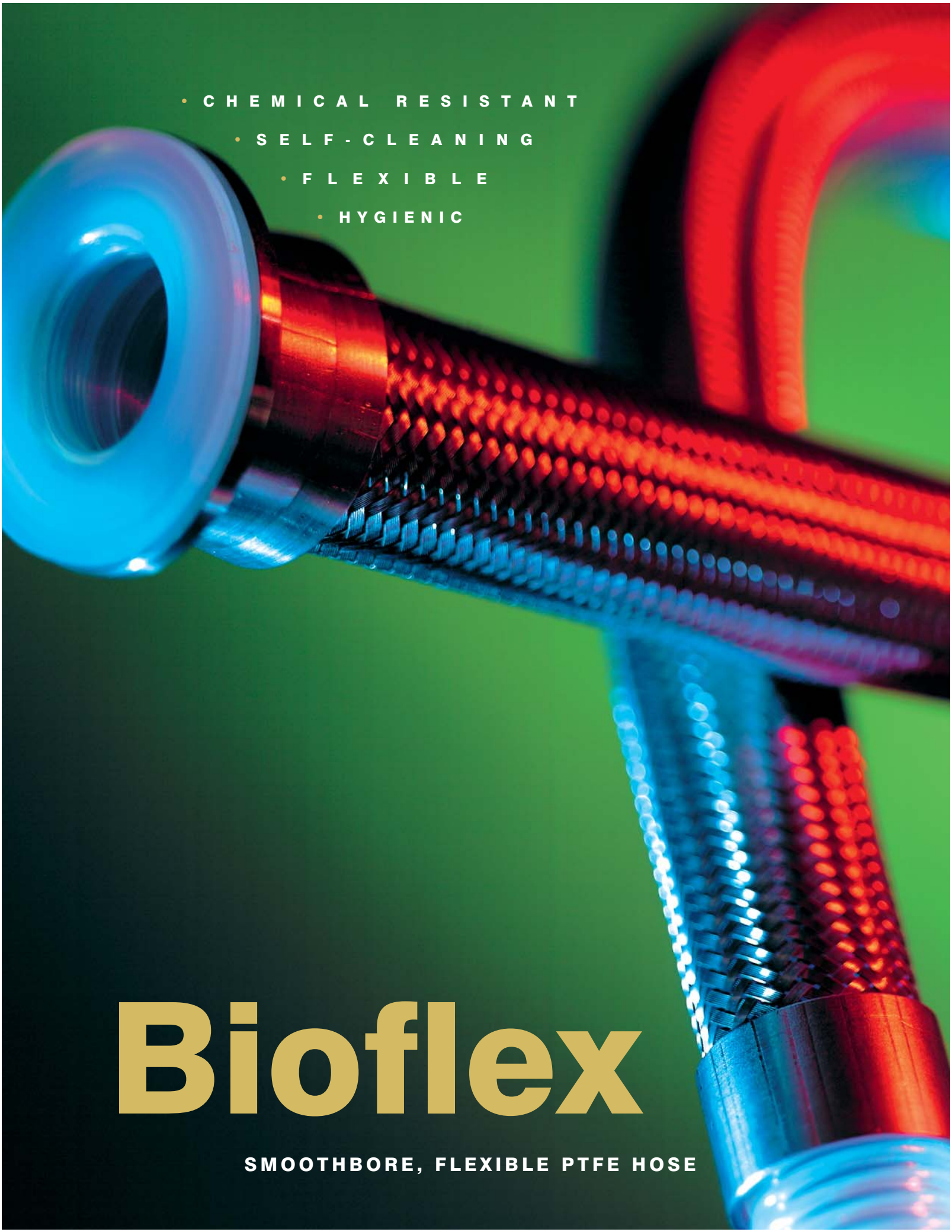

• CHEMICAL RESISTANT
• SELF-CLEANING
• FLEXIBLE
• HYGIENIC
Bioflex
SMOOTHBORE, FLEXIBLE PTFE HOSE

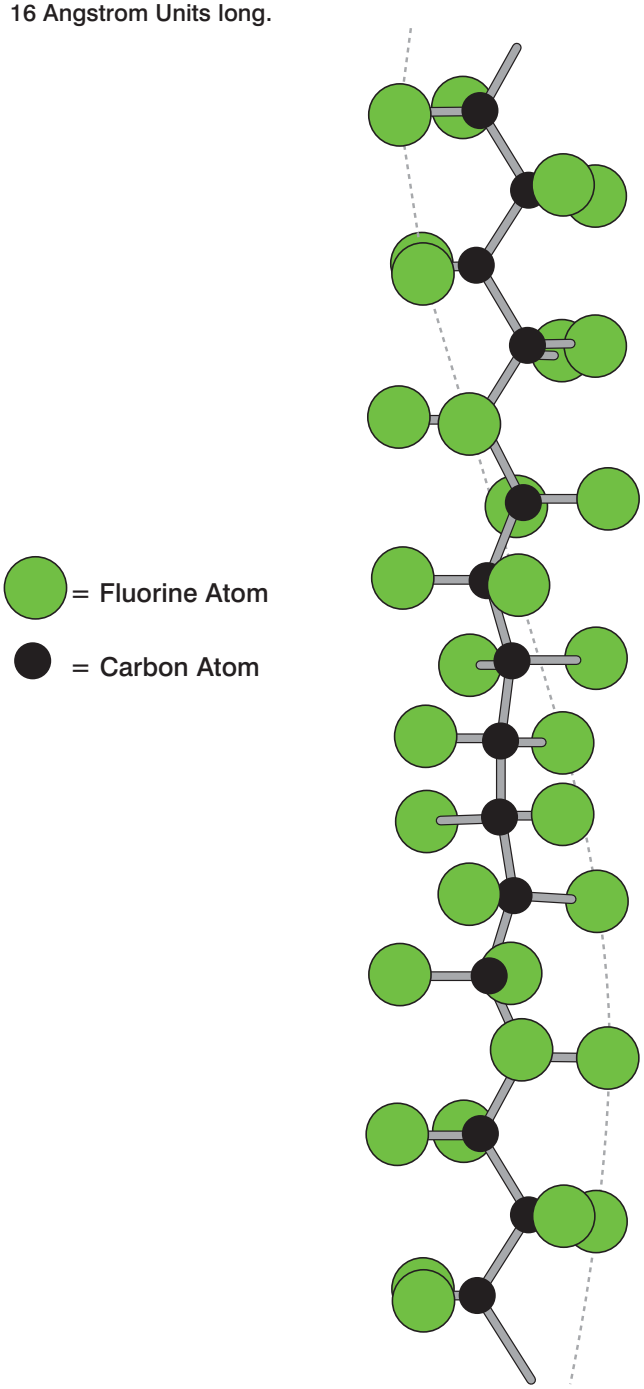
Bioflex...

The World's Leading PTFE-Lined Flexible Hose.

Contents

PTFE - The Optimum Choice For Hose Linings

Section from a PTFE Molecule,
16 Angstrom Units long.



PTFE, or Polytetrafluoroethylene, comprises long-chain molecules of carbon atoms, each linked to two fluorine atoms.

The fluorine atoms provide a helical spiral which surrounds the carbon chain and protects it.

It is this structure which creates the unique properties for which PTFE is well-known.

Excellent Chemical Resistance

PTFE is renowned as the most chemically resistant material known. Only a very few, very unusual substances and conditions can affect it, like fluorine gas at high temperature and pressure and liquid, boiling sodium metal.

PTFE lined hoses can therefore be used for a wider variety of chemicals than any other hose type, making it the ideal choice for very corrosive chemical applications and multi-product applications.

Non-Stick Surface

The use of PTFE as a surface for cookware products has demonstrated to the world how easily cleanable PTFE surfaces are.

This means that PTFE lined hoses can be purged 100% clean more easily, faster and more reliably than any other type of hose.

Excellent Temperature Range

The cookware application also demonstrates another of PTFE's many attributes - temperature resistance. PTFE itself can be used as a hose liner at temperatures from -240˚F through +500˚F, dependent upon the hose design and the application conditions.

This is the widest temperature range of any rubber or plastic hose lining material.

Hose Design

The only issue with PTFE as a hose lining material is the best way it can be integrated in to the hose design. This is where Aflex Hose have a proven record of success over the last 30 years.

Aflex Hose

The World's Leading Manufacturer of PTFE Flexible Hose

Aflex Hose, founded in 1973, pioneered the concept of PTFE lined flexible hose for the transfer of process fluids more than 30 years ago.

Corroflon convoluted PTFE hose and other types of PTFE hose, manufactured and supplied by Aflex, are used by major Chemical, Pharmaceutical and Food companies worldwide.

Over the years, hundreds of thousands of custom-built hoses have been designed and built to cope with the most difficult of operating conditions, and Aflex have continuously developed and expanded their product range having pioneered and introduced Antistatic hose, Polypropylene Braided hose and many other innovations in response to customer demands.

In 1998, Aflex fulfilled the most stringent demand yet.

Customers, worldwide, had always asked for the ultimate PTFE lined flexible hose... one product which incorporates the advantages of both convoluted and smoothbore designs. A product which is sufficiently flexible, like convoluted, yet which retains the advantages offered by smoothbore, like fast flow rate and cleanability.

After years of painstaking research and development, Aflex launched such a hose ... **Bioflex**.

Bioflex is a smoothbore, highly flexible, PTFE lined hose. Its design overcomes the disadvantages of conventional smoothbore and convoluted PTFE flexible hose designs, dramatically improving on many of their individual technical performance parameters.

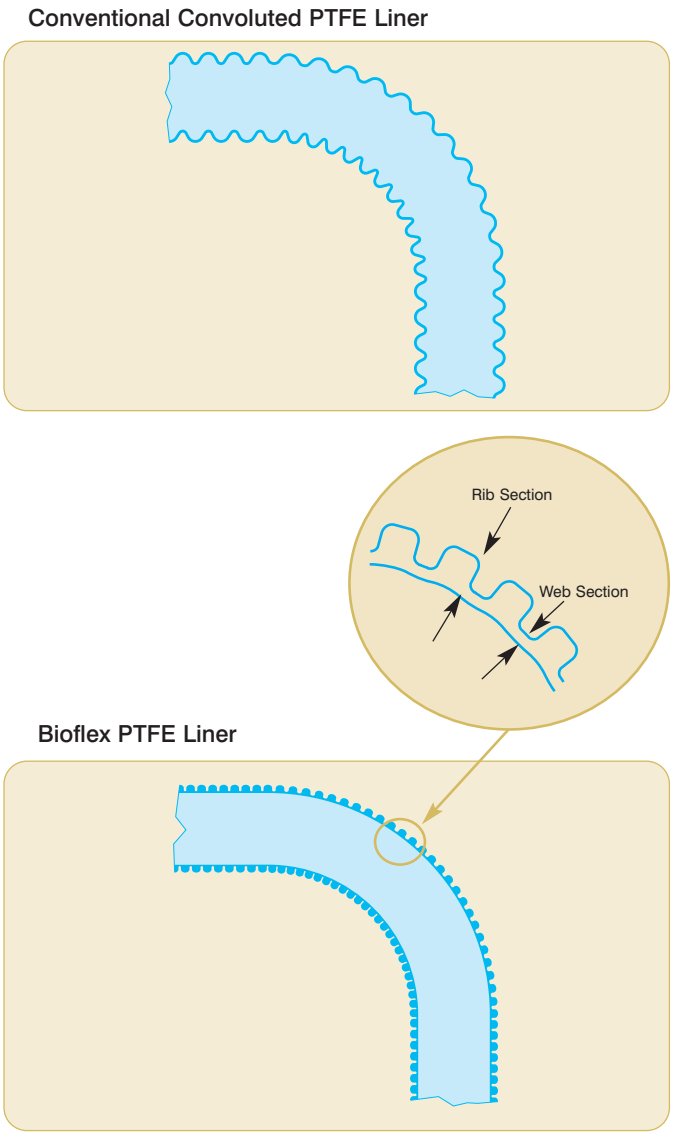
The key feature of Bioflex PTFE hose is the PTFE liner design, which comprises integral rib sections which support the tube against kinking, vacuum and pressure, and highly compressed web sections which give a smoothbore inner surface and excellent flexibility.

Another feature is the integral PTFE lined and flared end fitting design (see next page) which is available for all the standard end fittings on Bioflex Hose Assemblies.

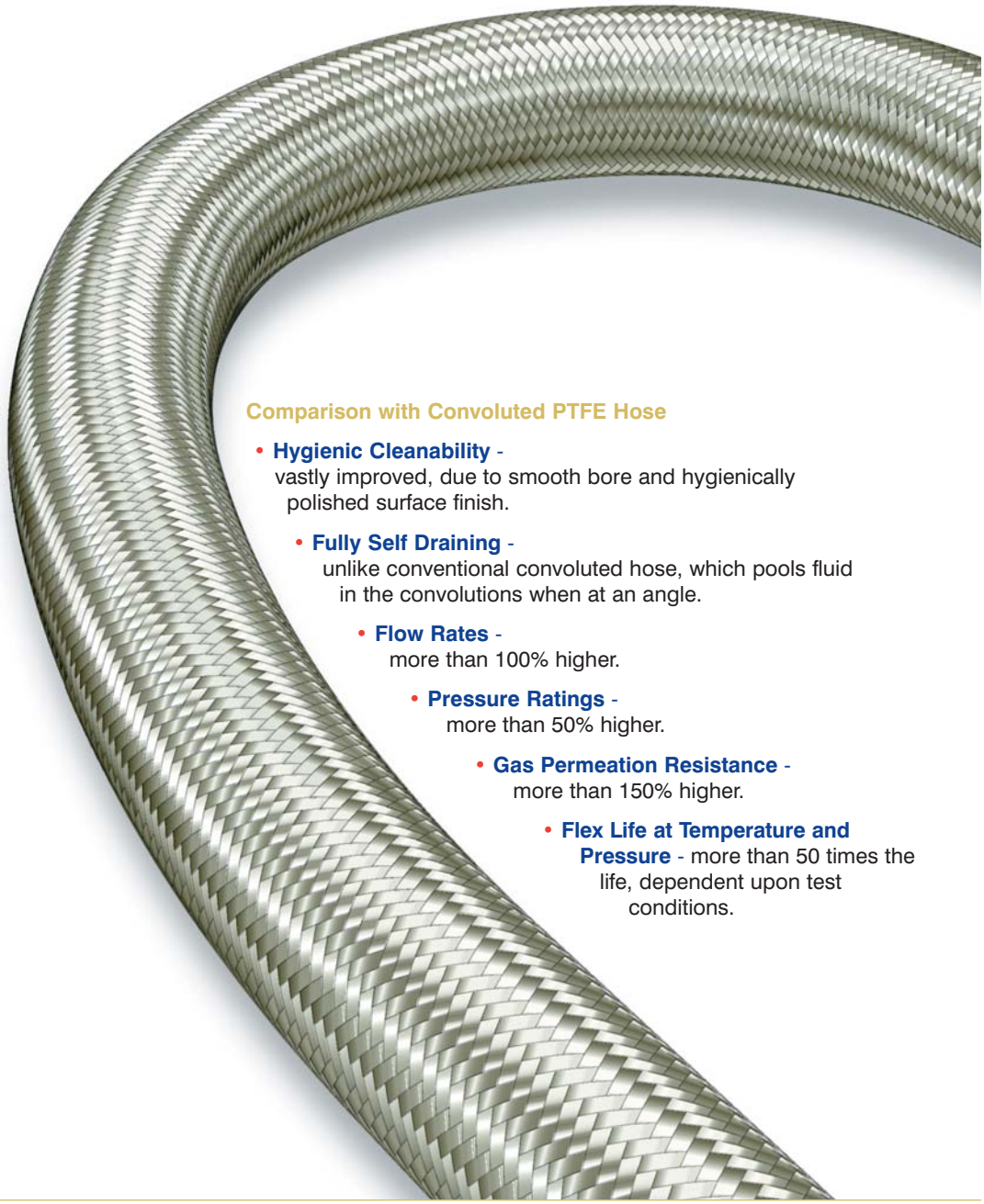
This provides clean, full-bore flow through the end fitting without any entrapment points - unlike conventional fittings, which introduce a bore restriction, also a crevice at the end of the fitting tail.

This PTFE lining also protects the end fitting from any corrosive media passing through the hose bore.

Today, Bioflex has become the established standard in process fluids applications all over the world, and continues to be introduced into new applications every day.



Bioflex. The World's Leading



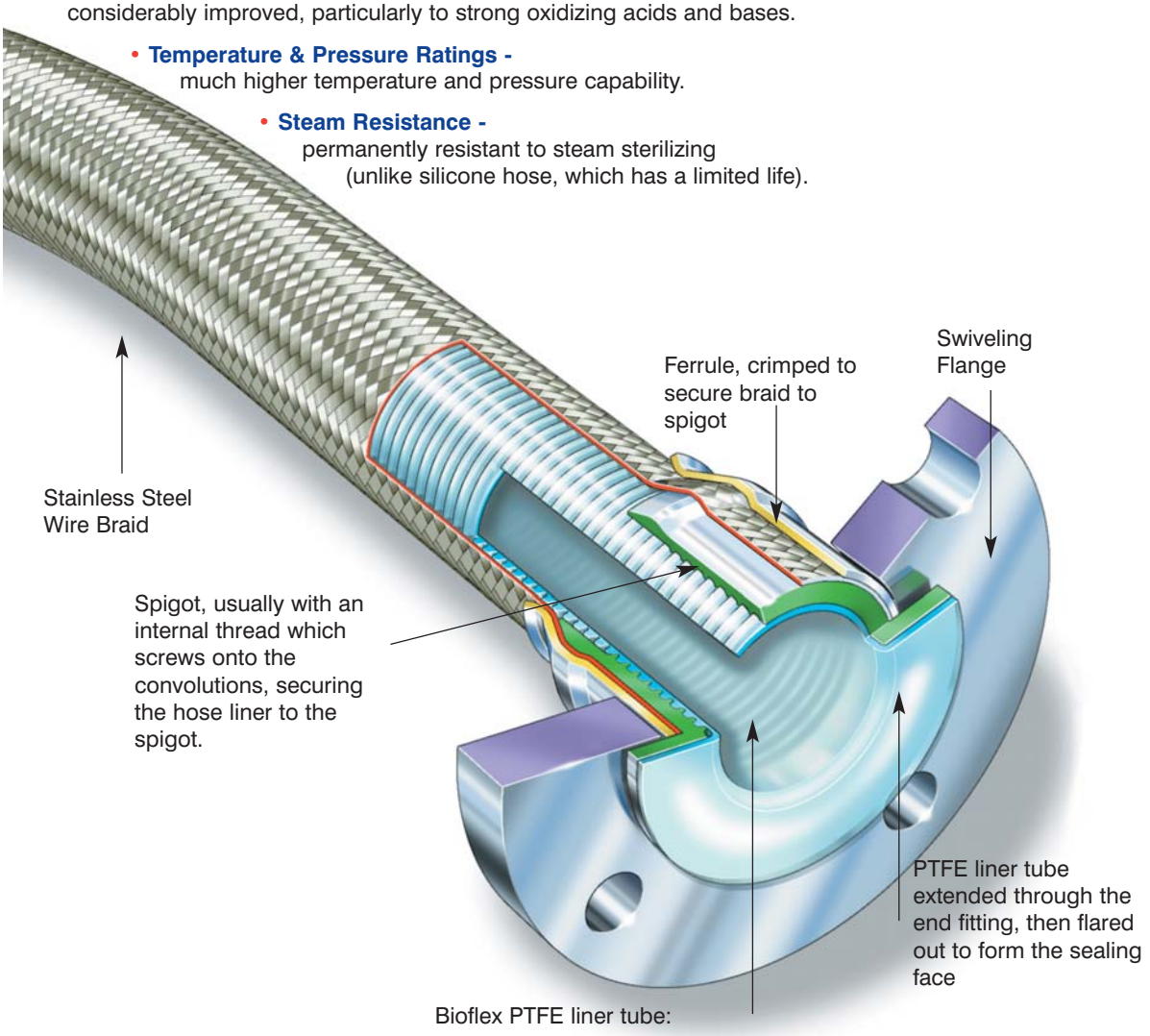
Comparison with Convoluted PTFE Hose

- **Hygienic Cleanability** - vastly improved, due to smooth bore and hygienically polished surface finish.
- **Fully Self Draining** - unlike conventional convoluted hose, which pools fluid in the convolutions when at an angle.
- **Flow Rates** - more than 100% higher.
- **Pressure Ratings** - more than 50% higher.
- **Gas Permeation Resistance** - more than 150% higher.
- **Flex Life at Temperature and Pressure** - more than 50 times the life, dependent upon test conditions.

PTFE - Lined Flexible Hose

Comparison with Silicone Rubber Hose

- **Hygienic Cleanability -**
  much better, due to highly polished inner surface finish.
- **Chemical Resistance -**
  considerably improved, particularly to strong oxidizing acids and bases.
- **Temperature & Pressure Ratings -**
  much higher temperature and pressure capability.
- **Steam Resistance -**
  permanently resistant to steam sterilizing
  (unlike silicone hose, which has a limited life).



Bioflex PTFE liner tube:

- externally convoluted
- smooth bore, with slight ripples
- internal surface finish is 'mirror smooth', generated by hot polishing during manufacture

The Bioflex Test Program

Bioflex has been designed to fulfill the most demanding of customer expectations and, as such, has been subjected to a highly complex and rigorous Proof Testing Program, parts of which are described here.

Test # 1. The 'Flip-Flop' Test.

The 'Flip Flop' test was invented by Aflex Hose to combine the extremes of flexing, temperature and pressure simultaneously. The hose is flexed to its Minimum Bend Radius in two opposing directions through a 240° arc. It is cycled through this flexing profile 20 times per minute, while pressurized to its Maximum Working Pressure, inside an oven heated to 356°F.

Results

Bioflex consistently achieves more than 50 times the life of standard convoluted hose.

Typically, a 1in Bioflex hose is still intact tested at 725 psi for 100,000 cycles, whilst a 1in convoluted hose tested at 435 psi fails due to the inner tube bursting after 1,300 cycles.

Similar results are also achieved when testing without pressure, at room temperature.

Test # 2. The Permeability Test.

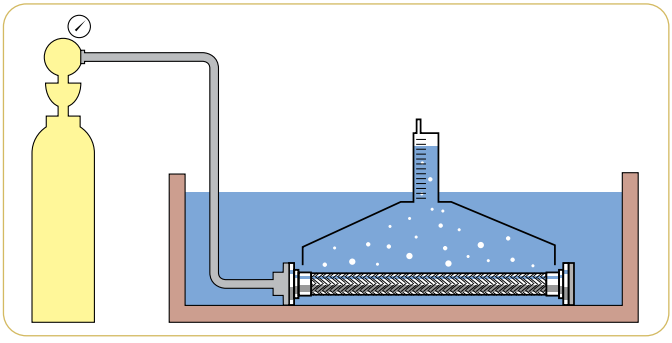
Fixed lengths of Bioflex were pressurized to 435 psi with Helium Gas, and compared with samples of standard convoluted PTFE hose.

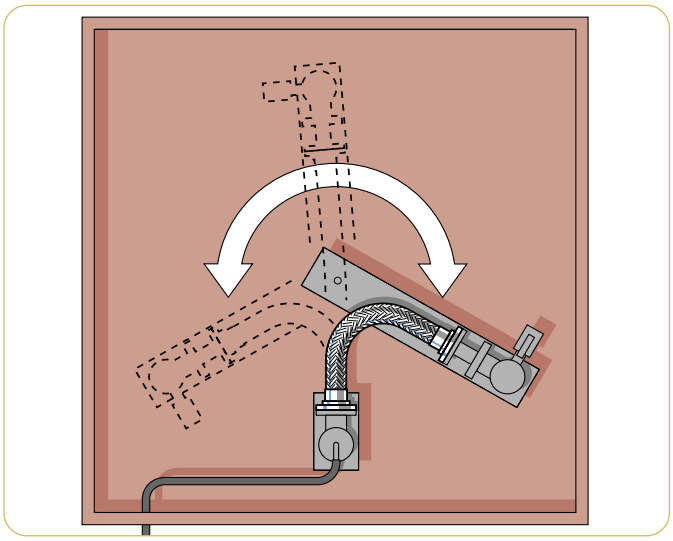
Results

Bioflex has more than 2.5 x the permeation resistance of standard convoluted hose. Milliliters of helium which permeated hose, per foot, per hour:

1in Bioflex = 42

1in Convoluted = 113





Test No# 3. The Flow Rate Test.

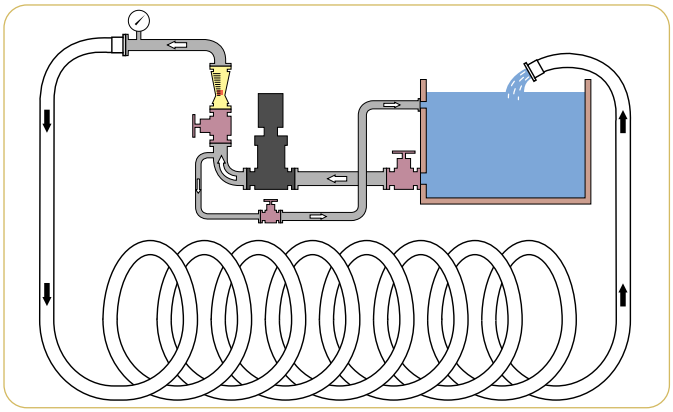
The test apparatus illustrated below was used to measure the flow rate of Bioflex, both in a straight configuration and coiled to its Minimum Bend Radius. The test medium was water.

Results

Comparisons were made with samples of standard convoluted hose with the same diameter on the inside of the convolutions as the Bioflex inside diameter. These show that Bioflex is capable of delivering 2 - 3 times the flow rate of convoluted hose.

Additional tests have shown that the flow rate through a Bioflex hose is actually greater than that of a convoluted hose which is one size larger. For example, 1½in Bioflex has a higher flow rate than 2in convoluted hose. It is therefore possible to use a smaller Bioflex hose, fitted with full size end fittings, to replace a convoluted hose more effectively, and more economically!

This remarkable improvement is due to the fact that the turbulent flow created by the convolutions in the standard product is virtually eliminated by the much smoother bore of Bioflex.



How to Order Bioflex

Bioflex Hose Assemblies

Bioflex is always custom built to individual order and is supplied in the form of finished hose assemblies, after the length, liner, braid, cover and end fittings have been decided upon.

Selecting the Hose Grade

There are two types of PTFE liner available: natural (GP) and anti-static (AS), and four types of braid: Grade 304 stainless steel (SS), polypropylene (PB), Hastelloy (HB), PVDF, or Kynar (KYB). These are described on pages 11 and 12. Rubber covering and other external protection systems are also available, described on pages 13 and 14.

A hose grade is specified by using the abbreviations given. For example, Bioflex AS,PB would describe a hose with an anti-static PTFE liner and a polypropylene braid.

Step-up End Fittings

The very high flow rates of Bioflex hose relative to convoluted hose make it possible to use a smaller bore size Bioflex hose assembly with 'Step-up' size end fittings, where the end fitting size is one size larger than the hose size. Thus, a lighter weight, more flexible hose can be used without compromizing the flow rate!

Selecting the End Fittings

Bioflex is available with a range of 'standard' end fittings (described on pages 15 through 26), normally supplied hygienically PTFE lined and flared.

End Fitting Materials

All hose end fitting spigots are supplied made from Grade 316 SS, and all ferrules, swiveling nuts and flanges are from Grade 304 SS, or Grade 316 SS if Grade 304 is not available.

Grade 316 SS and Grade 304 SS, depending upon the method of manufacture, will be to one of the following specifications:

Grade	British Standard	American Standard	German/Euro Standard
316	316 S31	AISI 316	1.4401
316	316 S11	AISI 316L	1.4404
316	316 C16	CF8M	1.4408
304	304 S15	AISI 304	1.4301
304	304 S11	AISI 304L	1.4307
304	304 C15	CF8	1.4308

Selecting the Hose Length

Bioflex hose assemblies are made up to the specific lengths required. The hose length is taken as the length from the sealing face at one end of the hose to the same at the other end. The length tolerance is normally +5%-0%. Closer tolerances are available to special order.

***Bioflex Hose Assembly Length Limitations**

Nominal Size of Hose		Minimum Hose Assembly Length*				Maximum Hose Assembly Length	
		Used Straight		Flexed Thru' 90°			
in	mm	in	mm	in	mm	in	mtrs
3/8	10	4	100	5	120	66	20
1/2	15	6	150	6	150	66	20
5/8	16	6	150	6 1/2	160	66	20
3/4	20	6	150	7	180	66	20
7/8	22	8	205	9	230	66	20
1	25	9	230	10	250	66	20
1 1/4	32	9	230	11	280	66	20
1 3/8	35	9	230	14	350	59	18
1 1/2	40	9	230	15	380	56	17
1 7/8	48	10	250	18	450	43	13
2	50	10	250	20	500	33	10

* Listed lengths are for SS, PB or KYB Braided Hose Assemblies fitted with PTFE lined fittings only. For all other specifications including rubber covered grades and non-lined ends, add 4in (100mm) up to 1ins bore, 6in (150mm) above 1in bore.

Bioflex Specifications. Temperatures, Pressures & Flow Rates

Temperature vs Pressure

Due to its extremely strong construction, Bioflex has outstanding resistance to temperature and pressure, much higher than that of conventional convoluted PTFE lined hose.

Maximum Working Pressure (MWP) Variation with Temperature:

Hose with SS Braid as per Graph.

Hose with PB Braid, pressure as listed (Page 10) from -22˚F through +176˚F and 50% less from 176˚F through 212˚F.

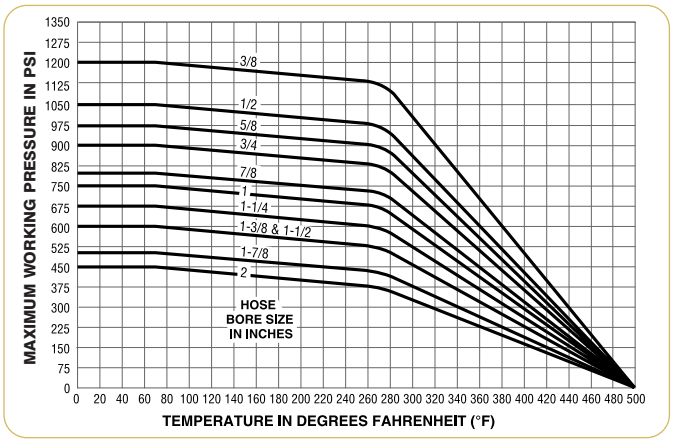
Hose with RC, FP and SI grades as per Graph, BUT only within the temperature range for the particular grade of rubber cover, as given below.

Operating Temperature Limits (Internal Fluid Only):

SS	-94˚F through +500˚F
PB	-22˚F through +212˚F
SS,RC & SS, FP	-40˚F through +284˚F
SS, SI	-40˚F through +356˚F
KYB	-40˚F through +248˚F

(Subtract 36˚F from the above maximum temperature limits if the temperature is external to the hose).

Temperature & Pressure Resistance Graph for Bioflex GP, SS and AS, SS



Temperature vs Vacuum

All sizes of Bioflex GP,SS and AS,SS are usable at full vacuum up to 266˚F. Above this, the vacuum resistance should be reduced 1% for every 1.8 degrees above 266˚F.

Rubber covered grades the same, BUT ONLY within the temperature limits for the type of rubber.

Flow Rates

In practice, flow rates will vary with hose flexing, fluid viscosity, end fitting design and other parameters, but Bioflex hose flow rates are always around 2 times better than convoluted PTFE hose, when comparing hose assemblies with PTFE lined (non bore-restricted) end fittings.

Bioflex Hose - Flow Rate Calculation

If it is required to determine the flow rate of a particular hose assembly, or if it is required to determine the pressure required to generate a certain flow rate, then this can sometimes be approximately calculated by the Bioflex supplier.

It should be noted that calculations can only be made for fluids with a viscosity equal to water, and for hose assemblies with PTFE lined end fittings (no bore restrictions at the ends of the hose).

The following information should be given to the supplier:

To calculate the Flow Rate in gallons per hour:

- Pressure in psi at the Entry into the Hose Assembly
- Pressure in psi at the Exit from the Hose Assembly

> (Subtracted to calculate Pressure Drop over the Hose Length)

- The hose configuration (roughly straight, or 33% Bends, or 66% Bends, or 100% tightly coiled)

OR To Calculate the Pressure Drop in psi over the length of the Hose Assembly:

- Required Flow Rate in gallons per hour
- The hose configuration (roughly straight, or 33% Bends. or 66% Bends, or 100% tightly coiled)

Non-Whistling

The ‘whistling’ noise created by turbulent flow when steam or other gasses are passed through a convoluted hose is completely eliminated when using Bioflex.

Bioflex

Quality Assurance, Certification and Approvals

BS EN ISO 9001:2000

Aflex products are all manufactured in accordance with BS EN ISO 9001: 2000 Quality Management Systems independently assessed and registered by National Quality Assurance Limited (NQA).

USP Class VI

Natural and Antistatic PTFE Hose Liners, Platinum Cured Silicone Rubber Covers (White and Clear) and EPDM Rubber Cover (Blue) have been tested in accordance with USP protocols and are found to conform to the requirements of USP Class VI Chapter <88>

Natural and Antistatic PTFE Hose Liners, Platinum Cured Silicone Rubber Covers (White and Clear) have also been tested in accordance with USP protocols and are found to conform to the requirements of USP Class VI Chapter <87>, the L929 MEM Elution Test and are considered non-cytotoxic.

FDA

The Materials used to manufacture the natural PTFE Tube liner conforms to FDA 21 CFR 177.1550, and the antistatic PTFE liner conforms to FDA 21 CFR 178.3297.

3-A Sanitary Standards

The PTFE used in the liner is manufactured solely from materials which meet the requirements of the 3-A Sanitary Standards

Pharmaceutical Manufacturers Approvals

Most of the major pharmaceutical manufacturing companies in the world have audited and/or approved Aflex Hose as a Hose Supplier.

CE Marking (Europe only)

Aflex has been assessed by Zurich Risk Services and found to comply with the Pressure Equipment Directive 97/23/EC (European Community) Conformity Assessment Module D1, approved to CE Mark applicable hose products, accompanied by a Hose Usage Data Sheet, and a Declaration of Conformity.

Attestations of Conformity to ATEX Directive 94/9/EC (Potentially Explosive Atmospheres)

Available for hose and assemblies for components used in Gas Zones 1 & 2 and Dust Zones 21 & 22, when applicable.

Material Certification to EN10204

Available for all the hose or hose assembly components.

Certificates of Conformity to EN45014

Are available for all products.

Hose Identification and Testing

All Aflex Hose assemblies are identified with a stainless steel identification tag, ring or ferrule, vibro etched with a unique serial number for traceability, and other relevant information.

Each assembly is pressure tested to1.5 times maximum working pressure before despatch, and pressure test certificates can be supplied.

Bioflex Size Range

Nominal Hose Bore Size		Actual Bore Size		O/D of Tube		Braid Type	Approximate O/D of Braid or Rubber		Minimum Bend Radius	
in	mm	in	mm	in	mm		in	mm	in	mm
3/8	10	3/8	9.5	0.46	11.75	TO	-	-	1 3/8	35
						SS	0.50	13	13/16	20
						RC	0.68	17.4	0.71	18
1/2	15	1/2	12.7	0.61	15.40	TO	-	-	2 3/8	60
						SS	0.65	16.5	1	38
						PB	0.77	19.5	1	38
						SS,RC/FP	0.85	21.0	2 3/8	60
						SI	0.85	21.0	2 3/8	60
						KYB	0.70	17.5	2 3/8	60
5/8	16	5/8	16.0	0.77	19.50	TO	-	-	2 11/16	68
						SS	0.80	20.8	1 13/16	45
						PB	0.90	23.3	1 13/16	45
						SS,RC/FP	1.00	25.0	2 11/16	68
						SI	1.00	25.0	2 11/16	68
						KYB	0.85	21.5	2 11/16	68
3/4	20	3/4	19.0	0.91	23.00	TO	-	-	3	75
						SS	1.00	24.4	2	50
						PB	1.10	27.9	2	50
						SS,RC/FP	1.20	30.4	3	75
						SI	1.20	30.4	3	75
						KYB	1.00	26.0	3	75
7/8	22	7/8	22	1.06	26.80	TO	-	-	3 5/8	92.5
						SS	1.15	28.4	2 3/8	60
						PB	1.25	32.0	2 3/8	60
						SS,RC/FP	1.30	33.2	3 5/8	92.5
						SI	1.30	33.2	3 5/8	92.5
						KYB	1.20	29.7	3 5/8	92.5
1	25	1	25.4	1.22	31.00	TO	-	-	4 3/8	110
						SS	1.30	32.3	2 3/4	70
						PB	1.50	37.7	2 3/4	70
						SS,RC/FP	1.50	37.3	4 3/8	110
						SI	1.50	37.3	4 3/8	110
						KYB	1.30	33.4	4 3/8	110
1 1/4	32	1 1/4	32	1.47	37.30	TO	-	-	5 1/2	140
						SS	1.55	39.5	3 15/16	100
						PB	1.70	44.3	3 15/16	100
						SS,RC/FP	1.75	44.5	5 1/2	140
						SI	1.75	44.5	5 1/2	140
						KYB	1.55	39.7	5 1/2	140
1 3/8	35	1 3/8	34.9	1.59	40.50	TO	-	-	6 5/16	160
						SS	1.70	43.1	4 3/4	120
						PB	1.90	47.8	4 3/4	120
						SS,RC/FP	1.90	48.1	6 5/16	160
						SI	1.90	48.1	6 5/16	160
						KYB	1.70	42.9	6 5/16	160
1 1/2	40	1 1/2	38	1.77	45.00	TO	-	-	7 1/16	180
						SS	1.80	47.0	5 1/2	140
						PB	2.00	50.8	5 1/2	140
						SS,RC/FP	2.05	52.0	7 1/16	180
						SI	2.05	52.0	7 1/16	180
						KYB	1.90	47.7	7 1/16	180
1 7/8	48	1 7/8	47.6	2.15	54.60	TO	-	-	11	280
						SS	2.20	57.1	7 1/2	190
						PB	2.40	62.0	7 1/2	190
						SS,RC/FP	2.40	62.1	11	280
						SI	2.40	62.1	11	280
						KYB	2.55	57.3	11	280
2	50	2	50.8	2.33	59.10	TO	-	-	11 13/16	300
						SS	2.40	60.9	7 7/8	200
						PB	2.60	66.0	7 7/8	200
						SS,RC/FP	2.60	66.0	11 13/16	300
						SI	2.60	66.0	11 13/16	300
						KYB	2.45	61.7	11 13/16	300

& Specifications

MWP of Hose*		Minimum Burst Pressure		Maximum Continuous Hose Length		Weight per Unit Length	
Psi	Bar	Psi	Bar	Ft	Mtrs	Lbs/ft	Kg/Mtr
72	5	290	20	66	20	0.04	.06
1160	80	4640	320	66	20	0.09	.14
1160	80	4640	320	60	18		.22
72	5	290	20	66	20	0.10	.15
1015	70	4060	280	66	20	0.19	.29
507	35	2030	140	66	20	0.15	.22
1015	70	4060	280	60	18	0.26	.39
1015	70	4060	280	60	18	0.26	.39
145	10	580	40	66	20	0.12	.19
72	5	290	20	66	20	0.11	.17
943	65	3770	260	66	20	0.23	.35
478	33	1880	130	66	20	0.16	.25
943	65	3770	260	60	18	0.31	.47
943	65	3770	260	60	18	0.31	.47
145	10	580	40	66	20	0.13	.20
72	5	290	20	66	20	0.13	.20
870	60	3480	240	66	20	0.26	.40
435	30	1740	120	66	20	0.19	.28
870	60	3480	240	60	18	0.37	.55
870	60	3480	240	60	18	0.37	.55
145	10	580	40	66	20	0.16	.24
58	4	232	16	66	20	0.19	.28
798	55	3190	220	66	20	0.35	.52
399	27.5	1600	110	66	20	0.25	.38
798	55	3190	220	60	18	0.50	.74
798	55	3190	220	60	18	0.50	.74
145	10	580	40	66	20	0.22	.33
58	4	230	16	66	20	0.24	.36
725	50	2900	200	66	20	0.42	.63
362	25	1450	100	66	20	0.31	.47
725	50	2900	200	60	18	0.62	.92
725	50	2900	200	60	18	0.62	.92
145	10	440	30	66	20	0.27	.41
43	3	170	12	66	20	0.30	.45
652	45	2610	180	66	20	0.57	.85
333	23	1300	90	66	20	0.48	.72
652	45	2610	180	60	18	0.77	1.15
652	45	2610	180	60	18	0.77	1.15
87	6	350	24	66	20	0.36	.53
29	2	115	8	60	18	0.36	.54
580	40	2320	160	60	18	0.67	1.00
290	20	1160	80	60	18	0.58	.86
580	40	2320	160	52	16	0.92	1.38
580	40	2320	160	52	16	0.92	1.38
87	6	290	20	60	18	0.46	.68
29	2	115	8	56	17	0.44	.66
580	40	2320	160	56	17	0.74	1.10
290	20	1160	80	56	17	0.60	.90
580	40	2320	160	50	15	1.04	1.55
580	40	2320	160	50	15	1.04	1.55
87	6	290	20	56	17	0.52	.78
29	2	115	8	43	13	0.55	.82
507	35	2030	140	43	13	0.92	1.38
261	18	1040	72	43	13	0.75	1.12
507	35	2030	140	36	11	1.30	1.94
507	35	2030	140	36	11	1.30	1.94
87	6	230	16	43	13	0.65	.97
29	2	115	8	33	10	0.84	1.25
435	30	1740	120	33	10	1.27	1.90
217	15	870	60	33	10	1.07	1.60
435	30	1740	120	27	8	1.72	2.56
435	30	1740	120	27	8	1.72	2.56
87	6	170	12	33	10	0.95	1.42

***MWP:** the Maximum Working Pressure of a hose assembly is limited to the lowest of the MWPs of either of the two end fittings, as given for each end fitting design on pages 15 through 22, or of the hose itself as listed above.

SPECIAL CONDITIONS

PTFE Hose - Use with Halogens

When PTFE lined hose is used with the halogens chlorine and fluorine, or any corrosive halogen compounds which diffuse easily and are gaseous for example phosgene, then trace quantities may diffuse through the PTFE liner to the outside.

Only trace quantities are required, mixed with atmospheric moisture, to create a serious corrosion condition with stainless steel wire braid in particular.

Also, if any Halogen compounds are present in the environment external to the hose (for example, salt in a sea water spray), and if the temperature of the hose exceeds 122˚F, there is a serious risk of "Chloride Stress Corrosion" of the stainless steel wire braid on the hose.

For such applications, always use the alternative braid materials, either HB or KYB (for fluorine & chlorine) or PB (for external chlorides)..

"Penetrating" Fluids and Gasses

Like other plastics and rubbers, in certain special circumstances PTFE is sometimes subject to diffusion through the tube wall, dependant upon the nature of the chemical, and the pressure and temperature of operation.

As mentioned above, Halogens represent a specific problem. Automotive fuels, on the other hand, diffuse much less through PTFE than through other plastics, like nylon.

Some other types of penetrating fluids can also diffuse through PTFE to varying degrees, which may or may not present a problem. Known examples are sulphur trioxide, glacial acetic acid and methyl methacrylate.

Consult with Aflex Hose if these, or any other gasses or fluids which are known to be penetrating are to be used.

Gas/Fluid Cycling

There are some applications where the fluid passing through the hose turns into a gas, then back into a fluid, then into a gas etc., in a cyclic sequence.

This is normally associated with changes in temperature and/or pressure.

For complex reasons these conditions are extremely damaging to the hose liner, whatever material it is made from.

For example, hoses are sometimes used to pass steam, water, steam etc. into rubber molding presses, in order to heat the mold, then rapidly cool it before reheating in the next cycle. Hoses of all types fail rapidly in such an application, and PTFE lined hose is no exception.

Consult Aflex Hose for further information if these conditions apply.

CONNECTING ASSEMBLIES FOR USE IN APPLICATIONS

When being connected for use in applications, the end fittings on hose assemblies must be connected to correct mating parts in the correct way, using the correct tools - wrenches, clamps, nuts and bolts etc.

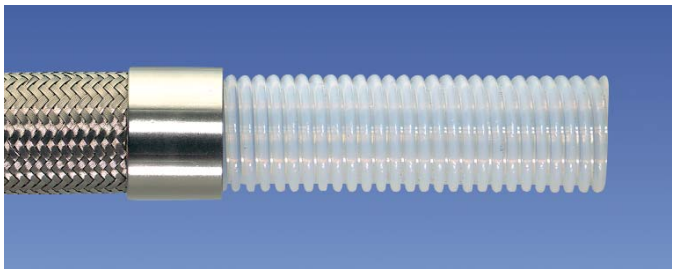
The connections must be sufficiently tightened to ensure that the joint is leak-free, but must not be over-tightened as this can damage the connection.

In applications involving the transfer through the hose of expensive or dangerous fluids or gasses, the connections must be pressure tested first before being put in to service. This should be done with some harmless medium, like water or compressed air, to 1½ times the maximum working pressure of the hose assembly, as defined in this brochure.

If in doubt, consult Aflex Hose for advice.

Bioflex Hose Liners

GP - General Purpose Liner



Purpose

Bioflex GP is the 'General Purpose' grade, for use in all applications where fluids or gases are being conveyed which do not generate a risk of static charge development (see "AS").

Design & Approvals

Bioflex GP is a virgin PTFE liner, manufactured from hose grade PTFE which conforms to the requirements of:

FDA 21 CFR 177.1550

Bioflex GP hose liner tube has also been tested, and complies with:

USP Class 6 :

- Systemic Injection Test
- Intracutaneous Test
- Intramuscular Test
- USP L929 MEM Elution Test (Cytotoxicity)

EC - ELECTRICAL CONTINUITY

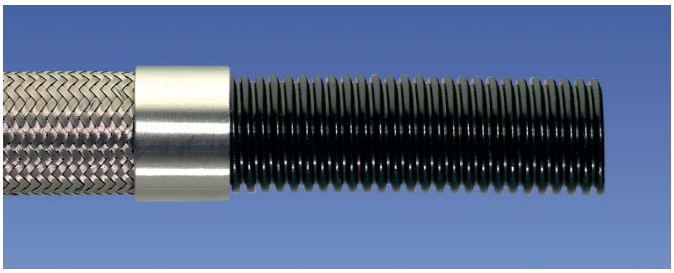
All Bioflex hose assemblies are electrically continuous. Electrical Continuity requires that the hose assembly supplied is electrically continuous, or conductive, between metal end fittings at each end of the hose.

The requirements for this are specified in the German Document BRG132, and the Specification EN ISO 12115, tested to EN ISO 8031 Clause 3.7, which requires that for hose assemblies with a resistance between fittings of $\leqslant 10^2$ ohms, a letter "M" can be applied, or $\leqslant 10^6$ ohms, a letter "Ω" can be applied.

Braided Bioflex Hose Assemblies all meet the requirements of both "M" and "Ω", but are not stamped unless requested.

The only exception is for assemblies without braid. Grade AS, TO (Antistatic, Tube Only) meets the requirements of "Ω", $\leqslant 10^6$ ohms, but Grade GP, TO (Natural, Tube Only) does not meet either "M" or "Ω".

AS - Anti-Static PTFE Liner



Purpose

Bioflex AS is an essential requirement in applications where there is the risk of an electrostatic charge build-up on the inside surface of the PTFE tube which may then discharge through the tube wall. Media passing through which create such a risk are fluids which have a Conductance of less than 10^{-8} S/m (Siemens per Metre), or 10^4 pS/m such as fuels, solvents, freons, some WFI (ultra-pure "Water for Injection") and non-polar organics which are being transferred at a medium to high flow velocity.

All twin or multi phase media, and any non-mixing media, such as powder in air, or water droplets in steam, in gases or in oil, also colloidal fluids constitute a particular hazard for static charge generation, and always require grade AS.

If in doubt, consult Aflex Hose.

Design & Approval

Bioflex AS is an anti-static PTFE liner manufactured from FDA approved PTFE, and less than 2.5% of "high purity" Carbon Black material to FDA requirement 21 CFR 178.3297. The carbon is encapsulated by the PTFE, and in normal, non-abrasive applications will not come loose to contaminate any fluid passing through. Bioflex AS also conforms to:

USP Class 6 :

- Systemic Injection Test
- Intracutaneous Test
- Intramuscular Test
- USP L929 MEM Elution Test (Cytotoxicity)

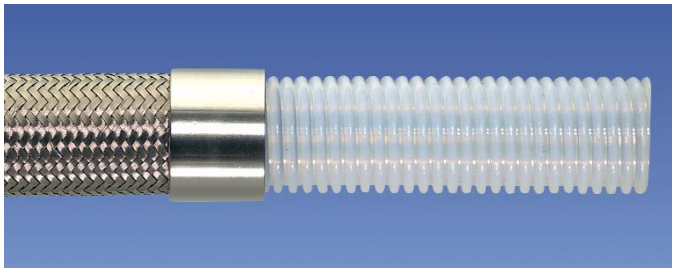
Specifications

When "AS" (Antistatic) grade hose is specified, then the hose supplied will be in accordance with the requirements of BS5958 Part 2, 1991 Clause 19.3, when tested in accordance with EN ISO 8031 Clause 3.1, which requires that the resistance between a plug inserted 25mm into the bore at the end of the hose assembly, and one of the metallic end fittings should be less than 10^8 ohms.

NOTE: When in service, at least one end fitting must be connected to earth, to permit dissipation of the static charge from the end fitting.

Bioflex Hose Braids

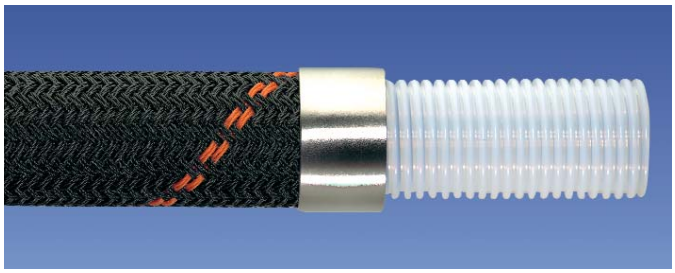
SS - Stainless Steel Braid



Purpose

Stainless Steel braided hose is the general purpose product, and can be used in applications involving high temperatures and working pressures. High tensile AISI 304 stainless steel wire is used, to give maximum pressure resistance and external protection to the hose.

PB - Polypropylene Braid



Purpose

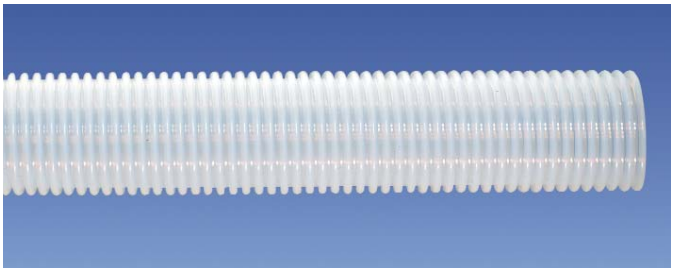
Polypropylene braided hose is often preferred to SS in applications involving frequent handling and movement of the hose, and where temperatures are within the range -22˚F through +212˚F. PB braid is lighter in weight, and any broken strands will not cut the operator's hands.

Electrical Continuity is achieved by 2 monel wire plaited earthing strips, criss-crossed underneath the braid, and connected to the fittings at each end.

In addition, PB braid is not prone to "chloride stress corrosion", and has generally good chemical resistance.

NOTE: Prolonged exposure to sunlight eventually results in UV degradation of PB braid.

TO - Tube Only (no braid)

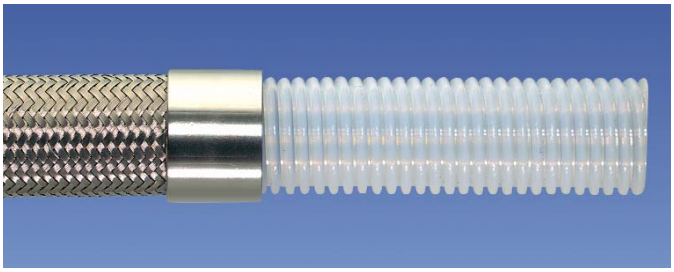


Purpose

TO grade hose (available in both GP and AS) is a lightweight hose, used in applications where working pressures are low and where there is no need for the physical protection offered by an external braid. TO grade is not vacuum-proof.

TO grade tube is not normally helium tested.

HB - Hastelloy Braid (C276 grade)



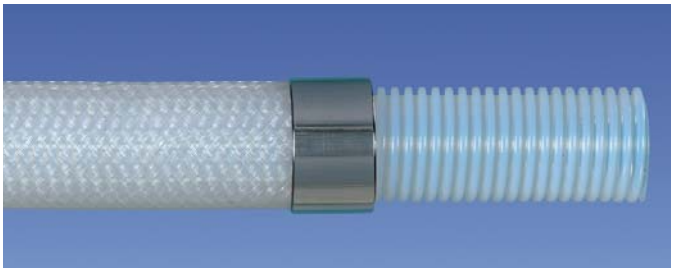
Purpose

Hastelloy Wire Braid is used instead of SS where severe chemical corrosion conditions exist around the outside of the hose. One way in which this can happen is when chlorine or fluorine are being transferred. Diffusion of trace quantities of such gasses through the PTFE liner can lead to atmospherically wetted fluorine or chlorine attacking the braid material, in which case the Hastelloy Braid would be resistant.

Specifications

Same as for SS on Pages 9 and 10, except that the Burst Pressure and MWP are 50% lower.

KYB - Kynar Braid (Polyvinylidene Fluoride Monofilament)



Purpose

Kynar Braid is used for the same reasons as HB above, but only in applications where the reduced pressure and temperature ratings of KYB are acceptable.

Bioflex Rubber Covers

RC - Rubber Covered

Purpose

For the most rugged applications where the hose may be subjected to rough treatment and severe external abrasion. Also for hygienic applications, where the external smoothness and cleanability of the hose is of prime importance.

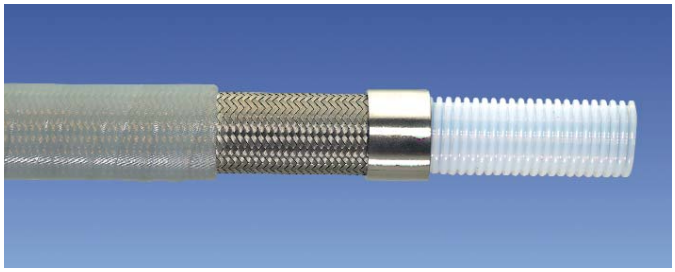
Design

An SS braided hose assembly has a smooth finish, blue EPDM external rubber cover vulcanized directly onto the braid. EPDM has excellent chemical resistance, and is temperature resistant up to 248˚F (external) 284˚F (internal). Black anti-static EPDM, and alternative colours of rubber, and strips with alternative text titles are available to special order.

Specifications

The EPDM rubber cover has been tested and conforms to the requirements of USP Class VI.

SI - Silicone Rubber Cover



Purpose

As for RC hose, but where the hose may be required to withstand temperatures up to 356˚F. SI grade hose is semi-transparent, allowing visual monitoring of the braid.

Design

An SS braided hose assembly has an external smooth finish silicone rubber cover vulcanized directly on to the braid.

Specifications

The Silicone rubber cover has been tested and conforms to the requirements of USP Class VI.

FP - Fireproof Rubber Covered

Purpose

As for RC hose, but where the hose is also required to resist failure in the event of fire, in accordance with Specification BS5173 Section 103.13 (Fireproof). This specification calls for an 2100˚F flame to be applied to the hose at minimum bend radius, maximum operating pressure (water), and one end fitting under vibration. The hose must withstand at least 15 minutes without leakage.

Design

As for RC hose, but the red EPDM rubber is specially compounded to be fire resistant. Black, anti-static EPDM Fireproof rubber is also available as an option to special order.

RC-300 - Rubber Covered 12in (300mm) at End

Purpose

In applications where excessive flexing of the hose at the end fitting occurs, it is sometimes necessary to ‘stiffen’ the hose in this area, to prevent kinking.

Design

A layer of rubber is applied and vulcanized directly to the ferrule, and 12in (300mm) along the hose from the fitting. This can be done either on an SS braided hose (RC-300) or on a rubber covered hose as a 12in (300mm) long double layer of rubber at the end (DRC-300).

The rubber used is normally Blue EPDM, but if the hose is FP or SI covered, then the same type and color of rubber would be used (DFP-300 or DSI-300).

Limitations

Cannot be applied to PB or KYB braided hose. If required consult Aflex Hose for an alternative “EPR” system. (EPR includes a 12in (300mm) length of loose rubber hose, hose clipped to the ferrule).

Bioflex External Protection Systems

KR - Kink Resistant

Purpose

For applications where there is a risk that the hose might be severely flexed anywhere along its length, and possibly kinked as a result.

Design

KR is only available on hoses which also have an SS wire braid and a rubber cover (RC, FP or SI). An SS reinforcement wire is helically wound on to the SS wire braid, then the rubber cover is applied on top of the helical wire.

Limitations

Only available for sizes 3/4in and above.

Specifications

As for the Rubber Covered hose grade, except that the standard RC Grade rubber has a super-smooth finish which is not possible on the "KR" hose grade.

SR - Scuff Rings

Purpose

For medium duty applications where the hose requires some protection against abrasion when dragged over the ground, but where a full rubber cover would be too heavy and cumbersome. Also for PB and KYB braided hose, which cannot be Rubber Covered.

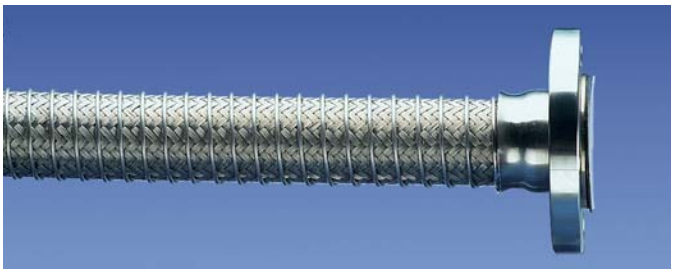
Design

Specially molded abrasion resistant rubber scuff rings are placed every 20in along the hose.

Limitations

Available for hose sizes 1in (25mm) through 2in (50mm) only. The operating temperature should not exceed 284˚F (internal).

PC - Protection Coil



Purpose

For applications where the hose requires protection against abrasion when dragged over the ground, but where any rubber reinforcement is not permissible due to temperature, chemicals etc.

Design

A stainless steel wire helix is wound on to the braid and welded to the ferrules at each end.

Limitations

Only available on SS, PB, HB or KYB in sizes of 3/4in and above.

Specifications

As for the Braided Hose Grade.

Bioflex Standard Flange Fittings

Flange Fittings

Description

Swivel flange fitting, integral PTFE lined and flared.

Specifications

Flanges to ASA 150 (ASME B16.5 Class 150), DIN PN10 or PN16, and BS10 Table E. Other flange ratings to these specifications are also available, and other types of flanges can be supplied.

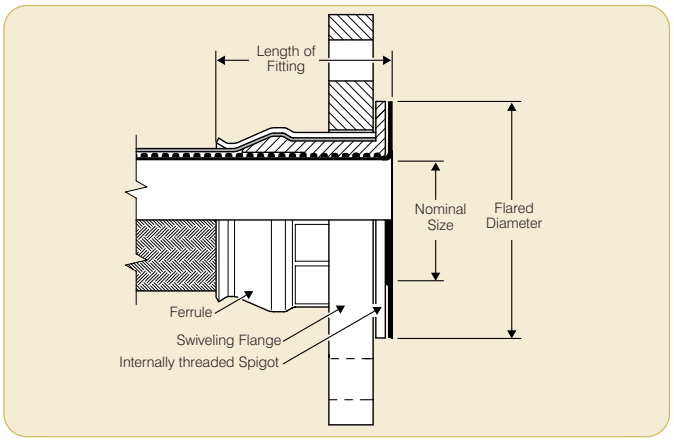
Materials

Grade 316 SS Spigot, Grade 304 Flange and Ferrule, except that 1in, 1 1/2in and 2in PN10 Flanges are Grade 316. Alternative options include grade 316 SS flanges, polypropylene flanges mounted on SS spigots, zinc or nickel plated mild steel flanges, and other materials to special order.

Maximum Working Pressures

These are defined by the flange specification. For standard PN10 and PN40 etc. the Maximum Working Pressures are 145 psi (10 Bar) and 580 psi (40 Bar) respectively. For ASA 150 the Maximum Working Pressure is 230 psi or 16 Bar. Test Pressures are 1.5 times the MWP of the fitting. (Exceptions: when the hose MWP is less than the fitting MWP).

Standard Flange Fitting



Hose Size		Nominal Size of - Flange		Fitting Length		Flared Diameter				Recommended Bolt Tightening Torques		Weight/ Fitting	
						ASA 150		DIN PN10					
in	mm	in	mm	in	mm	in	mm	in	mm	ft.lbs	mtr. kgs	lbs	kgs
1/2	15	1/2	15	17/16	37.0	1 1/4	32	1 3/8	32	8	1.10	1.20	0.54
3/4	20	3/4	20	17/16	37.0	1 11/16	43	1 3/4	43	8	1.10	2.00	0.88
1	25	1	25	1 5/8	40.5	2	50	2 1/2	63	10	1.40	2.10	0.96
1 1/4	32	1 1/4	32	1 11/16	43.5	2 1/2	63	2 1/2	78	12	1.70	3.00	1.36
1 1/2	40	1 1/2	40	1 7/8	47.0	2 7/8	73	3 1/2	88	15	2.10	3.90	1.75
2	50	2	50	1 15/16	48.5	3 5/8	92	4	102	25	3.50	6.00	2.70
*2	50	2 1/2	65	2 3/4	70.5	4 1/8	105	4 1/8	122	30	4.20	8.80	4.00
*2	50	3	80	3 1/2	89.0	5	127	5	127	40	5.60	11.50	5.20

These are not the correct flared diameters, but they are the maximum diameter to which the PTFE can be flared out for that flange size. If the full size flare diameter is required, consult Aflex Hose for a solution.

"Step-Up" Flange Fittings on 2in Hose (see list)

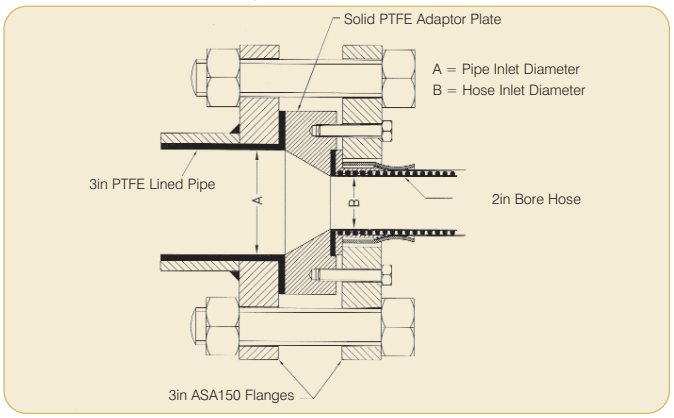
Because the 2in Bioflex Hose has better flow rates than both 2 1/2in and 3in Convoluted PTFE hose, it represents a superior alternative when fitted with the larger flanges.

It is, however, necessary to also "Step-Up" the PTFE-lined bore, to ensure an diameter match with the mating connector.

This is best achieved using a solid PTFE Adaptor Plate, as shown in the drawing.

Other sizes scan also be "Stepped Up" if required, for example 1in Hose to 2in Flange.

2in to 3in ASA150 Flange Joint



Bioflex Triclover Fittings - Not PTFE Lined

Triclover Fittings

Description

Triclover fitting, not PTFE lined. Hygienic design spigot, all internal (wetted) surfaces electro-polished to <20μin (<0.5μm).

Specifications

Generally in accordance with BS4825: Pt 3 or DIN 32676, also others.

Maximum Working Pressures and Temperatures

All sizes 232 psi (16 Bar). Test Pressure = 348 psi (24 Bar) up to the temperature limit of the rubber seal.

Materials

Spigot in Grade 316 S11 (AISI 316L, or 1.4404), Ferrule in Grade 304 SS.

Size of Triclover Fittings

When ordering, it is necessary to determine:

(a) What Triclover Flange Diameter is required?

(b) What is the Hose Size required?

(c) Is the Outlet Diameter for the hose fitting the same as the I/D of the Pipe to which it will be connected?

See the List for the Standard Sizes & Outlet Diameters. If the requirement is not on this list, then please specify the alternative dimensions required.

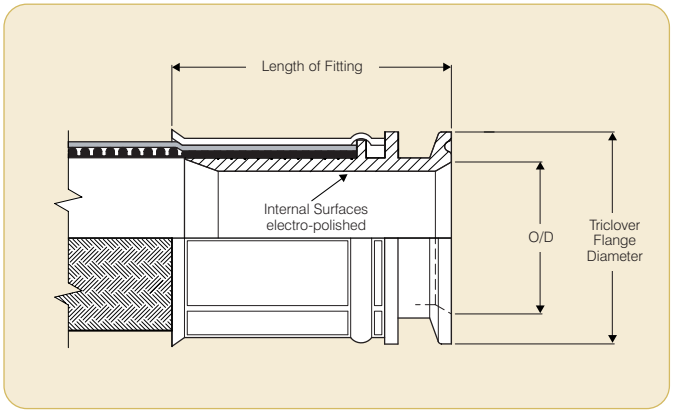
If in doubt, request a "Triclover Enquiry Form" from Aflex Hose, to be filled out and returned.

Unpolished, Non-Lined Triclover Fittings

In applications where polishing is not required, but the most economical price is required, unpolished and/or purge-welded end fittings to special order can sometimes provide a solution.

Consult Aflex for details.

Non-Lined Triclover Fitting



Standard Hose and Pipe Sizes, and Outlet Diameters

Nominal Hose Size	Standard Triclover Flange Dia.		Pipe I/D Equal to Fitting Outlet Diameter		Nominal Pipe Size (inches = BS4825, DN = DIN 32676)	Length of Fitting	
in	in	mm	in	mm		in	mm
1/2	1.00	25.4	3/8	9.5	DN10	1 3/8	34.5
3/4	1.34	34.0	5/8	16.0	DN15	1 7/8	47.5
1	2.00	50.5	7/8	22.2	1in	1 7/8	47.5
1	2.00	50.5	1	26.0	DN25	1 7/8	47.5
1 1/4	2.00	50.5	1 1/4	32.0	DN32	2 1/2	62.5
1 1/2	2.00	50.5	1 3/8	34.9	1 1/2in	2 5/8	66.5
1 1/2	2.00	50.5	1 1/2	38.0	DN40	2 5/8	66.5
2	2.50	64.0	1 7/8	47.6	2in	2 3/4	69.8
2	2.50	64.0	2	50.0	DN50	2 3/4	69.8
2	3.00	77.5	2 3/8	60.3	2 1/2in	3	76.0
2	3.60	91.0	2 5/8	66.0	DN65	3	76.0
2	3.60	91.0	2 7/8	73.0	3in	3	76.0
2	4.20	106.0	3 3/16	81.0	DN80	3	76.0
2	4.70	119.0	3 7/8	97.6	4in	3 3/8	86.0
2	4.70	119.0	3 15/16	100.0	DN100	3 5/16	84.5

Bioflex Triclover Fittings - PTFE Lined

Triclover Fittings

Description

Triclover fitting integral PTFE lined and hot formed. Design patented in Europe by Aflex Hose Ltd.

Specifications

Generally in accordance with BS4825: Pt 3, or DIN 32676.

Maximum Working Pressures and Temperatures

All sizes 232 psi (16 Bar). Test Pressure = 348 psi (24 Bar) up to the temperature limit of the rubber seal.

Materials

Spigots Grade 316 SS. Ferrules Grade 304 SS.

Size of Triclover Fittings

When ordering, it is necessary to determine:

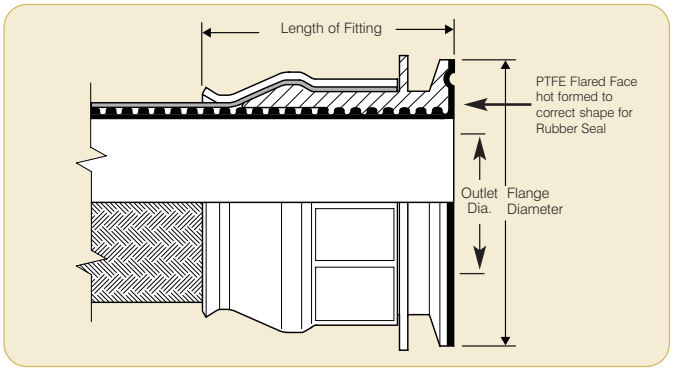
(a) What Flange Diameter is required?

(b) What is the Hose Size required?

(c) Is the Outlet Diameter for the hose fitting the same as the I/D of the Pipe to which it will be connected?

See the List for the Standard Sizes & Outlet Diameters. If the requirement is not on this list, then please specify the alternative dimensions required.

If in doubt, request a "Triclover Enquiry Form" from Aflex Hose, to be filled out and returned.



Standard Hose and Pipe Sizes, and Outlet Diameters

Nominal Hose Size		Standard Triclover Flange Dia.		Pipe I/D Equal to Fitting Outlet Diameter		Nominal Pipe Size (inches = BS4825, DN = DIN 32676)	Specs & Sizes with pipe I/D which are larger than the largest O/D possible with a lined end from the hose size shown. Set against the nearest option	Length of Fitting (non rubber covered grades only)	
in	mm	in	mm	in	mm			in	mm
3/8	10	1.00	25.4	3/8	9.5	1/2in		2.00	53.0
3/8	10	1.34	34.0	3/8	10.0	DN10		2.00	53.0
5/8	16	1.34	34.0	5/8	16.0	DN15		2.20	55.0
7/8	22	2.00	50.5	7/8	22.2	1in		2.20	53.0
1	25	2.00	50.5	1	26.0	DN25		2.00	51.0
1 1/4	32	2.00	50.5	1 1/4	32.0	DN32		2.20	56.0
1 3/8	35	2.00	50.5	1 3/8	34.9	1 1/2in	DN40 (1 1/2in - 38mm Pipe I/D)	2.30	56.5
1 7/8	48	2.50	64.0	1 7/8	47.6	2in	DN50 (2in - 50mm Pipe I/D)	2.40	58.0
*2	50	3.05	77.5	2 3/8	*60.3	2 1/2in		2.70	69.0
*2	50	3.60	91.0	2 5/8	*66.0	DN65		2.90	74.0
*2	50	3.60	91.0	2 7/8	*73.0	3in		3.40	87.0
*2	50	4.17	106.0	3 3/16	*81.0	DN80		3.50	111.0

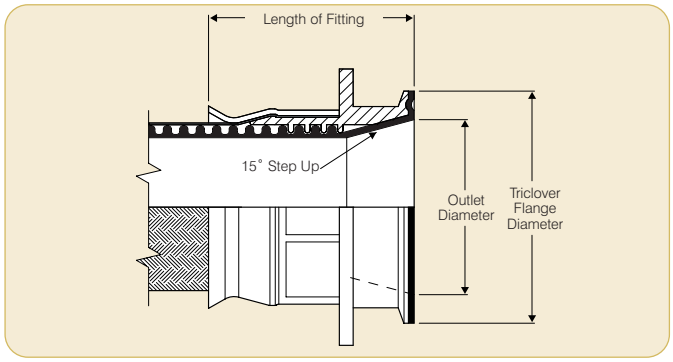
Note: The 3/8in, 5/8in, 7/8in, 1 3/8in and 1 7/8in hose sizes can only be supplied as assemblies with lined triclovers (or I-Line fittings) at BOTH ends, because other types of fittings (flanges, camlocks etc.) are not available for these hose sizes.

*"Step Up" PTFE Lined Triclover Fittings

Because the 2in Bioflex Hose has better flow rates than either 2 1/2in or 3in convoluted PTFE hose, it represents a superior alternative when fitted with larger Triclover fittings.

It is, however, necessary to "Step Up" the PTFE lined bore, to ensure a diameter match between the Outlet Diameter and the Pipe I/D, as shown in the drawing.

*** "Step Up" PTFE Lined Triclover Fitting**



Bioflex “PTFE Beaded” Triclover Fittings

Description

In this new (patent pending) design, the PTFE hose liner tube is extended through the Triclover end fitting, and is flared over the sealing face. It is then hot-formed to conform to the shape of the rubber seal, and therefore replaces the rubber seal.

This includes the ‘bead’ shape, which is used for concentric location of the seal to the mating component when a joint is made, as shown in the sketch opposite.

Advantages of the Bioflex PTFE Beaded End Fitting

- After connection, the PTFE does not ‘bulge’ into the bore in the same way that a rubber seal would. This rubber ‘bulge’ interferes with the flow path, and can cause material entrapment, but these problems are eliminated by using this new design.
- The need to ensure the compatibility of the rubber seal with the media passing through is no longer a problem, due to the all-PTFE sealing system.
- The joint includes only one sealing face, not two as with the rubber seal.
- The internal section of the molded PTFE seal, which is squared off to provide a closed sealing edge in the joint, ensures no crevices in which materials entrapment might occur.
- If hoses are required to be joined together, then the Bioflex PTFE Beaded Triclover End Fitting can be connected to a standard Bioflex Triclover Fitting (see page 17) to provide an all-PTFE lined joint between the hoses.

Specifications

Generally in accordance with BS4825:Pt 3 or DIN 32676, also others to special order.

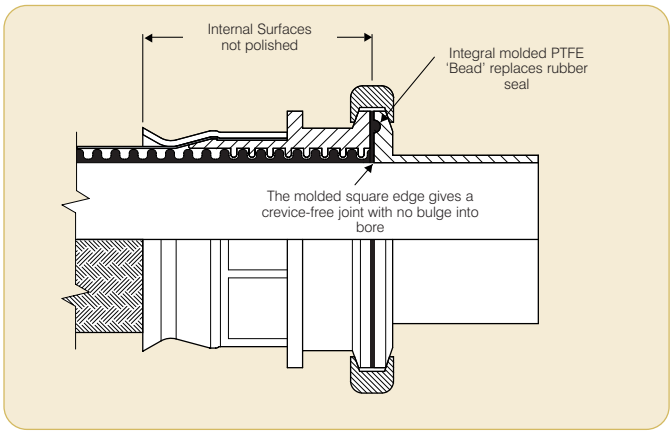
Materials

Spigot in Grade 316 SS. Ferrules in Grade 304 SS.

Maximum Working Pressures

All sizes 232 psi (16 Bar). Test Pressure = 348 psi (24 Bar). Pressures apply only up to 266˚F.

Bioflex PTFE Beaded Triclover End Fitting (Shown in a joint with a Triclover Pipe Connection)



Standard Hose and Pipe Sizes, and Outlet Diameters

Nominal Hose Size		Standard Triclover Dia.		Pipe I/D Equal to Fitting Outlet Dia.		Nominal Pipe Size (inches = BS4825, DN = DIN 32676)	Length of Fitting (non rubber covered grades only)	
in	mm	in	mm	in	mm		in	mm
3/4	20	1.34	34.0	3/4	19/20	DN20	2.00	50.8
7/8	22	2.00	50.5	7/8	22	1in	2.20	56.6
1	25.4	2.00	50.5	1	26	DN25	2.00	52.6
1 3/8	35	2.00	50.5	1 3/8	34.9	1 1/2in	2.35	60.0
1 7/8	48	2.50	64.0	1 7/8	47.6	2in	2.45	62.6

Bioflex I-Line Fittings

PTFE Lined I-Line Fittings

I-Line fittings, Integral PTFE Lined and Flared.
Designed to be used together with the standard clamps and Gaskets (EPDM, Nitrile, Viton, PTFE).

Maximum Working Pressures

All sizes up to 261 psi (18 Bar). Test Pressure = 391 psi (27 Bar).

Materials

Spigots Grade 316, Ferrule Grade 304.

Nominal Hose Size		I-Line Fitting Size		Connector Sleeve Diameter		Ferrule to Sealing Face	
in	mm	in	mm	in	mm	in	mm
7/8	22	1	25	1 1/4	31.88	2 1/4	57.90
1 3/8	35	1 1/2	40	1 3/4	44.58	2 1/4	56.50
1 7/8	48	2	50	2 1/4	57.40	2 5/8	66.70

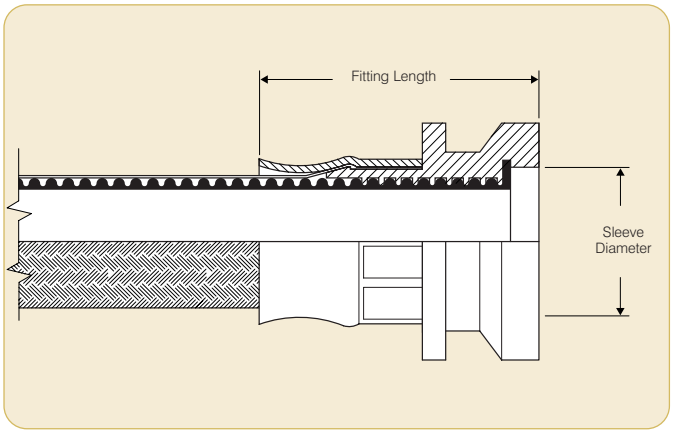
Limitations

Like PTFE-Lined Triclovers, I-Line fittings are used on 7/8in, 1 3/8in and 1 7/8in hose sizes, with only the possibility of I-Line or Triclover fittings at the other end.

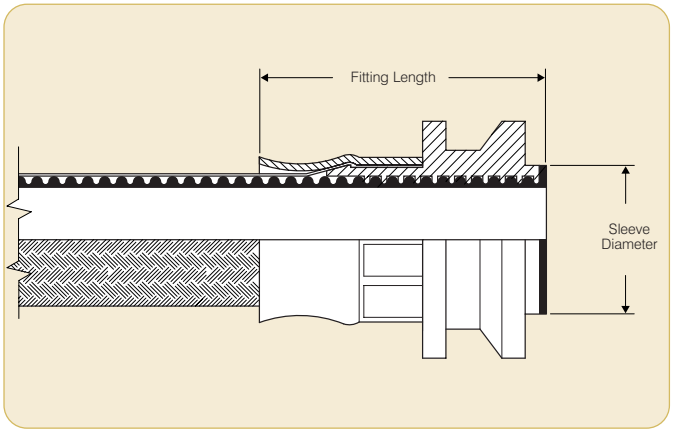
Adaptors

PTFE-Lined and Flared Flange-to-I-Line adaptors are also available, to special order.

I-Line Female Fitting



I-Line Male Fitting



Bioflex Standard Cam Action Fittings

Cam Action Coupler (Female) Fittings

Description

Cam Action quick release coupler (female) fitting, integral PTFE lined.

Specifications

Generally to Mil-C-27487 and DIN2828. (Fully interchangeable with other makes of Cam Action type quick-release fittings to these specifications).

Materials

Cam Action spigot in Grade 316 SS, ferrule in Grade 304 SS, standard gasket in buna N nitrile rubber, with alternatives available.

Alternative Gasket Materials

FEP-encapsulated Silicone Rubber Gasket. (Rubber fully encapsulated inside an FEP outer). Usable at temperatures up to 320˚F. (Note: this type of gasket requires higher clamping forces than normal to ensure a positive seal. Normally supplied with an aluminum or polypropylene male adaptor clamped in, to "pre-set" the gasket for easier use).

Other types of gaskets are also available, including EPDM or Viton Rubber.

Limitations

Usable at temperatures up to 212˚F, but higher temperature use is possible, dependent upon the gasket materials.

Not normally recommended for "Safety Critical" applications, where the locking arm Saflok option is preferred (page 21).

Mating Connectors

A wide variety of mating connectors is available, including BSP female threaded adaptors and PTFE lined flange adaptors.

Maximum Working Pressures

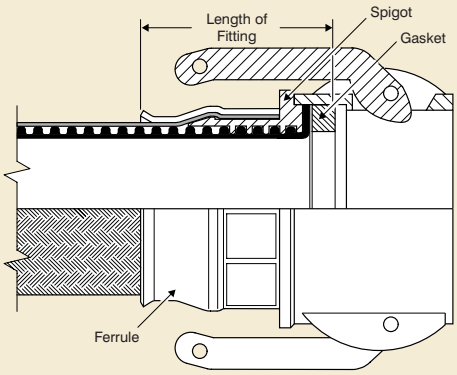
All sizes 145 psi (10 Bar). Test Pressure = 217 psi (15 Bar).

Higher working pressures up to 260 psi (18 Bar) are available to special order.

Cam Action Adaptor (Male) Fittings

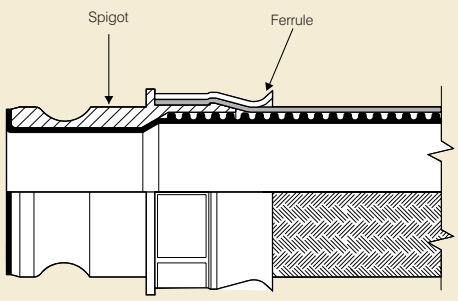
PTFE Lined Cam Action Adaptor (Male) Fittings are also available. Specification, materials and size range as for Female (Coupler) Fittings.

Cam Action Coupler (Female) Fitting



Nominal Size		Length of Fitting (non rubber covered grades only)		Weight of Fitting	
in	mm	in	mm	lbs	kg
3/4	20	1 3/4	44.8	0.80	0.35
1	25	1 15/16	49.0	1.00	0.45
1 1/2	40	2 3/16	55.5	1.80	0.84
2	50	2 1/4	57.5	2.40	1.10

Cam Action Coupler (Male) Fitting



Bioflex Saflok Cam Action Fittings (Fixed or Swivel)

Saflok Cam Action Coupler Fittings

Description

PTFE Lined Fixed or Swiveling Auto-Locking Arm Cam Action Quick Release Fitting. The lock is released by pulling a wire ring horizontally away from the fitting, then using the ring to pull the arm open. The lock is designed as a safety feature, to prevent accidental opening of the connection resulting from vibration or “tugging”.

Construction & Materials

As for the Cam Action Coupler on the previous page. The fitting is the same length, but has ring operated trigger locks on both arms.

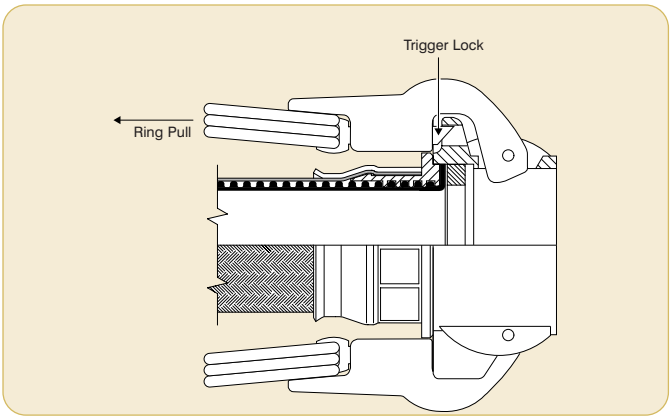
Maximum Working Pressures

All sizes 145 psi (10 Bar). Test Pressure = 217 psi (15 Bar).
Higher Working Pressures up to 260 psi (18 Bar) are available to special order.

Nominal Size		Length of Fitting (non rubber covered grades only)		Weight of Fitting	
in	mm	in	mm	lbs	kg
1	25.0	$1^{15}/_{16}$	49.0	1.30	0.59
$1^{1}/_{2}$	40.0	$2^{3}/_{16}$	55.5	2.50	1.15
2	50.0	$2^{1}/_{4}$	57.5	3.00	1.40

Other sizes available to special order.

Saflok Cam Action Fitting



Cam Action Adaptor to Flange Connectors

Description & Purpose

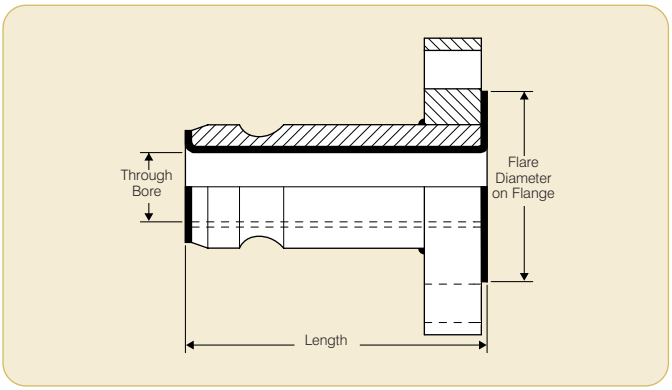
SS Cam Action Adaptor (male) to Flange Connector, PTFE lined right through the connector.

Construction & Materials

The SS Cam Action Adaptor and Flange components are welded together, and include a thick wall PTFE liner, either GP or AS grade, flared at both ends.

Cam Action Adaptor Size		Flange Size & Specification	Flare Dia. on Flange		Length		Minimum Through Bore	
in	mm		in	mm	in	mm	in	mm
1	25	1in ASA 150	2.00	50	$4^{1}/_{8}$	105	0.84	21
1	25	DN25/PN16 (1in)	2.58	64	$4^{1}/_{8}$	105	0.84	21
$1^{1}/_{2}$	40	$1^{1}/_{2}$ in ASA 150	2.87	73	$4^{3}/_{8}$	118	1.35	34
$1^{1}/_{2}$	40	DN40/PN16 ($1^{9}/_{16}$ in)	3.47	88	$4^{3}/_{8}$	118	1.35	34
2	50	2in ASA 150	3.63	92	$4^{3}/_{8}$	118	1.69	43
2	50	DN50/PN16 (2in)	3.63	92	$4^{3}/_{8}$	118	1.69	43

Cam Action Adaptor to Flange Connector



Bioflex SMS & RJT Fittings

SMS Female Fittings

Description

SMS female fitting, integral PTFE lined.

Flared Face “Hotformed” into correct shape for seal.

Specification

Generally to Swedish SMS 1148 specification.

Materials

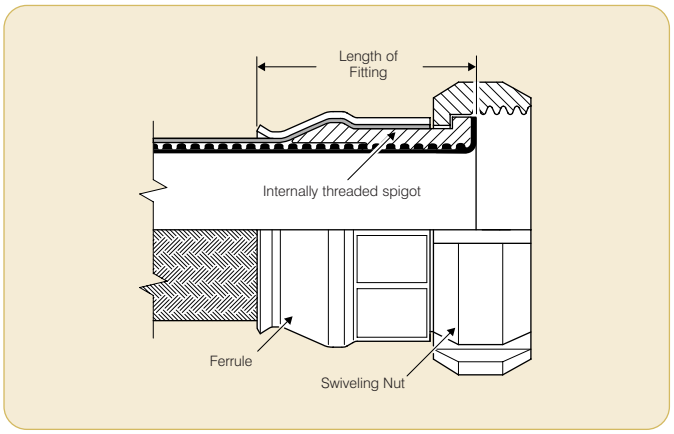
Spigot Grade 316, Ferrule & Nut Grade 304.

Maximum Working Pressures

All sizes 145 psi (10 Bar). Test Pressure = 217 psi (15 Bar).

Nominal Size		Length of Fitting (non rubber covered grades only)		Weight of Fitting	
in	mm	in	mm	lb	kg
1	25	2 1/2	66	0.55	0.25
1 1/4	32	2 5/8	72	0.79	0.36
1 1/2	40	2 3/4	81	1.01	0.46
2	50	2 3/4	79	1.41	0.64

SMS Female Fitting



RJT Female Fittings

Description

RJT female fitting, integral PTFE lined.

Flared Face “Hotformed” into correct shape for seal.

Specification

Generally to BS4825: Pt 5.

Materials

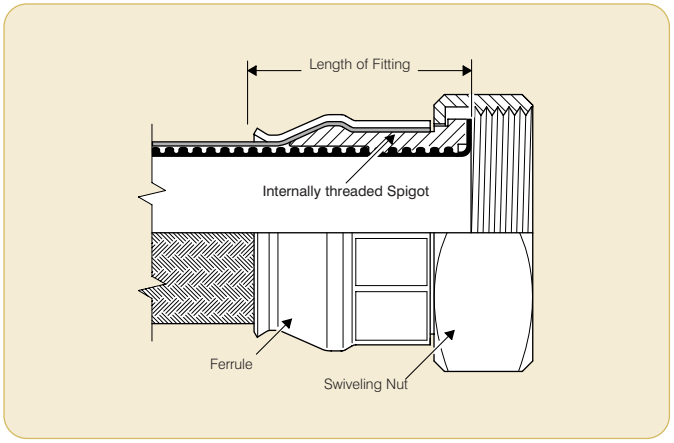
Spigot Grade 316, Ferrule & Nut Grade 304.

Maximum Working Pressures

All sizes 145 psi (10 Bar). Test Pressure = 217 psi (15 Bar).

Nominal Size		Length		Weight of Fitting	
in	mm	in	mm	lb	kg
1	25	2 1/2	68	0.55	0.25
1 1/2	40	2 3/4	73	1.01	0.46
2	50	2 3/4	76	1.41	0.64

RJT Female Fitting



Bioflex 90˚ Elbow Fittings

Introduction

In applications where the hose is normally used at 90˚ to an end fitting, for example when a hose length is hanging vertically downwards from a horizontal connection, to pipework, then a 90˚ elbow can be used to “take the strain”.

PTFE Lined 90˚ Elbow End Fittings

As with most end fittings for Process Fluid applications, it is usually preferred that elbows are PTFE lined, for cleanliness, and to avoid internal bacteria traps.

Aflex have developed a new design of PTFE lined 90˚ elbow. This design includes a normal PTFE lined straight fitting, attached to the end of the hose. The hose behind the fitting is passed through a 90˚ elbow stainless steel tube, which is welded to the back of the ferrule, as shown opposite.

Size Range & Specification

Triclover Fittings: Hose Sizes 7/8in, 1in, 1 3/8in, 1 7/8in and 2in only. With all Other Fittings: Hose Sizes 1in, 1 1/2in & 2in only.

Limitations

Specifications are generally the same as for the hose and straight end fittings.

Elbows for Stainless Steel Braid and Rubber Covered Grades are available, but not for PB & KYB Braids.

Minimum Hose Lengths with 1 x Elbow Fittings:
7/8in & 1in = 12in (300mm) 1 3/8in, 1 1/2in, 1 7/8in & 2in = 20in (500mm).
(Double for two elbow fittings)

Dog-Legs

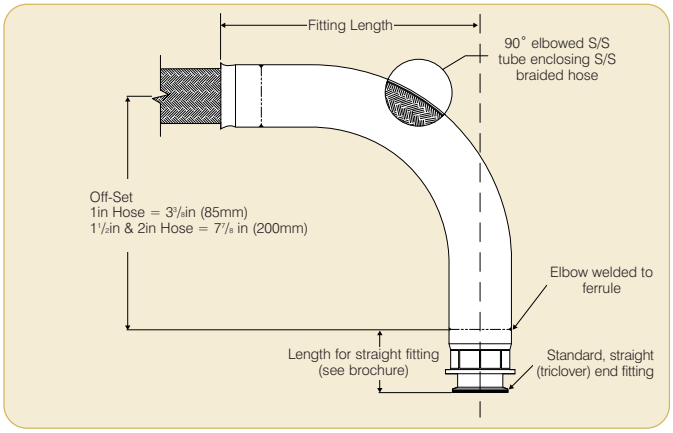
Elbow pieces can also be used to create ‘dog-legs’ in hoses, to shape the hose in applications where this may be an advantage, to special order.

(Only available for the hose sizes as above, but not for the rubber covered grades, and not for PB and KYB grades).

Non-Lined 90˚ Elbow End Fittings

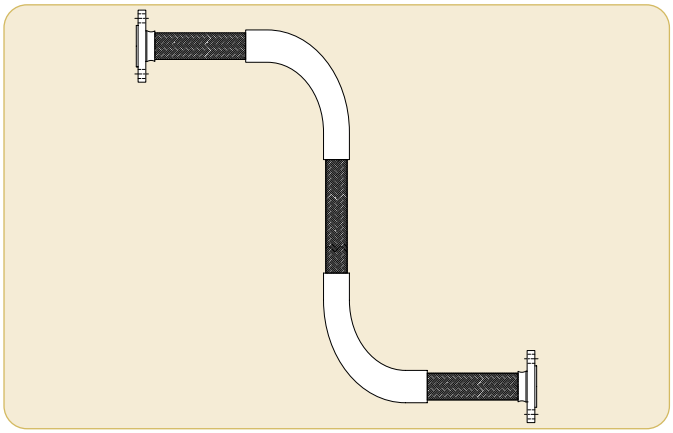
A 90˚ elbow attached to the hose can be supplied non-PTFE lined, as shown, for any size of hose or type of fittings, to special order.

PTFE Lined 90˚ Elbow End Fitting

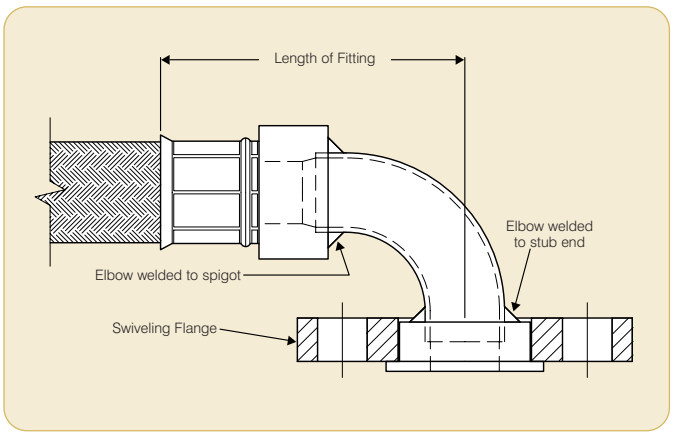


Hose Bore Sizes	Off-Set		Fitting Length	
	in	mm	in	mm
7/8in or 1in	3 3/8	85	5 5/8	143
1 3/8in, 1 1/2in	7 7/8	200	9 3/8	237
1 7/8in & 2in	7 7/8	200	12 3/8	314

Dog-Legs



Non-Lined 90˚ Elbow



Bioflex Non Lined End Fittings

Fixed Male Fittings

Description

Fixed male fitting, BSP taper male thread.

Specifications

Threads to BS21.

Materials

All components are either zinc plated mild steel or Grade 316 SS with a Grade 304 ferrule.

Alternatives (to special order)

NPT, JIC, metric or BSP parallel screwthreads with flat face or 60˚ internal cone.

Polypropylene males available to special order.

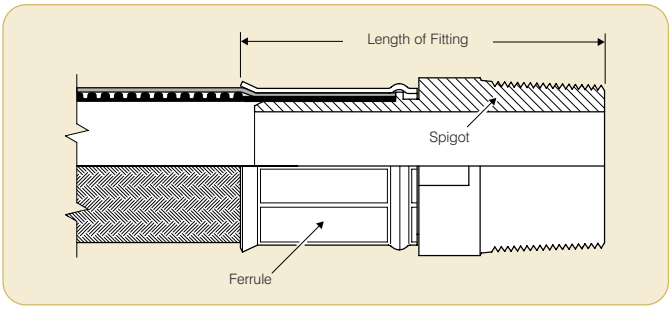
Limitations

Polypropylene Fixed Male Fittings are only usable between 14˚F and 122˚F, and the Maximum Working Pressure is 80% less.

Maximum Working Pressures (MWP)

As given for the hose. (Test Pressures = MWP x 1.5).

Fixed Male Fitting



Nominal Size		Length		Weight of Fitting (steel)	
in	mm	in	mm	lb	kg
3/8	10	2 1/4	57	0.15	0.07
1/2	15	2	51	0.22	0.10
3/4	20	2 1/2	62	0.35	0.16
1	25	2 5/8	66	0.57	0.26
1 1/4	32	3 1/2	87	0.88	0.40
1 1/2	40	4	100	1.28	0.58
2	50	4 1/4	108	2.10	0.95

Cone Seat Female Fittings

Description

60˚ cone seat female union fitting, BSP parallel thread non-lined.

Specifications

Generally to BS5200 and ISO 1179.

Materials

All components are either zinc plated mild steel or Grade 316 SS with an Grade 304 Ferrule.

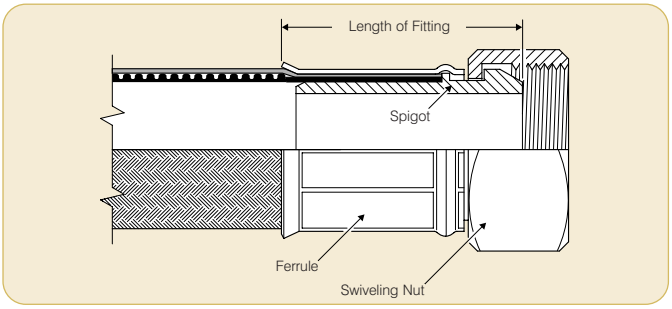
Alternatives (to special order)

These fittings may be supplied with a flat seat or with a metric or NPSM thread. Lug Nut female union (and male) fittings are also available in gunmetal or stainless steel. JIC Females can also be supplied. 45˚ and 90˚ elbowed fittings are also possible.

Maximum Working Pressures

As given for the hose. (Test Pressures = MWP x 1.5).

Cone Seat Female Fitting



Nominal Size		Length		Weight of Fitting	
in	mm	in	mm	lb	kg
3/8	10	2	50	0.13	0.06
1/2	15	2	49	0.18	0.08
3/4	20	2 3/8	60	0.40	0.18
1	25	2 1/2	63	1.10	0.32
1 1/4	32	2 1/8	54	1.30	0.50
1 1/2	40	2 1/8	54	1.28	0.58
2	50	2 1/8	55	2.03	0.92

Bioflex Dip Pipes

Fixed Dip Pipes

Description

Fixed Dip Pipes are rigid tubes, either straight or 90˚ elbowed, which are directly crimped to the end of Bioflex hoses. They are designed for insertion into drums, tanks and reaction vessels in order to suction drain (or inject) process fluids transferred through the hose.

Materials

Standard dip pipes are in anti-static (AS) PTFE. Also available in 316 SS, polypropylene, virgin PTFE (GP) and other materials to special order.

How to order

Specify the size and material of the dip pipe, whether it is straight or 90˚ elbowed. Give the length of the straight leg of the dip pipe and the length of the rest of the hose assembly separately.

Maximum Working Pressures

Dip Pipes are normally only tested to 58 psi (4 Bar) pressure, and are not suitable for use at pressures higher than 43 psi (3 Bar). They are usable at negative pressure up to full vacuum.

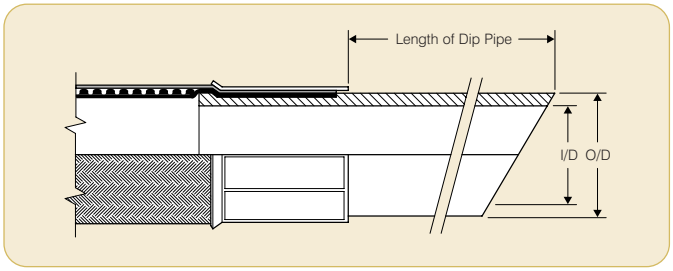
If higher pressure ratings are required, consult Aflex Hose.

Lengths

Dip Pipes are supplied as standard in 39in (1 meter) lengths, but can be supplied in any length to individual requirements.

Nominal Hose Bore Size		Approximate Dip Pipe Dimensions			
		Outside Diameter		Inside Diameter	
in	mm	in	mm	in	mm
1/2	15	0.63	16	0.31	8
3/4	20	0.87	22	0.51	13
1	25	1.14	29	0.83	21
1 1/2	40	1.54	39	1.00	27
2	50	2.17	55	1.58	40

Fixed Dip Pipe



Detachable Dip Pipes

Description

As Fixed Dip Pipes above, but connected to the hose through an end fitting, not by crimping direct to the hose.

Design

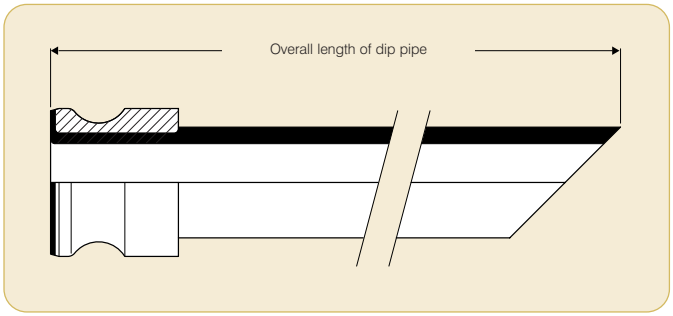
A straight, or 90˚ elbowed anti-static PTFE Dip Pipe, fitted with (any) PTFE Lined & Flared end fitting.

The most usual end fitting is a Cam Male (as shown), so the dip pipe can then be connected to a hose with a Cam Female end fitting.

Specifications

As above for Fixed Dip Pipes.

Detachable Dip Pipe



Bioflex DIN 11851 Fittings

DIN 11851 Fittings (Male & Female)

Description

DIN 11851 male and female fittings, integral PTFE lined and flared.

The PTFE sealing face is hot molded into the correct shape, designed to achieve the optimum pressure seal.

Specification

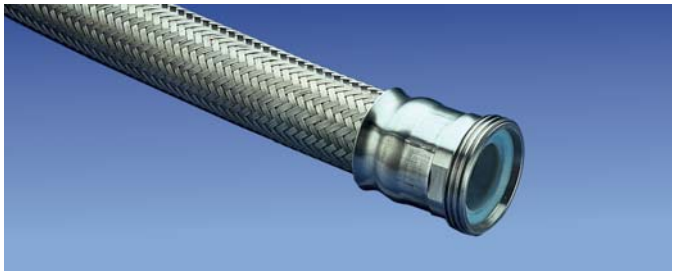
Generally to German DIN 11851 specifications.

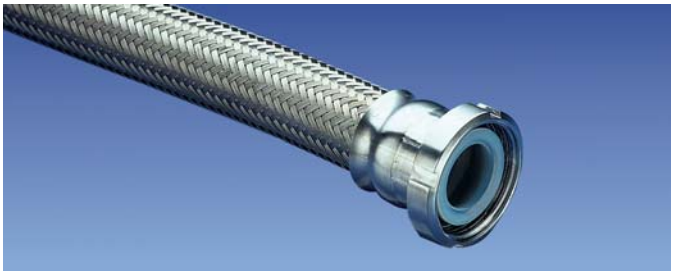
Materials

Spigots in Grade 316 SS nuts and ferrules in Grade 304 SS.
NB : The PTFE lined male fitting is designed to be used without a rubber seal.

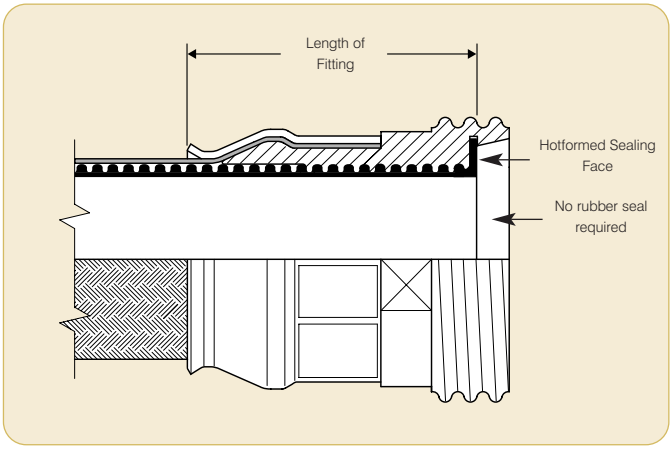
Maximum Working Pressures (MWP)

SS Braided, $^{3}/_{4}$in through $1^{1}/_{4}$in MWP = 580 psi (40 Bar).
$1^{1}/_{2}$in through 2in MWP = 362 psi (25 Bar).
PB Braided, MWP as for hose.
Test Pressure = 1.5 x MWP.

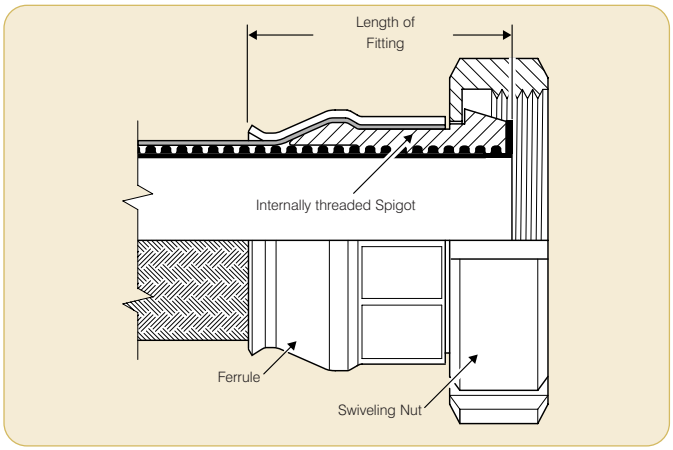




DIN11851 Male Fitting



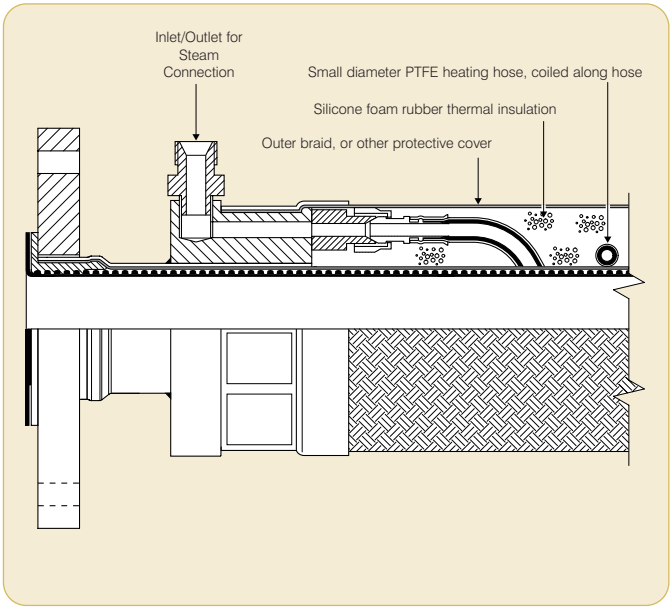
DIN11851 Female Fitting



Nominal Size		Fitting Length (Male) (non rubber covered grades only)		Fitting Length (Female) (non rubber covered grades only)		Weight of Fitting			
						Male		Female	
in	mm	in	mm	in	mm	lbs	kg	lbs	kg
$^{1}/_{2}$	15	$1^{7}/_{8}$	48.5	$1^{5}/_{8}$	41.5	0.30	0.13	0.35	0.16
$^{3}/_{4}$	20	2	50.5	$1^{3}/_{4}$	44.0	0.40	0.18	0.50	0.22
1	25	$2^{1}/_{8}$	54.5	$1^{15}/_{16}$	49.0	0.50	0.22	0.80	0.36
$1^{1}/_{4}$	32	$2^{3}/_{16}$	55.5	2	51.0	0.60	0.27	1.00	0.47
$1^{1}/_{2}$	40	$2^{1}/_{4}$	58.0	$2^{1}/_{2}$	63.5	0.75	0.33	1.20	0.55
2	50	$2^{5}/_{8}$	66	$2^{1}/_{2}$	64.0	1.30	0.58	2.00	0.93

Bioflex Steam Heated Hose Assemblies. (CH Grade)

CH Hose Assembly



Purpose

For use in applications where the temperature of the process fluid must be maintained as it passes through the hose. This is usually required to prevent solidification or an increase in fluid viscosity. Steam heating is preferred to electrical heating in some applications for reasons of availability or safety, but is less controllable.

Description

The heating element comprises a small diameter PTFE heating hose, 1/4in (6mm) or 3/8in (9.5mm) bore size, with a single SS wire braid. This is spirally wrapped around the hose, with inlet and outlet ports attached, either both at one end or at opposite ends of the hose assembly. In the case of hose assemblies longer than 10ft (3 meters), it is usual to have several heating hoses with inlet ports at opposite ends and along the hose. This reduces the effects of temperature loss over the length of the Hose Assembly. The thermal insulation is usually closed-cell silicone foam rubber. The outer cover is a SS wire braid with a rubber cover if necessary.

Design

Each hose is custom designed and built to suit the requirements of the particular application. The following information is therefore required:

- Fluid in Hose Assembly
- Maintained Temperature of Fluid in Hose
- Temperature of Steam or Fluid in the Heating Hose
- Min/Max Ambient Temperature
- Pressure/Vacuum Applied to Fluid
- External Conditions of Abrasion etc.

Specifications

As for Bioflex GP, SS on pages 9 and 10, except that the minimum bend radius is tripled, and the outside diameter and weight are significantly increased in line with the particular design.

Limitations

1in PTFE lined PN10 flange spigots on heated hoses can only have a maximum flare diameter of 2in (50mm), not 2 1/2in (63mm).

If the hose is “hanging”, straight or at 90˚, under its own weight, special construction is required, so advise Aflex Hose accordingly.

Minimum CH Hose Assembly Length, when collars are used 29 1/2in.

Bioflex Electrically Trace Heated Hose Assemblies. (ETH Grade)

Purpose

For use in applications where the temperature of the process fluid must be maintained as it passes through the hose. In some applications, an additional 'melt out' facility may also be required.

Description

The heating element comprises either a resistance or self-regulating element spirally wrapped around the hose assembly. Resistance element heated hoses usually also require a temperature sensor to be built in to the construction. The power cords and (if applicable) temperature sensor cords emerge from the hose assembly at one end, through glands and conduits. The thermal insulation is foam rubber, silicone foam rubber for temperatures above 176˚F. The outer cover may be a polypropylene yarn or SS wire braid with a rubber cover if necessary, or a ribbed PVC waterproof sleeve.

Design

Each hose is custom designed and built. Application details must be supplied by filling out an "ETH Hose Questionnaire", available from Aflex Hose. Generally, for Hazardous Areas, particularly "ZONE 1", the self regulating type of heating element is employed, with or without a temperature sensor and control, and flameproof glands and conduit are also required. The Watts per unit length of the heating element, the pitch of the spiral on the hose, and the thickness of the thermal insulation are all calculated in accordance with established formulae to give the required maintained temperature.

Specifications

As for Bioflex GP, SS on pages 9 and 10, except that the Minimum Bend Radius is tripled and the outside diameter and weight are significantly increased in line with the particular design. Maximum ETH Hose Assembly Lengths are as Bioflex GP, SS.

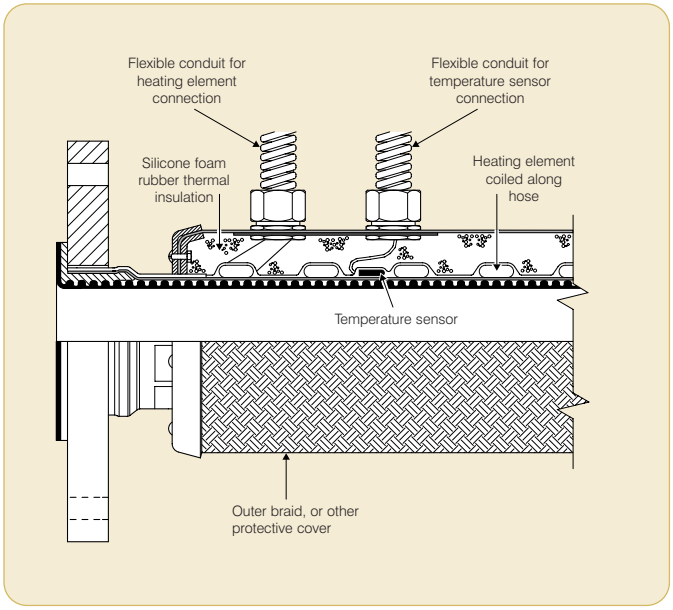
Limitations

1in PTFE lined PN10 flange spigots on heated hoses can only have a maximum flare diameter of 2in (50mm), not 2½in (63mm).

If the hose is "hanging", straight or at 90˚, under its own weight, special construction is required, so advise Aflex Hose accordingly.

Minimum ETH Hose Assembly Length, when collars are used 29½in.

ETH Hose Assembly



Hose Configurations & Length Calculations

Hose Configuration Requirements

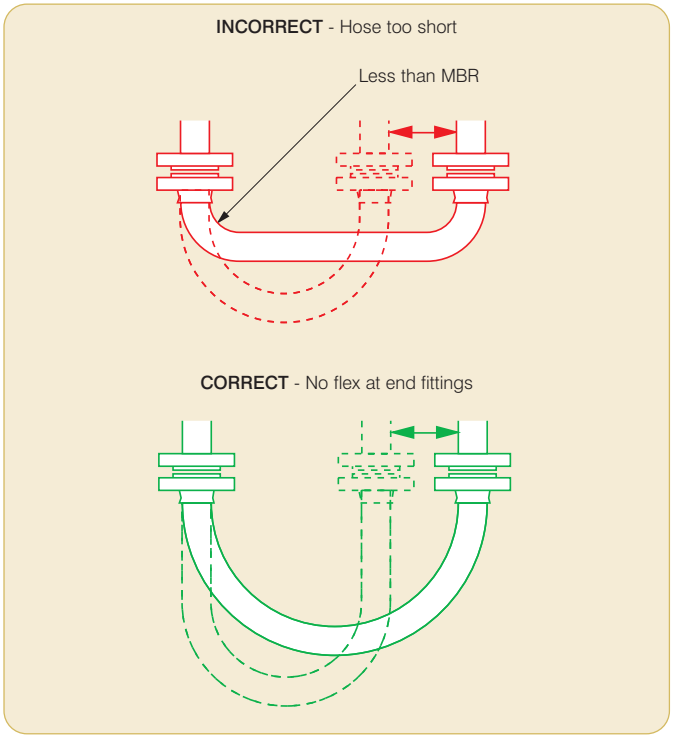
Hose Assemblies are usually connected at both ends in service. They may then either remain in a fixed, or static configuration or in a flexing, or dynamic configuration.

Whether static or dynamic, the First Rule concerning the configuration of the hose is that **the bend radius of the hose must never be less than the Minimum Bend Radius (MBR) for the hose** as listed in the relevant hose brochure.

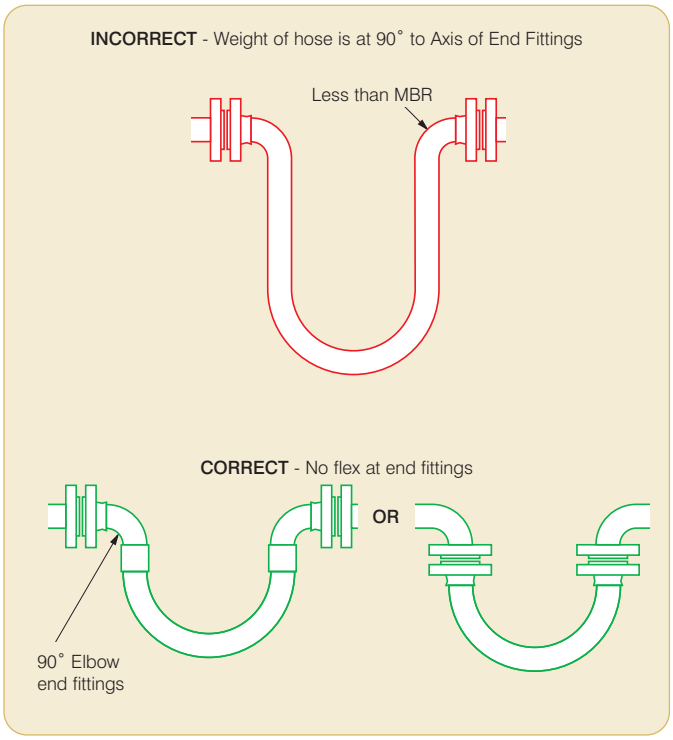
The most common situation when this is likely to occur is when the hose is flexed at the end fitting, with stress being applied to the hose at an angle to the axis of the end fitting. Typically, this happens either because the length of the hose is too short, or because the weight of the hose plus contents creates a stress at an angle to the end fitting.

The Second Rule, therefore, if possible, is to **design the configuration to ensure that any flexing in the hose takes place away from the end fittings.**

(Dynamic) Configuration



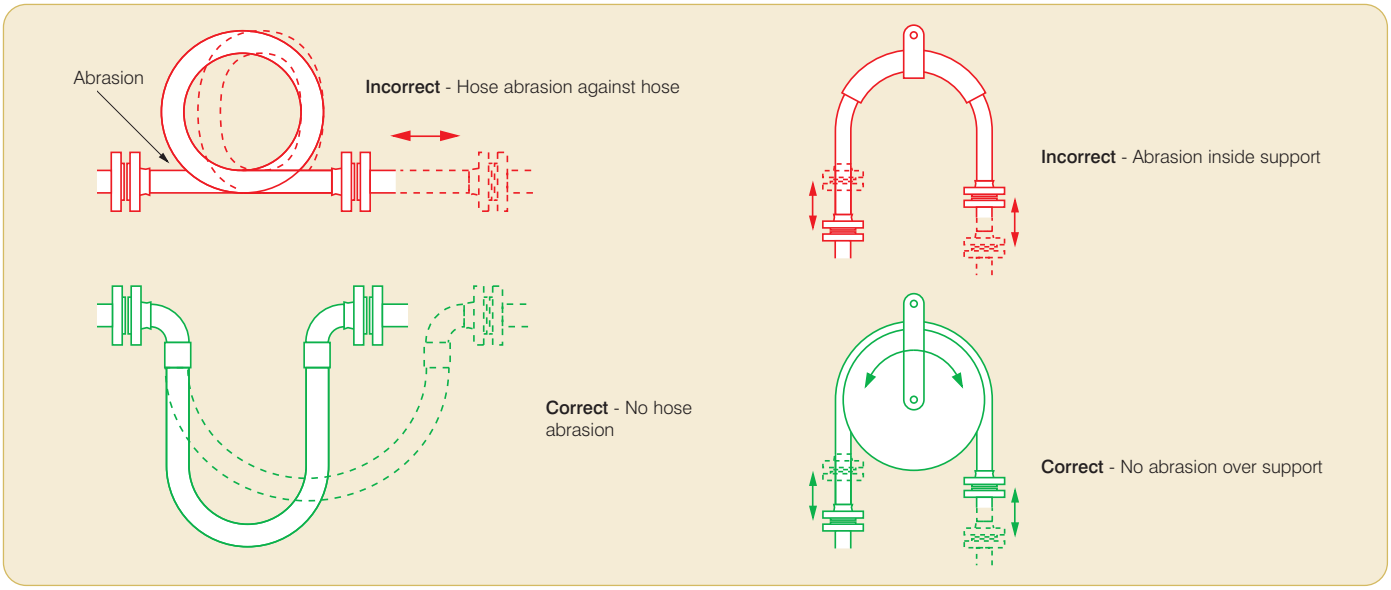
(Static) Configuration



Hose Configurations

The Third Rule is that **the hose configuration should always be designed, and supported where necessary, to avoid any possibility of external abrasion.**

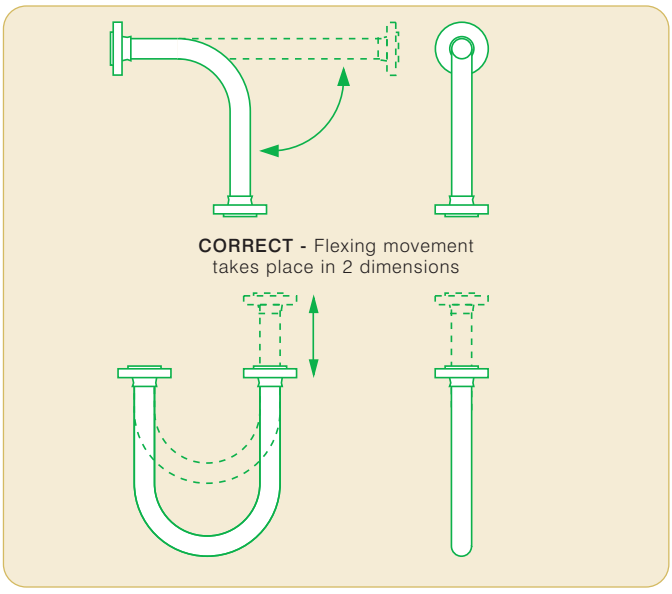
In some cases, the length, configuration and angle of the hose can be designed to avoid abrasion. In others, static or moving support frames or support wheels are required.

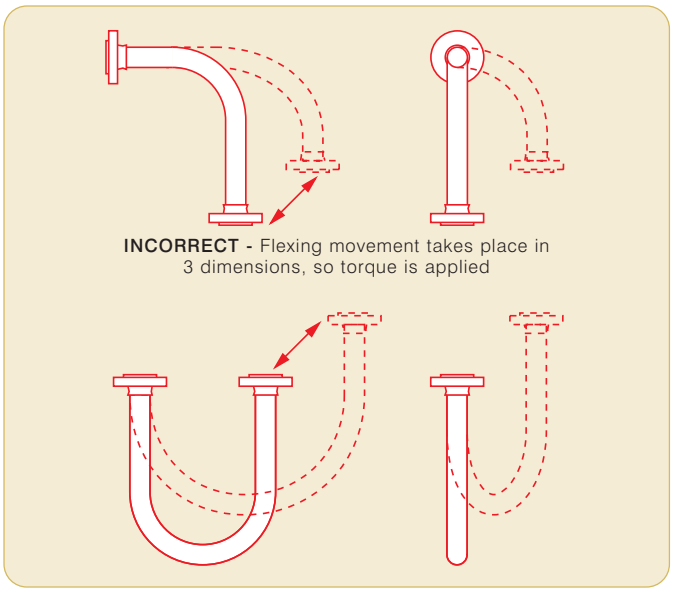


The Fourth Rule is that **the hose must not be subjected to torque, either during connection, or as a result of the flexing cycle.**

Torque (twist) in the hose can be applied during connection if the hose is accidentally twisted, or if the second end being connected is a screwed connection, and the hose is subjected to torque during final tightening.

In a flexing application, if any flexing cycle of the hose occurs in three dimensions instead of two, then torque will also occur:





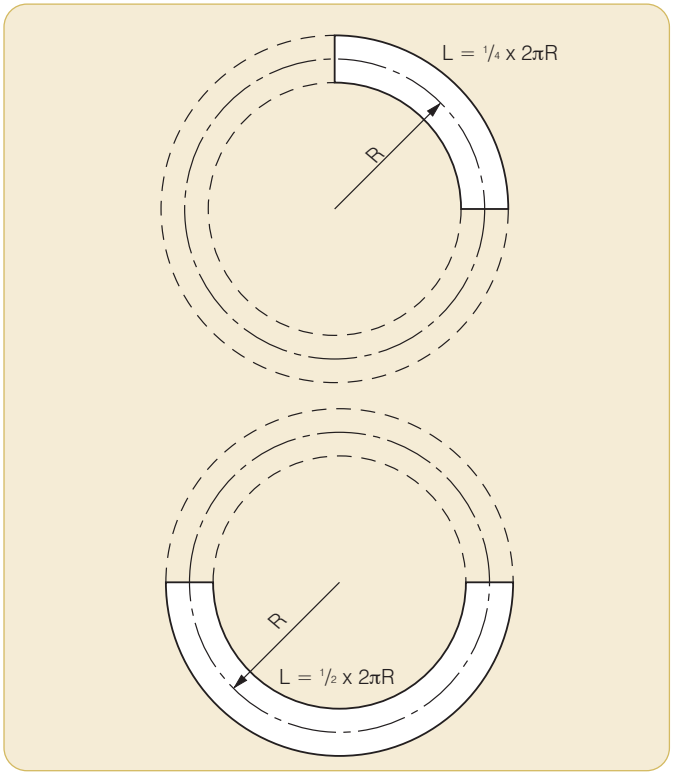
Both Corroflon and Bioflex hose have good resistance to a small level of torque, much better resistance than rubber or SS hose types, but it is still the best practise to take whatever steps are necessary to eliminate torque. If in doubt, consult Aflex Hose.

Hose Configurations & Length Calculations Continued

Calculating the Hose Length

The formula for calculating the bent section of the hose length around a radius is derived from the basic formula that the circumference of a circle = 2πR, where R = the radius of the circle, and π = a constant, = 3.142.

So, if the hose goes around a 90˚ bend, which is 1/4 of a full circumference, and the radius of the bend is R, then the length of the hose around the bend is = 1/4 x 2πR. Or half way round, in a U-shape, = 1/2 x 2πR.



Note :

In calculating the length of a hose assembly, the (non-flexible) length of the end fittings must be added in, also the length of any straight sections of hose, as in the following example:

Example :

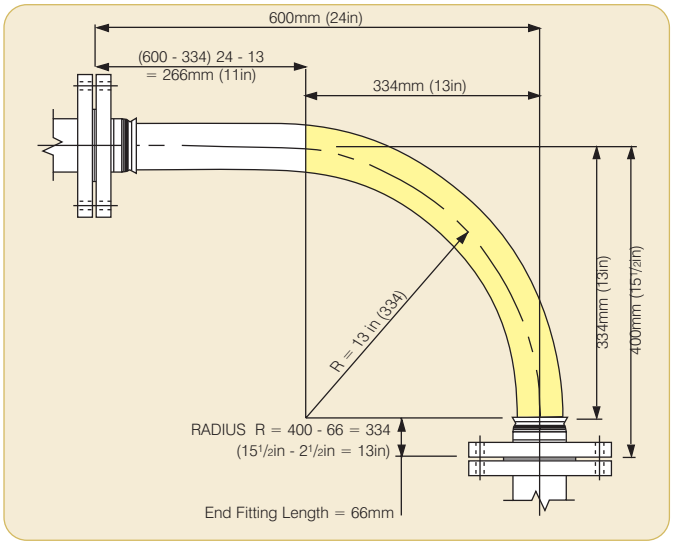
To calculate the length for a 2in bore size hose with flange end fittings, to be fitted in a 90˚ configuration with one leg 15 1/2in (400mm) long, the other 24in (600mm) long.

Length of Bent Section (yellow) = 1/4 x 2πR (R = 13in)
= 1/4 x 2 x 3.142 x 13 = **20.4in**

Length of top, Straight Section, including the top end fitting length
= 24 - 13 = **11in**

Length of bottom end fitting = **2 1/2in**

Total length of Hose Assembly = 20.4 + 11 + 2 1/2 = **33.9in**



Things to consider

(a) A hose will normally take the longest radius available to it to go around a corner, not the MBR! Also - always remember to include the **non-flexible** end fitting lengths.

(b) In dynamic applications, remember to always calculate the lengths for the most extended configuration during the flexing cycle, not the least extended.

(c) If the configuration is simply too complex for calculation, then obtain a length of flexible tubing of some kind, mark on paper, or a wall or floor, or both, where the connection points will be relative to each other, scaled down if necessary, then manually run the flexible tubing between them with full radiuses round bends. Measure the extended length, then scale up if necessary to determine the approximate length of the hose. Ensure that non of the bends will be less than the MBR.

If in doubt, consult Aflex Hose.

Conditions of Sale

General

Aflex PTFE hose products have not been designed or tested to be suitable for use in **USA Military Vehicles or Equipment, Aerospace applications, Medical Implantation applications or Motorsport applications,** and such use is therefore strictly prohibited unless written approval from Aflex Hose Ltd has been given.

Similarly, PTFE hose should not be used in any **radio active environment** as radiation has a detrimental effect on the mechanical and electrical properties of PTFE.

Aflex Hose Ltd will not accept liability for any failures of the Aflex Hose Products which are caused by customers failing to perform their Responsibilities as specified in these Conditions of Sale.

It is the customer's strict Responsibility to review all of the usage limitations given for the hose which he intends to use in an application, to ensure that the application conditions are in compliance with those usage limitations. The usage limitations are specified both on this page, and throughout the relevant sections under "Products and Information" on the Aflex Hose website. Customers must always consult the latest, up to date information, which is available and downloadable from the Aflex website, or request from Aflex Hose Ltd.

It must be accepted, however, that the usage limitations specified elsewhere in the Hose Product Information and on this page are intended as a guide only, since every possible factor in every type of application cannot possibly be covered. It is therefore the Customer's Responsibility to ensure the design suitability and safety of the products in their intended applications, giving particular consideration to the chemical and electrostatic compatibility of the fluids or gases passing through, the possibility of diffusion of fluid or gases through the PTFE hose lining, the possibility of external corrosive conditions, the types and likelihood of excessive mechanical abuse, such as abrasion (internal or external), crushing, excessive flexing or vibrations etc, and any excessive temperature and/or pressure "pulsing" conditions, all of which may cause premature hose failure. It is also the Customer's Responsibility to consider, and take account of the degree of risk involved in any hose failure, including the provision of adequate protection in the event of any risk to employees or the general public. In applications where any type of hose failure would lead to financial losses if the hose is not replaced immediately, it is the Customer's Responsibility to order and hold in stock spare hose(s) accordingly. It is also the Customer's Responsibility to advise Aflex Hose in writing if there are any special requirements for the hose, including cleaning, or drying, or extra testing requirements which are in addition to normal industrial standards.

If the Customer has any doubts concerning these or any other usage limitation or safety parameters, it is the Customer's Responsibility to consult Aflex Hose Ltd, to request a written response to any queries.

It is the Responsibility of the Customer to ensure that if the product is sold on, or passed on, however many times, that all the necessary information including this page and the Aflex Hose website address are also passed on to the final user, together with a specific requirement that the final user must review the usage limitations in terms of his own application.

Hose Service Life

It is not possible to guarantee a minimum service life for any of the Aflex Hose products which can be applicable for every type of application.

(For example, PTFE lined hose has been used in one application where it was cycled with hot steam, then cold water, also flexed every 17 seconds 24 hours per day, and the customer was very satisfied with a service life of 3 weeks before failure. In other light duty applications carrying pharmaceutical products, however, many Corroflon hoses are still performing satisfactorily after 20 years in service).

Service life predictions or guarantees can only be given in cases where all the relevant information concerning the application is given in writing to Aflex Hose, and Aflex Hose subsequently replies in writing prior to the order being placed.

If such a written undertaking is not sought and given, then Aflex Hose cannot be held liable for any hose product failure which the customer considers to be premature, excepting failures which are due to faulty materials or manufacturing defects.

24 Month Warranty

Aflex Hose Ltd warrants its products to be free from faulty materials or manufacturing defects from the date of the initial sale, for 24 months.

Product Failure

In the event of a product failure, Aflex Hose requests that the product should not be cut up or tampered with, but should be decontaminated and returned to Aflex Hose, plus a decontamination certificate, for examination and analysis of the fault. The customer should also provide full details in writing of the application conditions under which the hose failed, including Pressure, Vacuum, Temperature, Flexing and any cycling of any of these, also the fluid and gases passing through the hose, and the total time that the hose has been in service. The customer may send his own witness to the examination if required. Aflex Hose will provide a full Non Conformance Report for the customer.

If faulty materials or a manufacturing defect in the hose was responsible for the failure to perform then, the maximum liability to be accepted by Aflex Hose would include the invoice value of the failed hose itself, or the invoice value of the whole customer order if appropriate, also any reasonable costs for removal and replacement of the hose, and costs for packing and despatching the failed hose back to Aflex Hose. Aflex Hose Ltd will not accept liability for any other consequential or financial losses, including, but not limited to loss of profits, loss of products or downtime costs.

Untested Hose for Self Assembly by Customers

Aflex Hose sometimes supplies "loose" hose, without end fittings attached to Self Assembly Customers, who will then cut the hose to length and attach end fittings to make up Hose Assemblies.

Self Assembly Customers must then accept the responsibility to carry out pressure testing of 100% of such assemblies to 1½ times the Maximum Working Pressure before supply for end use, to validate both the hose and the end fitting attachment.

Unless the customer requests, and Aflex Hose confirm that their loose hose is pressure tested before supply, such testing is not normally applied by Aflex Hose, because this testing requirement is satisfied by the Self Assembly Customer during his own testing of the finished Hose Assembly.

The Self Assembly Customer must also accept responsibility for determining and approving the Design Suitability of the hose assemblies for their intended use before supply.

This includes determining and requesting or applying any special tests which may be identified as necessary to ensure suitability for the intended use.

Aflex Hose will only accept liability for its hose products which are assembled by customers themselves if all the hose and fitting components were either supplied by Aflex Hose or manufactured in accordance with Aflex Hose drawings, and they were assembled and tested in accordance with Aflex Hose's current Manufacturing and Testing Instructions.

Untested Hose Assemblies

Aflex Hose Ltd shall not be liable for any delay or default in performing in accordance with any Customers' order if the delay or default is caused by conditions beyond its control, including, but not limited to wars, insurrections, strikes, natural disasters or performance failures by Carriers, sub-contractors or other third parties outside the control of Aflex Hose Ltd.

Force Majeure

Aflex Hose Ltd stall not be liable for any delay or default in performing in accordance with any Customers' order if the delay or default is caused by conditions beyond its control, including, but not limited to wars, insurrections, strikes, natural disasters or performance failures by Carriers, sub-contractors or other third parties outside the control of Aflex Hose Ltd.

Legal System

These Conditions of Sale are subject to English Law.

Aflex Hose USA, LLC

World's Leading Manufacturer of PTFE Flexible Hose

AFLEX COMPANIES AND DISTRIBUTORS WORLDWIDE

GERMANY & AUSTRIA
Tecnoplast GmbH
Postfach 11 12 31, 40512 Dusseldorf, Germany
Telephone: (+49) 211 537 433-0 Fax: (+49) 211 593 914
Email: info@tecnoplast.de Web Site: www.tecnoplast.de

HUNGARY
Szalai & Tarsa KFT
Angst + Pfister Kepviselet
H-1106 Budapest, Maglodi UT 16, Hungary
Telephone: (+36) 126 166 69 Fax: (+36) 126 026 07
Email: szalaig@axelero.hu

HOLLAND & BELGIUM
Cleton & Meijer
PO Box 54, 3130 AB, Vlaardingen, Netherlands
Telephone: (+31) 104 345 922 Fax: (+31) 104 601 904
Email: sales@cleton-meijer.nl Web Site: www.cleton-meijer.nl

IRELAND
Dublin Engineering
184 Lower Kimmage Road, Dublin 6, Ireland
Telephone: (+353) 149 081 49 Fax: (+353) 149 083 11
Email: dublinengineering@eircom.net

ISRAEL
Transtechnica
Hyotzer St. 18, Industrial Zone Holon, P.O.B. 1703,
Holon, 58117, Israel
Telephone: (+97) 235 599 522 Fax: (+97) 235 599 544
Web Site: www.transtechnica2001.co.il

JAPAN & CHINA
Tofle Co. Inc.
Toyoda Nissei Kitahama Bldg No -10, 1-Chome, Kouraibashi,
Chuo-Ku, Osaka, 541-0043, Japan
Telephone: (+81) 647 065 000 Fax: (+81) 647 065 001
Email: international@tofle.com Web Site: www.tofle.com

POLAND, CZECH REPUBLIC & SLOVAKIA
Tubes International SP Z.O.O.
Ul. Bystra 15A, 61 - 366 Poznan, Poland
Telephone: (+48) 616 530 222 Fax: (+48) 616 530 220
Email: import@tubes.com.pl Web Site: www.tubes.com.pl

SINGAPORE & INDONESIA
Metallic Engineering (F.E.) Pte Ltd
No. 8 Loyang Walk
Loyang Industrial Estate, 508791, Singapore
Telephone: (+65) 654 623 95/654 623 96 Fax: (+65) 654 684 49
Email: metallic@singnet.com.sg Web Site: www.metallic.com.sg

SPAIN & PORTUGAL
Comercial Gasso S.A.
Pol. Ind. Can Calderon, C/Murcia, Nave C, 08830 Sant Boi De
Llobregat, Barcelona, Spain
Telephone: (+34) 936 539 800 Fax: (+34) 936 529 804
Email: gasso@ctv.es Web Site: www.gasso.com

SCANDINAVIA
Euroflon A.B.
Box 2045, S-591 02 Motala, Sweden
Telephone: (+46) 141 234 430 Fax: (+46) 141 513 13
Web Site: www.euroflon.se

SWITZERLAND
Flextechnik - M. Hauri
Heidenlochstrasse 56, CH-4410, Liestal, Switzerland
Telephone: (+41) 61 923 05 38 Fax: (+41) 61 923 05 39
Email: flextechnik@tiscalinet.ch

UNITED KINGDOM
Aflex Hose Limited
Spring Bank Industrial Estate, Watson Mill Lane,
Sowerby Bridge, Halifax, West Yorkshire HX6 3BW
Telephone : (+44) 1422 317 200 Fax : (+44) 1422 836 000
Website: www.aflex-hose.com

The World's Leading Manufacturer of PTFE Flexible Hose.

Aflex Hose USA, L.L.C
6111 Keller's Church Road, Unit B, Pipersville,
Bucks County, Pennsylvania, PA 18947, United States of America
Telephone: (+1) 215 766 1455 Fax: (+1) 215 766 1688
Web Site: www.aflex-hose.com

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