

NORTH CAROLINA BUILDING CODE COUNCIL

1202 Mail Service Center
Raleigh, North Carolina 27699-1202
(919) 647-0000

Code Change Proposal
Petition for Rule Making

Item Number _____

Granted by BCC _____ Adopted by BCC _____ Approved by BCC _____
Denied by BCC _____ Disapproved by BCC _____ Objection by BCC _____

PROPONENT: Kevin Haynie _____ PHONE: (336)444-4409
REPRESENTING: Self _____
ADDRESS: 971 Long Hill Rd _____
CITY: Pilot Mountain _____ STATE: NC _____ ZIP: 27041 _____
E-MAIL: kevinhaynie@hotmail.com _____ FAX: () - _____

North Carolina State Building Code, Volume: NCFGC2018 Chapter 4 Section: 403.5.3 _____

CHECK ONE: [] Revise section to read as follows: [] Delete section and substitute the following:
[X] Add new section to read as follows: [] Delete section without substitution:

~~LINE THROUGH MATERIAL TO BE DELETED~~ UNDERLINE MATERIAL TO BE ADDED

Type or print. Continue proposal or reason on plain paper attached to this form. See reverse side for instructions.

See Attachment A.

Will this proposal add to the cost of construction? Yes [] No [X]

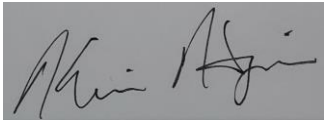
Explain total economic impact for added cost or savings in REASON.

Provide a fiscal analysis of any increase (or decrease) in cost. The proposed piping system is half the cost of CSST and 1/3rd the cost of other materials. Installation time is also cut about in half and requires fewer workers to install as its' light weight can be managed by one installer.

REASON:

See Attachment B- Discussion
See Attachment C- Letter from the Director of GasFlex to the State of NC.
See Attachment D- ISO 17484 Listing Certificate
See Attachment E- Installation Guide with Technical Specs
See Attachment F- Australian Gas Code Language for this piping system
Additional resources available at GasFlex.com

BCC CODE CHANGES

Signature:  _____

Date: 8/25/2021 _____

FORM 1/1/12

Attachment A

NCFGC 2018 Chapter 4 Section 403.5.3

Aluminum-alloy tubing shall comply with ASTM B210 or ASTM B241. Aluminum-alloy shall be coated to protect against external corrosion where it is in contact with masonry, plaster, or insulation, or is subject to repeated wettings by such liquids as water, detergent or sewage. Aluminum coextruded seamlessly in PE is considered an aluminum-alloy tubing. i.e. GasFlex

Aluminum-alloy tubing shall not be used in exterior locations or underground. An exception to this rule is if the alloy was designed for exterior and/or underground locations with manufacturer applied corrosion coatings and installed per the manufacturer's specifications. i.e. GasFlex

Attachment B

NC adopted the National Fuel Gas Code in 2018 which coincides with international fuel codes. I have come across a product that has been in the US, Europe and Australia for over 20 years. This technology was invented in the 1980's and meets International Fuel Gas Code and is officially adopted in the European Union, Australia, and several Latin countries. States across the US are recognizing that this fits ASTM B241- 7075 definition. It is aluminum in pipe by definition. The piping bares the ISO certificate and ASTM B241 coding as required.

This product is aluminum-alloy seamless tubing that has corrosion prevention coating on the exterior and interior made of PE with a special bonding layer between the PE and aluminum alloy. UV protectant was also imbedded so the pipe can be used for exterior applications. With the protective coatings, the inherent flaw of aluminum alloys is resolved. With this system, it also creates true di-electric connections removing the need to ground the system as is needed with CSST. The material is much lighter weight than other alternatives and much easier to work with. This will reduce installation costs for the consumers by reducing labor costs and material costs. This will make having gas services available for more of the state helping the home fuel industry. At 1/7th the price of copper, 1/3rd that of CSST and 1/2 of black iron pipe, you can see how attractive this product is and why it is spreading worldwide as well as approved world wide as meeting international gas code.

This is largely an unknown product in NC due to the process that is involved in having new products recognized and having code officials recognize what it is. The product is called GasFlex in the US and has been in business since 1994. It comes with international certifications and full installation guides for the product. It was engineered to be a one source fuel line. Given its' manufacturing process, what the pipe was designed to do, and the questions being raised about this pipe by state officials, I hereby recommend the afore mentioned amendment to clearly approve this material as an acceptable gas piping material for the state of NC. Australia and the EU added complete sections to their codes to remove all questions about this products viability. Given the code already allows for Aluminum-alloy tubing, clarification statements added will suffice to clear up any concerns by code officials around the state.

Aluminum-alloy gas tubing is already used in various appliances and is already present and in use in the state in various capacities. Some gas flexes are aluminum alloys. This will extend the use to main piping systems.

Attached are various documents from the manufacturer including a letter to NC from the company on its' product and how it meets code as written. Additionally is the installation guide and information from around the world recognizing this type of gas piping system as acceptable. One can also research further at GasFlex.com. When this product was shown to the local gas company, the techs were intrigued by this product and could see that it would revolutionize their gas system installs and would broaden their customer base with more affordable gas installs; Insomuch that they began researching how to become a distributor of the product. This stopped when they made their state contacts aware of this piping system and it was not recognized. No one individual is willing to state this product is what is purports to be without going through this amendment process.

I grew up the son of a NC licensed plumber having several thousand hours of experience working for his company. While I do not do plumbing as a profession now, I have ample experience working with all the various gas piping systems. This product is great. When I was researching what material to use doing a cost analysis, I came across several options. When I came across GasFlex, I started searching for NC gas codes to see if this was an acceptable material. This is not a PE plastic gas line. It is an aluminum alloy gas line that has PE protective coatings on the inside and outside. Given this pipe qualifies for the international code under section 403.5.3 (Same as NC), then logic would lead that this material is acceptable in North Carolina. The NC amendment adopting the international gas code even references metallic alloy pipes. This pipe does have the required coating to ensure the alloy is not subject to corrosion.

In general, I know gas piping for indoors must be a metallic pipe. This is mainly for the purpose if there is a home fire that the fuel line doesn't become a blow torch causing additional damages and being a danger for fire fighters. Hence the requirement if using copper with solder joints, one must use brazing that is rated for at least 1000 degrees per the code. The melting point for aluminum is over 1300 degrees. And the alloy is even higher. So the intent of the metal piping is met. Additionally this pipe given the PE coating has the flow rates of PE piping allowing smaller piping to service larger needs. This material is lighter than any other material, much easier to handle and a fraction of the cost of any other product available. About half of what CSST was calculating out to be for my home. This piping material will truly revolutionize the gas piping industry.

I implore this board to either adopt the code change as recommended, or to have an official public communication for state officials recognizing this product as meeting the present gas codes. Given there is such a product that is spurring such debate, the amendment would be good to establish its' universal applications for interior, exterior, and underground use. I have been advised this pipe meets PE piping definitions and could be used for underground use. Though this is an aluminum-alloy pipe, properly coated metal piping can be used underground as well. When asking for commitment of opinion from a few inspectors at different levels in the state, no one is willing to specifically say yes one way or the other. They either stated it is a PE pipe and can't be used indoor, but when pointed out it is aluminum alloy, they then advised it can only be used indoor, but then withdrew their statements and I was referred to this board to settle the matter. I now petition you to consider this and clear up the matter in the state.



January 15 , 2020

RE: gasFlex pipe Code Information

Dear Sirs,

The gasFlex (R) Flexible Gas Piping System, from Excel, is a complete natural gas and propane piping system internationally certified. Used in Europe and in Australia for over 20 years, this technology is now revolutionizing the way gas is installed in America. gasFlex alluminum alloy piping and fittings is ASTM B241 aluminum pipe lined with inner and outer layers of UV resistant polyethylene (PE). Aluminum tubing complies to the International Fuel Gas Code section 403.5.3 adopted by the State of North Carolina

gasFlex is a durable, reliable tubing *coated with PE*. The flexibility of gasFlex tubing results in easy rollouts. The stay-in-place rigid feature of the tubing makes it ideal for:

- Interior gas piping systems
- Underground gas piping systems
- Running gas lines to remote areas in the yard (BBQ -Jacuzzi - Space heater)

A tube is formed continuously (such as an extrusion), whereas a pipe is rolled from sheet material and seamed along its length. Tubes can have an end on them (test tubes) rounded at one end. Pipes are always open on both ends.

gasFlex alluminum alloy tubing and fittings is an ASTM B241 material lined with inner and outer layers of UV resistant polyethylene (PE)

The aluminum tube inside provides the fire resistance and the PE exterior provides the corrosion resistance.

The ASTM B241 standard covers a wide range of tubes and pipes and alloys:

Covers 5083 Aluminum in Pipe- Seamless

6010 NW 99th Ave, Unit 107
Doral , FL 33178
Ph: 305 851 3223
info@gasflex.com



Covers 5086 Aluminum in Pipe- Seamless
Covers 5086 Aluminum in Tube, Extruded, Seamless
Covers 5454 Aluminum in Pipe- Seamless
Covers 5454 Aluminum in Tube, Extruded, Seamless
Covers 5456 Aluminum in Pipe- Seamless
Covers 5083 Aluminum in Tube, Extruded, Seamless
Covers 6061 Aluminum in Tube, Extruded, Seamless
Covers 6061 Aluminum in Pipe- Seamless
Covers 6063 Aluminum in Pipe- Seamless
Covers 6063 Aluminum in Tube, Extruded, Seamless
Covers 7072 Aluminum in Pipe- Seamless
Covers 7072 Aluminum in Tube, Extruded, Seamless
Covers 7075 Aluminum in Pipe
Covers 7075 Aluminum in Tube, Extruded, Seamless
Covers 7178 Aluminum in Pipe- Seamless
Covers 7178 Aluminum in Tube, Extruded, Seamless
Covers 5456 Aluminum in Tube, Extruded, Seamless
Covers 5052 Aluminum in Pipe- Seamless
Covers 5052 Aluminum in Tube, Extruded, Seamless
Covers 2014 Aluminum in Forging - Open Die

In the case of gasFlex we have 7075 alloy aluminum pipe, coextruded with a tough and seamless PE jacket , thus complying with the aforementioned codes.

Seldom do you get new technologies that offer more economical and safer and better alternatives , such is the case of fiber optics , replacing copper for telecommunications and now gasflex replacing copper and/or CSST at a better cost and safer bonding characteristics.

Best Regards,

A handwritten signature in black ink, appearing to read "Fernan Ech Usher", is positioned below the text "Best Regards,".

Fernan Ech Usher
Director

6010 NW 99th Ave, Unit 107
Doral , FL 33178
Ph: 305 851 3223
info@gasflex.com



STANDARDSMARK LICENCE

SAI Global hereby grants:

Tubomart Enterprise Co.,Ltd

Rm 1401-1410, Block A1, Guangzhou Greenland, Central Plaza Shenzhou Road, Huangpu District,
Guangzhou, China

StandardsMark Licence

Manufactured to:

ISO 17484-1:2006 - Plastics piping systems - Multilayer pipe systems for indoor gas installations with a maximum operating pressure up to and including 5 bar (500 kPa) - Part 1: Specifications for systems

"the StandardsMark Licensee" the right to use the STANDARDSMARK as shown below only in respect of the goods described and detailed in the Schedule which are produced by the Licensee or on behalf of the Licensee* and which comply with the appropriate Standard referred to above as from time to time amended. The Licence is granted subject to the rules governing the use of the STANDARDSMARK and the Terms and Conditions for certification and licence. The Licensee covenants to comply with all the Rules and Terms and Conditions.

Licence No: SMK40185

Issued : 20 March 2019
Expires : 20 March 2024

Originally Certified : 21 March 2014
Current Certification : 19 March 2019

Kevin Goodwin
General Manager Technical Services
SAI Global Assurance



* For details of manufacture, refer to the licensee

The STANDARDSMARK is a registered certification trademark of SAI Global Pty Limited (A.C.N. 050 644 642) and is issued under licence by SAI Global Certification Services Pty Limited (ACN 108 716 669) ("SAI Global") 680 George Street, Sydney NSW 2000, GPO Box 5420 Sydney NSW 2001. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request. Refer to www.saiglobal.com, for the list of product models.



INFORM. INSPIRE. IMPROVE.



GASFLEX DESIGN AND INSTALLATION GUIDE

1. INTRODUCTION:

The objective of this manual is to provide the recommended design and installation practices of the gasflex flexible gas piping system for residential and commercial use. The user of this guide shall apply his professional criteria as well as the information provided by this guide. This guide includes the state of the art techniques according to code.

2. GAS PIPING INSTALLATION

- 1) **CUT:** gasFlex tubing comes in 100 and 200 meter coils that are conveniently marked every meter with the remaining length. Coils shall be unwound starting from the outside. Measure the distance between the gas meter to the manifold or to the first derivation. Uncoil the roll of gasFlex and cut the tubing using a gasflex cutter by placing the pipe perpendicular to the tool and apply pressure on the handle in a ratchet like motion that cuts the pipe. (Do not cut pipe using a hacksaw).



- 2) **FITTING :** Disassemble the fitting into its three parts :
SPLIT RING and **SCREW NUT**



NUT,

- 3) Slide the **NUT** into the pipe , then slide the **SPLIT RING**

- 4) Take the flaring tool and insert all the way into the pipe. Rotate the tool clockwise 360 degrees; this will create a chamfer on the pipe end preparing it for assembly with the **SPLIT RING**.



- 5) Connect the **SCREW NUT** to the fixed part of the gas line (this could be a ball valve or a black iron pipe fitting).
- 6) Check that the O-rings on **SCREW NUT** are clean , take the gasflex tubing by the flared end and slide the **SPLIT RING** so that is $\frac{1}{8}$ " from the flared end of the pipe, then insert the pipe into **SCREW NUT**.
- 7) Slide the **NUT** up to the **SCREW NUT** and start to tighten clockwise by hand and once it gets tight, use a wrench to finally tighten it up. A rule of the thumb that once is one it is hand tightened, use the wrench for one more turn.

- 8) Torque Values on Fittings

1216 $\frac{1}{2}$ " Pipe fittings: 45 ft-lbs
1620 $\frac{3}{4}$ " Pipe fittings: 65 ft-lbs
2025 1" Pipe fittings: 85 ft-lbs

IMPORTANT NOTES:

- Do not use pipe dope on the NUT threads
- Use pipe dope *only* on the tapered threads of the SCREW NUT

9) PIPE BENDING PRACTICE – (Hand Bending):

gasFlex pipe can be bent by **hand** according to the bending radiuses depicted below

1216 ½" Pipe: 3 inch bending radius by hand
1620 ¾" Pipe: 4 inch bending radius by hand
2025 1" Pipe: 6 inch bending radius by hand

10) PIPE BENDING PRACTICE – (Using Bending Tools):

The gasFlex system is outfitted with bending tools that allow smaller bending radiuses. These bending tools prevent "goose neck" and at the same time allow for tight bends around obstacles and behind the wall applications.

gasFlex pipe can be bent using **bending tools** according to the bending radiuses depicted below

1216 ½" Pipe: 1.5 inch radius using **bending tools**
1620 ¾" Pipe: 2 inch radius using **bending tools**
2025 1" Pipe: 3 inch radius using **bending tools**



Tubing marking practices:

gasFlex marking denominations are metric depicting the inner and outer diameters of the pipe mm (millimeters)

½" Nominal Size = Marked 12-16, 12mm Inner diameter & 16mm Outer diameter
¾" Nominal Size = Marked 16-20, 16mm Inner diameter & 20 mm Outer diameter
1" Nominal Size = Marked 26-32, 26mm Inner diameter & 32mm Outer diameter

The threads on the fittings are as follows:

½" Nominal Size = Marked 12-16 = Thread is ½" NPT
¾" Nominal Size = Marked 16-20 = Thread is ¾" NPT and ½" NPT
1" Nominal Size = Marked 20-25 = Thread is 1" NPT

The gasFlex piping system (TUBING AND ACCESORIES) is a multi-layered composite system consisting of interior aluminum tubing coextruded with inner and outer layers of UV resistant polyethylene (PE). The inner and outer layers of composite multilayer gasFlex are UV treated polyethylene; and its middle layer is a flexible aluminum tube. gasFlex has most of the advantages metallic pipe. Its advantages are easy bending, anti-rust, non-corrosion, and fire resistance.

The PE layers also create a shield so the tubing can be embedded in concrete or installed underground.



3 of 11

GasFlex's inner layer is formulated with carbon black to increase its tensile strength and abrasion resistance. The outer layers consist of PE formulated with UV-A and UV-B resistant components that offer an added layer of protection from direct sunlight.

Outside Installation:

gasFlex recommends that whenever the pipe is installed outside where it can be exposed to direct sunlight, it shall be covered to prevent continuous exposure.

Inside Installation:

Whenever the pipe is installed inside the building, it can be installed exposed to indoor light or it can also be embedded in concrete, or behind the wall in dry wall systems as needed.

Underground Installation

The PE layers in gasFlex create a shield that makes it resistant against acid, alkaline or salty soil and allows the system to be buried underground

General

gasFlex can be installed behind drywall and above false ceilings or surface mounted. gasFlex can be encased in concrete or buried underground without additional protection as its tough outer plastic layer resists chemicals and corrosive activity. **Superior Flow** gasFlex's smooth inner wall toughened with carbon black permanently resists scaling and abrasion, keeping gas flow constant over time

3. PIPE SUPPORT & INSTALLATION TIPS

DISTANCE BETWEEN SUPPORTS:

Horizontally : every 3 feet
Vertically : Every 10 feet

TIPS:

- Cut the pipe 6 inches longer than the measured distance
- The **gasFlex** fitting can be connected directly to the gas meter
- Gasflex can be pulled thru conduit like electric wire, conduit diameter shall be twice the diameter of the pipe and sweeping elbows are recommended for change of direction.

4. CONECTION TO GAS APPLIANCES and ELECTRICAL BONDING

gasFlex can be connected directly to fixed appliances such as water heaters, boilers, furnaces and Island Cookers without the installation of a termination outlet or flexible appliance connector. All local codes requiring drip legs and shutoff valves shall be observed.

Gas fireplaces, gas logs and non fixed gas appliances such as movable ranges shall be connected using an approved flexible appliance connector.



Fittings of the gasFlex system are made of brass and they come outfitted with a dielectrical

protection consisting of Polyethylene washers placed inside the ridge of the fitting as seen in the attached picture.

This means that there is no contact between the aluminum face of the pipe and the brass face, preventing any potential galvanic corrosion between the aluminum and the brass. The washers also provide electrical bonding as electrical conduction is interrupted .

5. TOOLS :

- **gasFlex** cutter
- **gasFlex** flaring tool (1216,1620, 2025)
- **gasFlex Inner tubing bender** (1216,1620, 2025)
- **gasFlex Outer tubing bender** (1216,1620 , 2025)
- Measuring tape
- Level
- Screwdrivers Phillips and flat
- Hammer
- Drill
- 2 Crecent Wrenches
- Hacksaw
- Pipe Dope

6. Pressure Drop Tables

gasFlex has a smooth bore inside , therefore classic flow calculation formulas like Pole's formula or Mueller's equation are valid. For practical purposes we have developed pressure drop tables.

See adenda # 1

7. Elevated pressure (2 psi – 25 Psi)

The gasFlex piping system (TUBING AND ACCESORIES) has been tested for operating pressures up to 125 Psi . Applications of pressures between 5 Psig and 25 psig are typically limited to high rise buildings mains , commercial , Industrial , agricultural and underground according to the pressure limitations set forth by local codes.

8. CODE ACCEPTANCE:

gasFlex pipe is covered by the following codes

- ISO 17484-1 International Standards Organization
- NFPA 54 USA
- ASTM F 1282 – 03 USA
- **AS4176** Australia
- PE 053.02 Brazil
- **NTC 2505** Colombia.
- **NPT 41011** Perú

9. CERTIFICACIONES:

- SAI GLOBAL Product Certificate **gasFlex**
- ISO 9001 Certificate
- SGS Test Report

10. CONVERSION FACTORS:

- 1 psi = 27.68" (w.c. = water column)
- 1 metro = 3.28 feet
- 1 " w.c. = 2.49 mbar
- 1 m³ = 35.31 cu feet
- 1 cfh = 1.048,9 btu
- 1 m³ / h = 37.040,1 btu
- 1 m³ / h = 10,86 kw
- kw = 3.411 btu

11. Protection

Concealed gasFlex should be routed in areas that will minimize the chance for physical damage or installed in areas where the tubing will be free to move to avoid potential puncture threat. gasFlex is considered free to move when there is at least 3" of clearance in the wall space. The tubing shall be protected at points of support and when passing through structural members such as joists, studs and plates.

Mechanical strike protection must be provided where all three of the following conditions are encountered:

1. **Constrained:** Tubing is not free to move to avoid a puncture threat
2. **Concealed:** View is obstructed by walls or structural members
3. **Routed Within distance of a potential strike zone:** If the tubing is routed in the construction within 3 inches of places where nails are driven and drills and screws are used

Note: Striker plates from any approved CSST provider can be used in gasFlex installations.

Sizing Tables and Capacity Charts

Capacity Tables - Natural Gas Low Pressure 7" W.C.

CAPACITY TABLE



www.gasflex.com

Gas	Natural Gas
Inlet Pressure	7.0" w.c.
Pressure Drop	3.0 in w.c.
Specific Gravity	0.6

INTENDED USE: Pipe Sizing between GAS METER and Appliance, or between 2nd stage regulator (manifold) and appliance in 2Psi systems.

Nominal OD:	1/2"	3/4"	1"
Designation	1216	1620	2025
SDR	8	10	10
Actual ID:	0.472"	0.630"	0.787"

Length (ft)	Capacity in Thousands of Btu per Hour		
	1/2"	3/4"	1"
10	167	343	599
20	118	242	423
30	96	198	345
40	83	171	299
50	75	153	268
60	68	140	244
70	63	130	226
80	59	121	211
90	56	114	200
100	53	108	189
125	47	97	169
150	43	89	154
175	40	82	143
200	37	77	134
250	33	69	120
300	30	63	109
350	28	58	101
400	26	54	95
450	25	51	89
500	24	48	85



Capacity Tables - Natural Gas

2 Psi Service

CAPACITY TABLE



www.gasflex.com

	Gas	Natural Gas
	Inlet Pressure	2.0 psi
	Pressure Drop	1.0 psi
	Specific Gravity	0.6

INTENDED USE: Pipe Sizing between Gas Meter and Second Stage (pounds to inches)
Regulator Manifold assembly

Nominal OD:	1/2"	3/4"	1"
Designation	1216	1620	2025
SDR	8	10	10
Actual ID:	0.472"	0.630"	0.787"

Length (ft)	Capacity in Thousands of Btu per Hour		
10	621	1275	2217
20	437	904	1569
30	358	733	1279
40	310	631	1108
50	276	570	989
60	252	518	904
70	235	477	846
80	218	450	784
90	206	426	733
100	194	402	699
125	174	358	631
150	160	327	573
175	148	304	529
200	138	286	495
250	124	256	443
300	113	232	402
350	104	215	375
400	97	201	351
450	92	188	331
500	24	181	314



Capacity Tables – LPG Propane Gas Low Pressure 11" W.C.

CAPACITY TABLE



www.gasflex.com

	Gas	Undiluted Propane
Inlet Pressure	11.0" w.c.	
Pressure Drop	1.0 in w.c.	
Specific Gravity	1.50	

INTENDED USE: Pipe Sizing between Integral second Stage Regulator at Tank or Second Stage (Low Pressure) Regulator and Building or Appliance.

Nominal OD:	1/2"	3/4"	1"
Designation	1216	1620	2025
SDR	8	10	10
Actual ID:	0.472"	0.630"	0.787"

Length (ft)	Capacity in Thousands of Btu per Hour		
10	179	368	645
20	127	261	455
30	104	213	372
40	90	184	322
50	80	165	288
60	73	150	263
70	68	139	243
80	63	130	227
90	60	123	215
100	57	117	203
125	51	104	182
150	46	95	166
175	43	88	153
200	40	82	144
250	36	74	129
300	33	67	118
350	30	62	109
400	28	58	102
450	27	55	96
500	25	52	91



Capacity Tables – LPG Propane Gas

2 Psi Service

CAPACITY TABLE



www.gasflex.com

	Gas	Undiluted Propane
Inlet Pressure	2.0 psi	
Pressure Drop	1.0 psi	
Specific Gravity	1.50	

INTENDED USE: Pipe Sizing between Integral second Stage Regulator at Tank or Second Stage (Low Pressure) Regulator and Building or Appliance.

Nominal OD:	1/2"	3/4"	1"
Designation	1216	1620	2025
SDR	8	10	10
Actual ID:	0.472"	0.630"	0.787"

Length (ft)	Capacity in Thousands of Btu per Hour		
10	952	1951	3411
20	672	1381	2408
30	549	1126	1968
40	476	975	1705
50	426	877	1525
60	389	795	1392
70	360	737	1289
80	336	689	1204
90	318	651	1136
100	300	617	1079
125	268	553	965
150	246	505	880
175	227	467	815
200	213	437	762
250	190	391	681
300	174	356	622
350	161	330	576
400	150	309	539
450	142	291	508
500	135	276	483

Pressure Drop Tables : **Natural Gas**

gasFlex 1/2" 1216

PRESSURE LOSS in "W.C. per foot - **NATURAL GAS** 0.64 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
26	27,283	0.024
39	40,925	0.048
52	54,567	0.070
62	64,798	0.137
75	78,439	0.192
78	81,849	0.206
81	85,260	0.222
99	103,704	0.314
107	112,543	0.360
113	118,518	0.399
120	125,852	0.444
130	136,404	0.512
134	140,741	0.543
141	148,148	0.596
150	157,333	0.665
159	166,667	0.738
168	175,926	0.814
177	185,185	0.894
194	203,704	1.065
212	222,222	1.250
230	240,741	1.449
247	259,259	1.662
265	277,778	1.889
282	296,296	2.130
300	314,815	2.385
318	333,333	2.654
335	351,852	2.937
353	370,370	3.234

gasFlex3/4" 1620

PRESSURE LOSS in "W.C. per foot - **NATURAL GAS** 0.64 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
26	27,283	0.010
39	40,925	0.015
52	54,567	0.025
62	64,798	0.033
75	78,439	0.063
78	81,849	0.068
81	85,260	0.073
99	103,704	0.102
107	112,543	0.118
113	118,518	0.130
120	125,852	0.144
130	136,404	0.165
134	140,741	0.175
141	148,148	0.192
150	157,333	0.214
159	166,667	0.237
168	175,926	0.261
177	185,185	0.286
194	203,704	0.339
212	222,222	0.397
230	240,741	0.459
247	259,259	0.525
265	277,778	0.595
282	296,296	0.670
300	314,815	0.748
318	333,333	0.831
335	351,852	0.917
353	370,370	1.007
388	407,407	1.201
424	444,444	1.410
459	481,481	1.637
494	518,518	1.879
530	555,555	2.138

gasFlex 1" 2025

PRESSURE LOSS in "W.C. per foot - **NATURAL GAS** 0.64 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
39	98,429	0.006
52	131,238	0.010
62	155,845	0.014
75	188,655	0.021
78	196,856	0.023
81	205,060	0.025
99	249,418	0.037
107	270,679	0.044
113	285,049	0.048
120	302,687	0.055
130	328,067	0.064
134	338,496	0.068
141	356,312	0.076
150	378,403	0.085
159	400,851	0.096
168	423,120	0.107
177	445,390	0.118
194	489,929	0.143
212	534,468	0.170
230	579,007	0.200
247	623,545	0.232
265	668,084	0.266
283	712,623	0.302
300	757,162	0.341
318	801,701	0.383
336	846,240	0.427
353	890,779	0.473
389	979,857	0.572
424	1,068,935	0.681
500	1,261,370	0.948
550	1,387,507	1.147
600	1,513,644	1.365
650	1,639,781	1.602
700	1,765,918	1.857

Pressure Drop Tables : LPG

gasFlex 1/2" 1216

 PRESSURE LOSS in "W.C. per foot - **LPG PROPANE GAS** 1.55 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
8	20,000	0.002
16	40,000	0.007
20	50,000	0.010
26	65,600	0.017
39	98,400	0.034
52	131,200	0.058
62	155,800	0.080
75	188,600	0.114
78	196,799	0.123
81	205,000	0.132
99	249,345	0.192
107	270,599	0.222
113	284,966	0.246
120	302,598	0.276
130	327,971	0.321
134	338,397	0.340
141	356,207	0.374
150	378,292	0.421
159	400,733	0.471
168	422,996	0.523
177	445,259	0.578
194	489,785	0.690
212	534,311	0.818
230	578,837	0.958
247	623,363	1.099
265	667,889	1.260
282	712,415	1.421
300	756,940	1.603
318	801,466	1.795
335	845,992	1.987
353	890,518	2.201

**gasFlex3/4" 1620**PRESSURE LOSS in "W.C. per foot - **LPG PROPANE GAS** 1.55 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
8	20,000	0.000
16	40,000	0.001
20	50,000	0.003
26	65,600	0.004
39	98,400	0.008
52	131,200	0.014
62	155,800	0.018
75	188,600	0.027
78	196,799	0.029
81	205,000	0.031
99	249,345	0.045
107	270,599	0.052
113	284,966	0.057
120	302,598	0.064
130	327,971	0.075
134	338,397	0.079
141	356,207	0.087
150	378,292	0.098
159	400,733	0.109
168	422,996	0.121
177	445,259	0.134
194	489,785	0.159
212	534,311	0.188
230	578,837	0.219
247	623,363	0.251
265	667,889	0.279
282	712,415	0.324
300	756,940	0.364
318	801,466	0.407
335	845,992	0.450
353	890,518	0.498
388	979,570	0.598
424	1,068,622	0.709
459	1,157,674	0.827
494	1,246,725	0.954
538	1,335,777	1.094
600	1,513,200	1.393
---	---	---

gasFlex 1" 2025

PRESSURE LOSS in "W.C. per foot - **LPG PROPANE GAS** 1.55 Specific Gravity

Flow cfh	POWER BTUH	PRESSURE LOSS "W.C./ foot
39	98,400	0.002
52	131,200	0.004
62	155,800	0.006
75	188,600	0.009
78	196,799	0.010
81	205,000	0.010
99	249,345	0.016
107	270,599	0.018
113	284,966	0.020
120	302,598	0.023
130	327,971	0.027
134	338,397	0.029
141	356,207	0.032
150	378,292	0.036
159	400,733	0.040
168	422,996	0.045
177	445,259	0.050
194	489,785	0.060
212	534,311	0.071
230	578,837	0.084
247	623,363	0.097
265	667,889	0.111
282	712,415	0.127
300	756,940	0.143
318	801,466	0.160
335	845,992	0.179
353	890,518	0.198
388	979,570	0.240
424	1,068,622	0.285
500	1,261,000	0.397
550	1,387,100	0.480
600	1,513,200	0.572
650	1,639,300	0.671
700	1,765,400	0.778
750	1,891,500	0.893
800	2,017,600	1.017
850	2,143,700	1.148
900	2,269,800	1.287
950	2,395,900	1.433
1,000	2,522,000	1.588
1,050	2,648,100	1.751
1,100	2,774,200	1.922

Electrical Bonding, Grounding and Galvanic Protection

The gasFlex piping system (TUBING AND ACCESORIES) is a multi-layered composite system consisting of an interior aluminum tubing coextruded with inner and outer layers of UV resistant polyethylene (PE).

GROUNDING:

Since there is no electrical conduction within the gasflex pipe system there are no chances of electric shock to people who come in contact with the gas piping. Appliances connected to the gasflex piping system shall be grounded per electrical code.

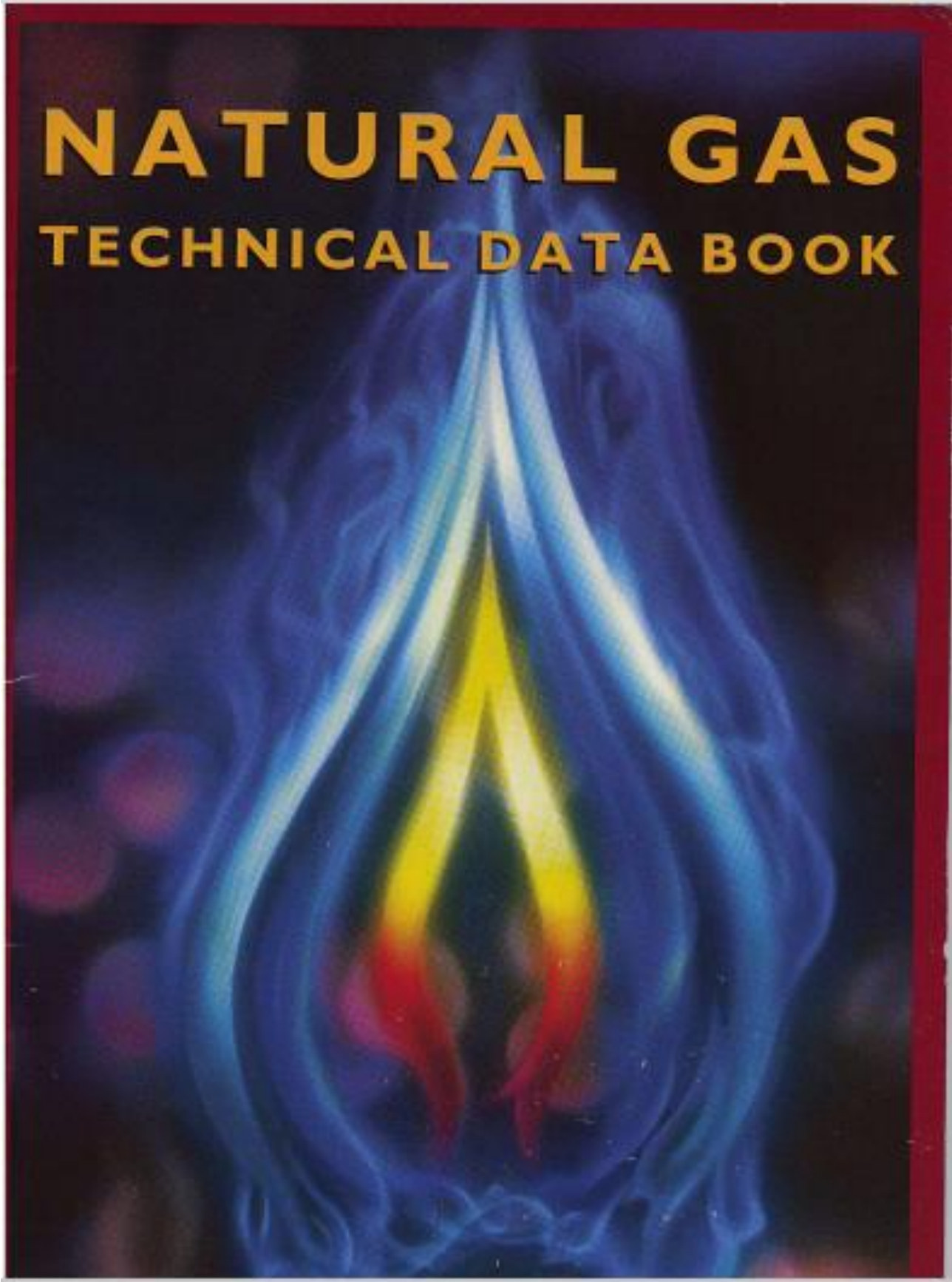
BONDING:

Unlike CSST, copper or Black Iron Pipe, there is no electrical conduction within the gasflex pipe system and there is no chance of electrical surge caused by nearby lightning strikes. However bonding conductors between the appliances and the electrical service equipment enclosure is recommended to keep all appliances at a common voltage. When an additional grounding electrode(s) is used for the gas service, it shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding system.

GALVANIC CORROSION PROTECTED

Fittings of the gasFlex system are made of brass and they come outfitted with a dielectrical protection consisting of PE washers placed inside the ridge of the fitting as seen in the attached picture resulting in no contact between the aluminum face of the pipe and the brass fitting, preventing electrical conduction and thus any potential galvanic corrosion between the aluminum and the brass.





KITEC PIPING SYSTEM

A new piping system approved for gas installation to T&P's under the Australian Standard AS4176-1994 is the Hardie Iplex product, Kitec.

Kitec piping differs from the traditional piping materials in that it is a composite of both polymer and metal, where aluminium tubing is sandwiched between inner and outer bonded layers of polyethylene. The combined effect is a corrosion resistant tube which is lightweight, tough, and keeps its sectional form while maintaining an angle when bent.

Installation:

Ease, speed and uniform quality of installation are attributes characteristic of the Kitec system. The piping being flexible can be transported in 30m coils to a site, unrolled and then serpented around obstacles between connection points. This ability allows for the use of only a minimal number of fittings.

Fittings are of a crimped variety and as such do not require either oxy-acetylene or torch cutting equipment to attach.

Crimping is performed using a lever type single action tool which produces a leak-tight connection without the application of any sealant.

Timed trials by experienced fitters on typical domestic installations have shown labour time savings on average of 30% over similar copper installation.

An extensive range of fittings, including transition fittings (from crimp type to threaded, etc.) are available to suit the following sizes of pipe.

PIPE DESIGNATION	NOM LD. (mm)	NOM O.D. (mm)	WEIGHT PER METER (kg)	WEIGHT PER 30m COIL (kg)
1216	12	16	0.10	3.0
1620	16	20	0.15	4.5
2025	20	25	0.20	6.0

TECHNICAL DATA

Chemical Resistance Non-corrosive, resists most acids, salt, solutions, alkalines, fats and oils

Operating Temperature Range -20°C to 60°C

Recommended Support Spacing Horizontal: 1m
Vertical: 2m

Fittings Hardie Iplex Fittings for Kitec only

Gas (Oxygen) Permeability Zero

Thermal Conductivity 0.45 W/mK

Linear Coefficient of Thermal Expansion 2.5×10^{-5} per °C

