4 582

Table B.10 b)
Maximum capacity of propane in kW for copper tubing for pressures of 140 kPa based on a pressure drop of 70 kPa

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
3	602	1 243	2 528	4 419	6 269	13 391	24 108
6	414	854	1 738	3 037	4 309	9 204	16 569
9	332	686	1 395	2 439	3 460	7 391	13 306
12	285	587	1 194	2 087	2 961	6 326	11 388
15	252	520	1 059	1 850	2 625	5 606	10 093
18	228	471	959	1 676	2 378	5 080	9 145
21	210	434	882	1 542	2 188	4 673	8 413
24	196	404	821	1 435	2 035	4 348	7 827
27	183	379	770	1 346	1 910	4 079	7 344
30	173	358	728	1 271	1 804	3 853	6 937
35	159	329	669	1 170	1 660	3 545	6 382
40	148	306	623	1 088	1 544	3 298	5 937
45	139	287	584	1 021	1 449	3 094	5 571
50	131	271	552	964	1 368	2 923	5 262
60	119	246	500	874	1 240	2 648	4 768
70	110	226	460	804	1 141	2 436	4 386
80	102	210	428	748	1 061	2 267	4 080
90	96	197	402	702	996	2 127	3 829
100	90	186	379	663	940	2 009	3 616
125	80	165	336	587	833	1 780	3 205
150	73	150	305	532	755	1 613	2 904

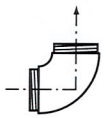
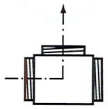
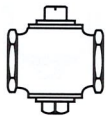
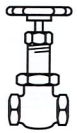
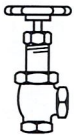
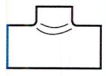
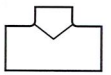
(Continued)

Table B.10 b) (Continued)

Length of tube, m	Outside diameter (mm)						
	9.5	13	16	19	22	29	35
175	67	138	280	490	695	1 484	2 672
200	62	128	261	456	646	1 381	2 486
250	55	114	231	404	573	1 224	2 203
300	50	103	209	366	519	1 109	1 996
350	46	95	193	337	478	1 020	1 836
400	43	88	179	313	444	949	1 708
500	38	78	159	278	394	841	1 514
600	34	71	144	251	357	762	1 372

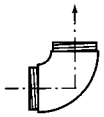
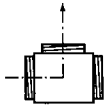
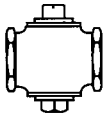
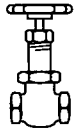
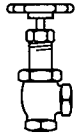
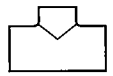
Table B.11 a)
Resistance of bends, fittings, and valves for natural gas and propane expressed in equivalent length of straight pipe in feet*

(See Clauses 6.3.7, B.2.4, and B.4.)

		Threaded fittings†			Valves (threaded, flanged, or welded)				90° welding elbows and smooth bends‡	Welding tees	
		Elbows									
		45°	90°	Tee	Plug	Globe	Angle	Swing check	R/d§ = 1-1/2	Forged	Mitre**
k factor		0.42	0.9	1.8	0.9	10	5	2.5	0.36	1.35	1.8
n (L/D ratio††)		14	30	60	30	333	167	83	12	45	60
Nominal pipe size, in (Schedule 40)	Inside diameter (d), in										
3/8	0.493	0.58	1.23	2.46	1.23	13.7	6.85	3.42	0.49	1.85	2.46
1/2	0.622	0.73	1.55	3.10	1.55	17.3	8.65	4.32	0.62	2.33	3.10
3/4	0.824	0.96	2.06	4.12	2.06	22.9	11.4	5.72	0.82	3.09	4.12
1	1.049	1.22	2.62	5.24	2.62	29.1	14.6	7.27	1.05	3.93	5.24
1-1/4	1.380	1.61	3.45	6.90	3.45	38.3	19.1	9.58	1.38	5.17	6.90
1-1/2	1.610	1.88	4.02	8.04	4.02	44.7	22.4	11.2	1.61	6.04	8.04
2	2.067	2.41	5.17	10.3	5.17	57.4	28.7	14.4	2.07	7.75	10.3
2-1/2	2.469	2.88	6.16	12.3	6.16	68.5	34.3	17.1	2.47	9.25	12.3

(Continued)

Table B.11 a) (Continued)

		Threaded fittings†		Valves (threaded, flanged, or welded)					90° welding elbows and smooth bends‡	Welding tees	
		Elbows									
		45°	90°	Tee	Plug	Globe	Angle	Swing check	R/d§ = 1-1/2	Forged	Mitre**
k factor		0.42	0.9	1.8	0.9	10	5	2.5	0.36	1.35	1.8
n (L/D ratio††)		14	30	60	30	333	167	83	12	45	60
Nominal pipe size, in (Schedule 40)	Inside diameter (d), in										
3	3.068	3.58	7.67	15.3	7.67	85.2	42.6	21.3	3.07	11.5	15.3
4	4.026	4.70	10.1	20.2	10.1	112	56.0	28.0	4.03	15.1	20.2
5	5.047	5.88	12.6	25.2	12.6	140	70.0	35.0	5.05	18.9	25.2

** Values for welded fittings are for conditions where the bore is not obstructed by weld spatter or backing rings. If appreciably obstructed, values for threaded fittings shall be used.*

† Flanged fittings have three-fourths the resistance of threaded fittings.

‡ Tabular figures give the extra resistance due to curvature alone, to which should be added the actual length of the bend.

§ R/d is the ratio of the elbow or bend radius to the inside diameter of the pipe.

*** Small socket-welding fittings are equivalent to mitre elbows and mitre tees.*

†† n = resistance in equivalent number of diameters of straight pipe, computed from the relation n = k / 4f, where the friction factor, f, is assumed to be 0.0075;n = L / D , where L = equivalent length of Schedule 40 straight pipe in feet and D = inside diameter of pipe in feet. For pipe having other inside diameters, the resistance expressed in equivalent length in feet can be computed from the above n values.

Note: *The equivalent lengths in feet shown in the table have been computed on the basis that the inside diameter corresponds to that of Schedule 40 (standard-weight) steel pipe, which is close enough for most purposes involving other schedules of pipe. Where a more specific solution for equivalent length is desired, this may be made by multiplying the actual inside diameter of the pipe in feet by n / 12, or the actual diameter in feet by n, read from the table heading. The*

(Continued)

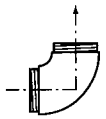
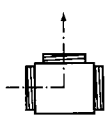
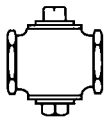
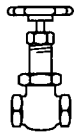
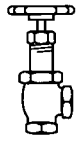
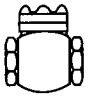
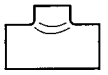
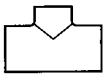
Table B.11 a) (Continued)

equivalent length values can be used with reasonable accuracy for copper or brass fittings and bends. For copper or brass values, however, the equivalent length of pipe should be taken as 45% longer than the values in the table, which are for steel pipe. Resistance per foot of copper or brass pipe is less than that of steel.

Example of calculation: To obtain the total equivalent length, add to the actual length of pipe involved the length in feet to allow for various fittings as shown in this table. Thus, if the problem involves 300 ft of NPS 4 pipe having three standard 90° elbows and two plug valves, the total equivalent length will be as follows:

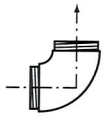
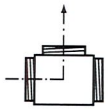
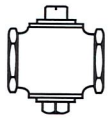
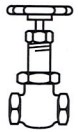
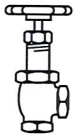
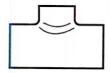
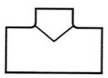
$300 + (3 \times 10.1) + (2 \times 10.1) = 350.5$ ft

Table B.11 b)
Resistance of bends, fittings, and valves for natural gas and propane expressed in equivalent length of straight pipe in metres*

		Threaded fittings†			Valves (threaded, flanged, or welded)				90° welding elbows and smooth bends‡	Welding tees	
		Elbows									
		45°	90°	Tee	Plug	Globe	Angle	Swing check	R/d§ = 1-1/2	Forged	Mitre**
k factor		0.42	0.9	1.8	0.9	10	5	2.5	0.36	1.35	1.8
n (L/D ratio††)		14	30	60	30	333	167	83	12	45	60
Nominal pipe size, in (Schedule 40)	Inside diameter (d), mm										
3/8	12.52	0.18	0.37	0.75	0.37	4.18	2.09	1.04	0.15	0.56	0.75
1/2	15.80	0.22	0.47	0.94	0.47	5.27	2.64	1.29	0.19	0.71	0.94
3/4	20.93	0.29	0.63	1.26	0.63	6.98	3.47	1.74	0.25	0.94	1.26
1	26.64	0.37	0.80	1.60	0.80	8.87	4.45	2.22	0.32	1.20	1.60
1-1/4	35.05	0.49	1.05	2.10	1.05	11.67	5.82	2.92	0.42	1.58	2.10
1-1/2	40.89	0.49	1.23	2.45	1.23	13.62	6.83	3.41	0.49	1.84	2.45
2	52.50	0.73	1.58	3.14	1.58	17.50	8.75	4.39	0.63	2.36	3.14
2-1/2	62.71	0.88	1.88	3.75	1.88	20.88	10.45	5.21	0.75	2.82	3.75
3	77.93	1.09	2.34	4.66	2.34	25.97	12.98	6.49	0.94	3.51	4.66

(Continued)

Table B.11 b) (Continued)

		Threaded fittings†			Valves (threaded, flanged, or welded)				90° welding elbows and smooth bends‡	Welding tees	
		Elbows									
		45°	90°	Tee	Plug	Globe	Angle	Swing check	R/d§ = 1-1/2	Forged	Mitre**
k factor		**0.42**	**0.9**	**1.8**	**0.9**	**10**	**5**	**2.5**	**0.36**	**1.35**	**1.8**
n (L/D ratio††)		**14**	**30**	**60**	**30**	**333**	**167**	**83**	**12**	**45**	**60**
Nominal pipe size, in (Schedule 40)	**Inside diameter (d), mm**										
4	**102.3**	1.23	3.08	6.16	3.08	34.14	17.07	8.53	1.23	4.60	6.16
5	**128.2**	1.79	3.84	7.68	3.84	42.67	21.33	10.67	1.54	5.76	7.68

** Values for welded fittings are for conditions where the bore is not obstructed by weld spatter or backing rings. If appreciably obstructed, values for threaded fittings shall be used.*

† Flanged fittings have three-fourths the resistance of threaded fittings.

‡ Tabular figures give the extra resistance due to curvature alone, to which should be added the actual length of the bend.

§ R/d is the ratio of the elbow or bend radius to the inside diameter of the pipe.

*** Small socket-welding fittings are equivalent to mitre elbows and mitre tees.*

†† n = resistance in equivalent number of diameters of straight pipe, computed from the relation n = k / 4f, where the friction factor, f, is assumed to be 0.0075; n = L / D, where L = equivalent length of Schedule 40 straight pipe in metres and D = inside diameter of pipe in metres. For pipe having other inside diameters, the resistance expressed in equivalent length in metres can be computed from the above n values.

Note: *The equivalent lengths in metres shown in the table have been computed on the basis that the inside diameter corresponds to that of Schedule 40 (standard-weight) steel pipe, which is close enough for most purposes involving other schedules of pipe. Where a more specific solution for equivalent length is desired, this may be made by multiplying the actual inside diameter of the pipe in metres by n / 12, or the actual diameter in metres by n, read from the table heading. The equivalent length values can be used with reasonable accuracy for copper or brass fittings and bends. For copper or brass values, however, the*

(Continued)

Table B.11 b) (Continued)

equivalent length of pipe should be taken as 45% longer than the values in the table, which are for steel pipe. Resistance per metre of copper or brass pipe is less than that of steel.

Example of calculation: To obtain the total equivalent length, add to the actual length of pipe involved the length in metres to allow for various fittings as shown in this table. Thus, if the problem involves 100 m of NPS 4 pipe having three standard 90° elbows and two plug valves, the total equivalent length will be as follows:

$100 + (3 \times 3.08) + (2 \times 3.08) = 115.4$ m

Table B.12
Use of capacity tables for sizing plastic pipe for natural gas and propane
(See Clause 6.3.5.)

Nominal pipe size	Pipe inside diameters, in									
	Schedule 40 steel pipe		SDR 21 plastic pipe		SDR 13.5 plastic pipe		SDR 11 plastic pipe		SDR 8.8 plastic pipe	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1/2	0.64	0.67	0.68	0.72	0.62*	0.66*	0.61*	0.66*	0.6*	0.65*
3/4	0.83	0.87	0.83	0.88	0.83	0.88	0.81*	0.87*	0.76*	0.82*
1	1.07	1.1	1.09	1.14	1.08	1.13	1.02*	1.08*	0.95*	1.02*
1-1/4	1.4	1.43	1.44	1.49	1.37*	1.42*	1.3*	1.37*	1.21*	1.29*
1-1/2	1.63	1.66	1.67	1.73	1.57*	1.62*	1.48*	1.55*	1.4*	1.48*
2	2.1	2.14	2.1	2.15	1.98*	2.03*	1.89*	1.95*	1.77*	1.84*
2-1/2	2.5	2.55	2.55	2.61	2.39*	2.46*	2.29*	2.36*	2.14*	2.23*

** Denotes inside diameter of plastic pipe that may be less than the inside diameter of Schedule 40 steel pipe. The tables in this annex should be used only for sizing plastic pipe with inside diameters equal to or greater than steel pipe. Sometimes plastic pipe with inside diameters less than the inside diameter of Schedule 40 steel pipe sized using the tables in this annex does not supply gas at a sufficient volume and pressure. Plastic pipe with inside diameters less than the inside diameter of Schedule 40 steel pipe should be sized using the calculation method detailed in this annex.*

Notes:

1) *Dimensions of Schedule 40 steel pipe are derived from ASTM A53/A53M and ASME B36.10.*
2) *Dimensions of plastic pipe are derived from CSA B137.4.*