

## LPG Piping System

### Design and Installation

#### PE Pipework

The majority of all underground lines installed by Flogas are Medium Density Polyethylene (MDPE) gas pipe. The gas pipe comes in a variety of sizes and the size chosen for each site is specifically designed to suit the individual gas requirements of the customer.

The installation of PE pipe should always be carried out by competent trained persons.

#### Installation of PE pipework below ground level

- Pipework may be buried in an open excavation backfilled with a suitable material.
- Piping design shall make due allowance for any additional loading or constraint imposed by the backfill or underground location.
- Piping may be laid in the same trench as piping carrying inert or flammable liquids or gases but it shall not be laid in the same trench as piping carrying toxic fluids or corrosive fluids, or fluids at a temperature significantly above ambient temperature.

#### Electrofusion Jointing

All underground joints should be sealed using electrofusion. Electrofusion jointing is a system using sleeve couplers with internal heating coils. The joint surface of the pipe and fittings are raised to a specific temperature by the application of heat. The molten surfaces formed are brought together with a firm constant pressure and held steady whilst cooling takes place.

#### Adjacent Services

PE service pipework should be laid no closer than 150mm from other service pipes carrying inert or flammable liquids or gases.

PE mains should be laid no closer than 200mm from other services. PE pipework should be adequately separated from steam pipes or heating pipes or other sources of heat.

#### Depth of Cover

##### Mains

Where no abnormal loading is likely, the cover should not be less than: -

- 600mm within private property and under tarmac or grass footpaths where there is no likelihood of heavy traffic.
- 750mm under roadways and grass verges and elsewhere.

Lesser cover may be approved by a competent person if experience indicates that the proposed location gives rise to a negligible risk of interference damage.

##### Service Pipework

Cover of not less than 375mm is acceptable where the risk of interference damage or mechanical damage is negligible otherwise the depth of cover shall not be less than 600mm.

##### Trench Preparation and Backfilling

- Trenches shall be excavated to the appropriate depth for the pipe to rest on firm ground, free from stones, rocks bricks or concrete.
- The trench should be backfilled as indicated on the drawing overleaf.

## Pipe Indication

A yellow plastic indicator tape or equivalent should be laid between 100mm and 300mm above the pipe, except where: -

- (a) the route of the pipe is adequately recorded or marked or is obvious.
- (b) Other means are available for pipe location.
- (c) The pipe is a service or installation pipe which can be isolated from the main or gas supply.

Indicator tapes for PE pipe should preferably incorporate a metallic core wire, for locating the pipe route by using a suitable instrument.

## STEEL PIPE (ID SIZES)

LOW PRESSURE Propane systems operating at 37mbar and a maximum pressure drop of 2.5mbar

Length		1/2"			3/4"			1"			1 1/4"			1 1/2"		
Metres	Feet	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000
6	20	44.8	1.73	153	133.8	5.2	456.5	289.5	11.2	987	555	21.4	1 893	854.6	33	2 916
9	30	35.8	1.4	122	107.4	4.2	366	233	9	795	423.5	16.4	1 445	689	26.6	2 352
12	40	30.6	1.2	104.3	91.9	3.6	313	199.5	7.7	680	363	14	1 238	591	22.9	2 017
15	50	27	1	92.2	81.3	3.1	277	176.7	6.8	603	321.8	12.4	1 098	524	20.3	1 790
18	60	24.4	0.9	83.3	73.6	2.8	251	160	6.2	546	291.6	11.3	995	475.6	18.4	1 622
24	80	20.8	0.8	70	62.7	2.4	214	136.7	5.3	466	249.4	9.6	851	407	15.7	1 389
30	100	18.3	0.7	62.4	55.4	2.1	189	120.9	4.7	412.6	220.8	8.5	753	360.6	13.9	1 230
38	125	16	0.62	54	48	1.9	165	106	4.1	361	194	7.5	661	316.5	12.2	1 080
46	150	14.4	0.6	49	43.6	1.7	148	95.4	3.7	325	174.6	6.8	595	285.6	11	974
61	200	12.2	0.5	41	37.2	1.4	127	81.6	3.2	278	149.4	5.8	510	244.6	9.4	834
76	250	10.7	0.42	36	32.8	1.3	112	71.9	2.8	245	132	5.1	450	216	8.3	737
91	300	9.7	0.37	33	29.6	1.1	101	64.9	2.5	221	119	4.6	406	195	7.6	666
107	350	8.8	0.34	30	27	1.0	92	59.5	2.3	203	109	4.2	373	179	6.9	612
122	400	8.2	0.32	27	25	0.97	85	55	2.1	188	101	3.9	346	166	6.4	568

## STEEL PIPE (ID SIZES)

MEDIUM PRESSURE Propane systems operating at 1.0 bar and a maximum pressure drop of 70mbar (Between First Stage Regulator and Second Stage Regulator)

Length		1/2"			3/4"			1"			1 1/4"			1 1/2"		
Metres	Feet	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000
6	20	502	19.4	1 714	1 476	57	5 035	3 160	122	10 783	5 698	220	19 440	9 214	356	31 438
9	30	407.6	15.8	1 391	1 199	46.3	4 090	2 569	99	8 767	4 634	179	15 812	7 497	290	25 581
12	40	351	13.6	1 198	1 034	40	3 527	2 217	85.7	7 565	4 001	154.6	13 651	6 475	250	22 091
15	50	312.7	12.1	1 067	921.5	35.6	3 144	1 977	76.4	6 746	3 569	138	12 177	5 777	223	19 710
18	60	284.3	11	970	838.5	32.4	2 861	1 800	69.6	6 141	3 250	125.6	11 089	5 262	203	17 954
24	80	244.6	9.5	834	722	28	2 464	1 551	60	5 293	2 803	108	9 563	4 540	175	15 489
30	100	215	8.3	735	637	24.6	2 175	1 371	53	4 677	2 477	95.7	8 453	4 014	155	13 696
46	150	174	6.7	594	515	20	1 759	1 110	42.9	3 787	2 008	77.6	6 851	3 256	126	11 108
61	200	149	5.8	509	442	17	1 511	954	36.9	3 257	1 728	66.8	5 897	2 804	108	9 567

**NOTE:**

A general allowance is included in the above figures for valves and fittings, however a factor of safety should be included in the flow rates

## COPPER TUBE (OD SIZES)

**LOW PRESSURE** Propane systems operating at 37mbar and a maximum pressure drop of 2.5mbar

Length		10mm			15mm			22mm			28mm		
Metres	Feet	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000
3	10	9.4	0.36	32	21.4	0.83	70	113.9	4.4	388	297	11.5	1 013
6	20	6.2	0.24	21	13.8	0.53	47	76.8	2.9	262	201	7.8	686
9	30	4.9	0.19	17	10.9	0.42	37	60.9	2.3	207	159.7	6.2	545
12	40	4.1	0.16	14	9.2	0.36	31	51.6	2.0	176	135.7	5.2	463
15	50	3.6	0.14	12	8.1	0.31	27	45.4	1.8	155	119.6	4.6	408
18	60	3.2	0.13	11	7.2	0.28	25	40.9	1.6	139	107.6	4.1	367
21	70	3.0	0.11	10	6.6	0.26	23	37.4	1.4	127	98.5	3.8	336
24	80	2.7	0.10	9	6.1	0.24	21	34.6	1.3	118	91.4	3.5	312

## POLYETHYLENE PIPE (OD SIZES)

**MEDIUM PRESSURE** Operating pressure 1bar with maximum pressure drop of 70mbar (Between First Stage Regulator and Second Stage Regulator)

Length		25mm			32mm			63mm		
Metres	Feet	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000	kW/hr	m <sup>3</sup> /hr	Btu/hr x1000
6	20	1 761	68	6 009	3 649	141	12 451	22 773	880	77 701
9	30	1 412	54.6	4 818	2 930	113	9 996	18 339	708	62 572
12	40	1 206	46.6	4 116	2 505	96.8	8 548	15 717	607	53 625
15	50	1 067	41.2	3 641	2 218	85.7	7 568	13 938	538	47 558
18	60	965	37.3	3 293	2 007	77.6	6 849	12 633	373	43 104
24	80	823	31.8	2 810	1 845	71.3	6 294	10 813	418	36 893
27	90	771	29.8	2 632	1 607	62	5 482	10 144	392	34 612
30	100	727	28	2 483	1 516	58.6	5 173	9 580	370	32 688
46	150	581	22	1 982	1 212	46.8	4 136	7 683	297	26 215
61	200	494	19	1 688	1 033	40	3 526	6 566	253	22 403
76	250	436	16.8	1 490	913	35.3	3 115	5 810	224	19 825
91	300	394	15	1 345	824	31.9	2 814	5 257	203	17 938
107	350	361	14	1 233	756	29.2	2 582	4 830	186	16 480
122	400	335	13	1 144	702	27	2 396	4 488	173	15 312

**NOTE:**

A general allowance is included in the above figures for valves and fittings, however a factor of safety should be included in the flow rates