Aflex Hose Ltd
World's Leading Manufacturer of PTFE Flexible Hose

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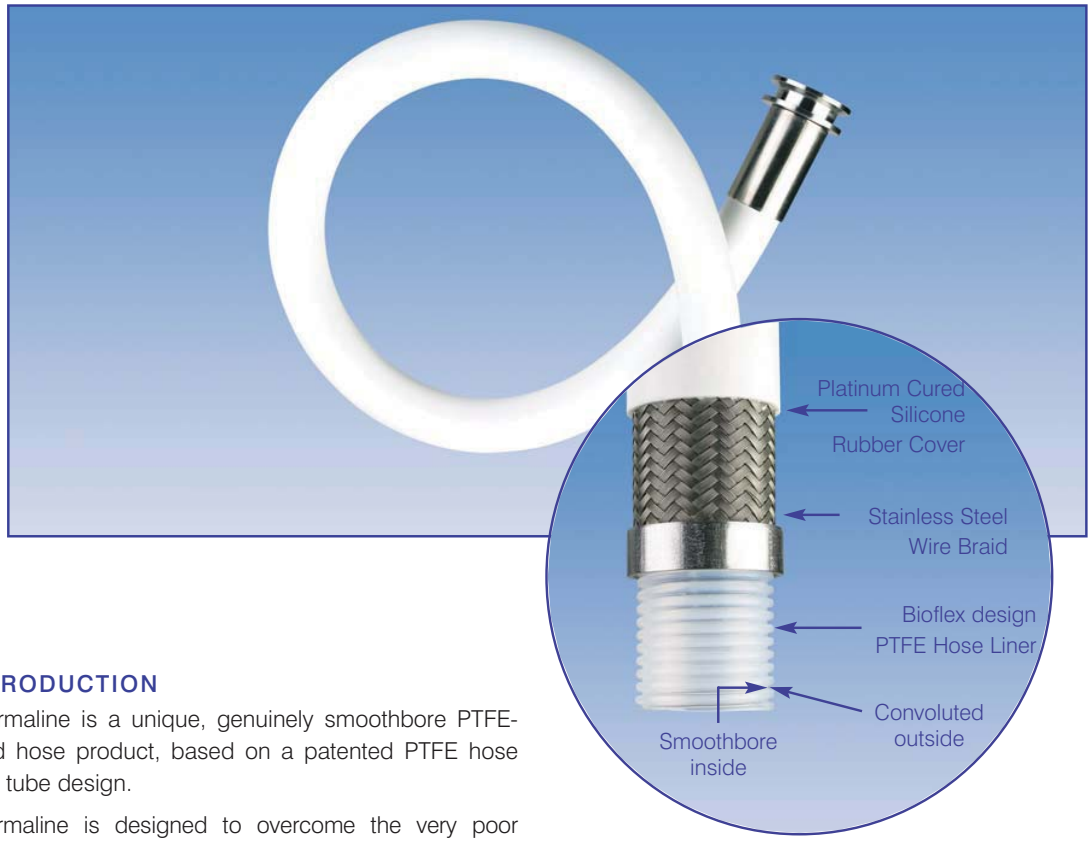
PHARMALINE



INTRODUCTION

Pharmaline is a unique, genuinely smoothbore PTFE-lined hose product, based on a patented PTFE hose liner tube design.

Pharmaline is designed to overcome the very poor flexibility of currently available similar smoothbore products.

The only products which can match the flexibility of Pharmaline are convoluted PTFE lined hose products, sometimes misleadingly referred to as "smoothbore" or "smoothflex", even when the bore is actually convoluted.

ALTERNATIVE PRODUCTS

Pharmalex (leaflet available) is a lower pressure, lighter duty alternative to Pharmaline. Pharmalex is the same as Pharmaline, but without any wire braid, and with a transparent Silicone Rubber cover.

APPLICATIONS

Pharmaline is designed for use in high purity Pharmaceutical, Biotech, Chemical and Foodstuffs application areas, where ease of cleaning the hose is required, both internal and external.

It is also very suitable for use in other general industrial applications, particularly those where hot fluids or gases are being passed, and if there is any risk of burns due to accidental touching of the hose - for example, hot oil or steam transfer applications.

ADVANTAGES OVER CONVENTIONAL HOSE DESIGNS

- Pharmaline can be used to replace silicone rubber hoses, particularly where much better chemical resistance, and ease of cleaning of the PTFE hose liner is an advantage.
- Unlike silicone rubber hoses, Pharmaline can be steam sterilised any number of times, without degradation of the hose liner.
- Pharmaline can be used to replace conventional smoothbore PTFE lined hoses in applications where much better flexibility of Pharmaline is a an advantage.
- Pharmaline is smaller in O/D and lighter in weight than its nearest rival product because the construction does not include any glass fibre filler layers. The PTFE weight per unit length, however, is higher.

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PHARMALINE

SPECIFICATIONS FOR PHARMALINE GP AND AS

Hose Bore Size		Actual Hose Bore Size		O/D of Cover		Minimum Bend Radius		Maximum Working Pressure		Burst Pressure		Weight per Unit Length	
in	mm	in	mm	in	mm	in	mm	Psi	Bar	Psi	Bar	lb/ft	kg/mtr
1/4	6.4	0.270	6.8	0.460	11.6	3/4	19	2000	130	8000	520	0.11	0.17
3/8	9.5	3/8	9.5	0.610	15.5	1	25	1500	100	6000	400	0.14	0.22
1/2	12.7	1/2	12.7	0.770	19.5	1 1/2	38	1000	70	4000	280	0.25	0.37
5/8	16.0	5/8	16.0	0.960	24.4	2	50	950	65	3800	260	0.35	0.52
3/4	19.0	3/4	19.0	1.070	27.3	2 1/2	63	900	60	3600	240	0.42	0.65
1	25.4	1	25.4	1.370	34.8	4	100	750	50	3000	200	0.57	0.88
1 1/2	38.0	1.530	38.8	2.035	51.7	6.70	170	550	38	2291	158	1.14	1.698
2	50.0	2.030	51.5	2.560	65.7	8.270	210	400	28	1783	123	1.58	2.355

HOSE TYPES, DESIGNS & APPROVALS

Pharmaline GP has a PTFE hose liner tube, manufactured from PTFE material in accordance with FDA requirement 21 CFR 177.1550.

An antistatic PTFE option is also available, Pharmaline AS, using liner material in accordance with the FDA requirement 21 CFR 178.3297.

Both Pharmaline GP and Pharmaline AS have been tested and the PTFE liners comply with USP Class VI, including the Elution (Cytotoxicity) test.

Both include grade 304 SS wire Braid, and a Platinium Cured white silicone rubber cover (Post-cured 4 hours at 200˚C in accordance with requirements for USP Class VI). The Silicone Rubber material is in accordance with FDA requirement CFR-177-2600.

ATEX - Attestations of Conformity and Labelling are available for the Pharmaline range of hose and hose assemblies.

PROPERTIES

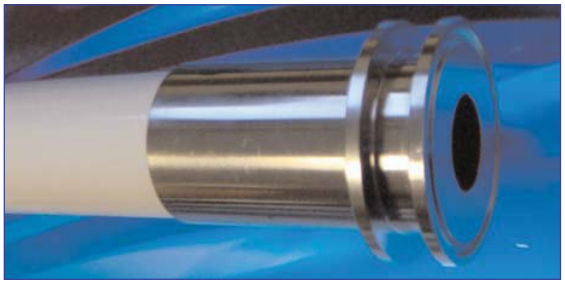
- **Temperature Range**: -60˚C (-80˚F) to +200˚C (+400˚F).
- **Pressure vs Temperature** - Pressure ratings are as listed up to 130˚C (266˚F), then reducing at 1% per 1˚C (1.8˚F) up to +200˚C (400˚F).
- **Vacuum** - All sizes fully vacuum resistant up to 130˚C.

FURTHER TECHNICAL INFORMATION

Further technical information related to PTFE material, Antistatic specifications, usage requirements and limitations, testing and flow rates etc. is available in the Bioflex Product Information pages on the Aflex Hose website.

CRIMPED END FITTINGS

- Sanitary and Mini Sanitary Triclamp (Triclover) Fittings in 316 SS, with bores electropolished to <0.375μm (<15μin).

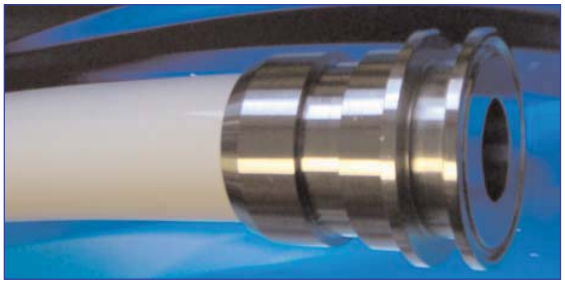


- I-Line Fittings, Compression Fittings, BSPT & NPT Male, Flanges, Camlocks, DIN11851, RJT, SMS, RJP and others are also available to special order.

RELINK END FITTINGS

"Relink" Self Assembly, Re-usable end fittings are also available for end fitting types as listed above.

These can be assembled and disassembled by the Customer, and are to a Patented Design.



The purchase of a Relink Hand press is required, and further information is available on the Relink leaflet on the Aflex website. Available for use with hose up to 1" - 25.4mm

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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.

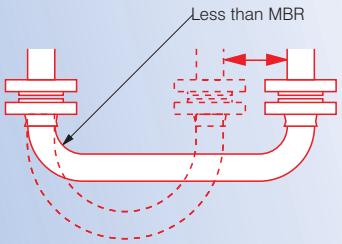
Whether static or dynamic, the First Rule concerning the configuration of the hose is that the bend radius of the hose must never be less than the Minimum Bend Radius (MBR) for the hose as listed in the relevant hose brochure.

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.

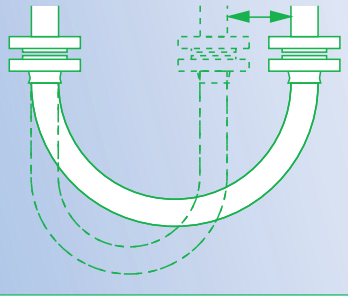
The Second Rule, therefore, if possible, is to design theconfiguration to ensure that any flexing in the hose takes place away from the end fittings.

(DYNAMIC) CONFIGURATION

INCORRECT - Hose too short

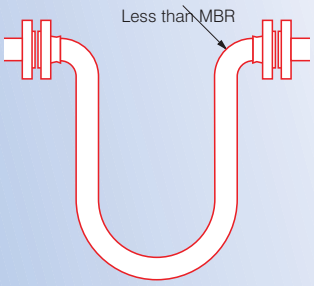


CORRECT - No flex at end fittings



(STATIC) CONFIGURATION

INCORRECT - Weight of hose is at 90˚ to Axis of End Fittings



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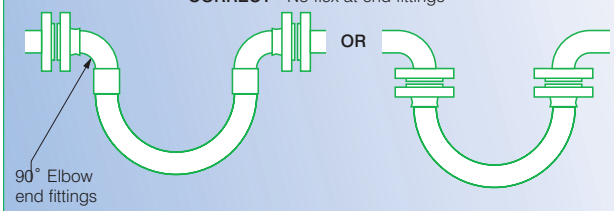

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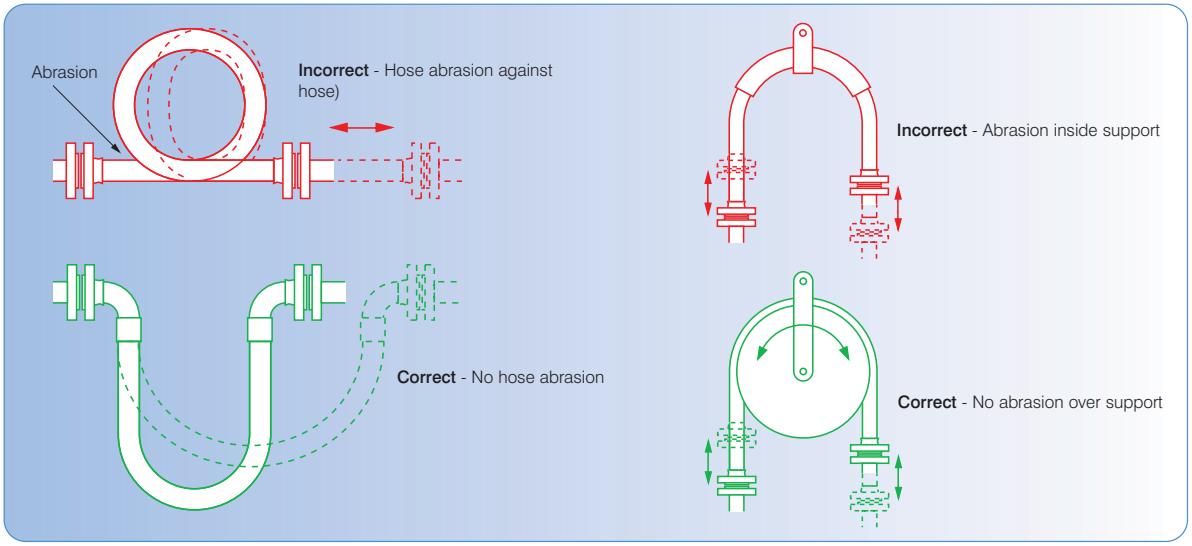
Hose Configurations & Length Calculations

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

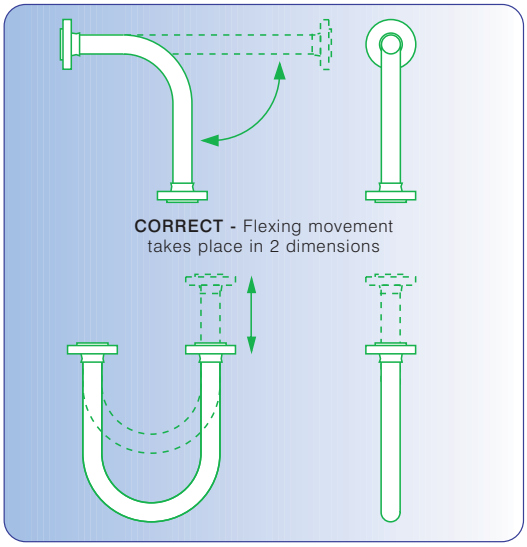
In some cases, the length, configuration and angle of the hose can be designed to avoid abrasion. In others, static or moving support frames or support wheels are required.

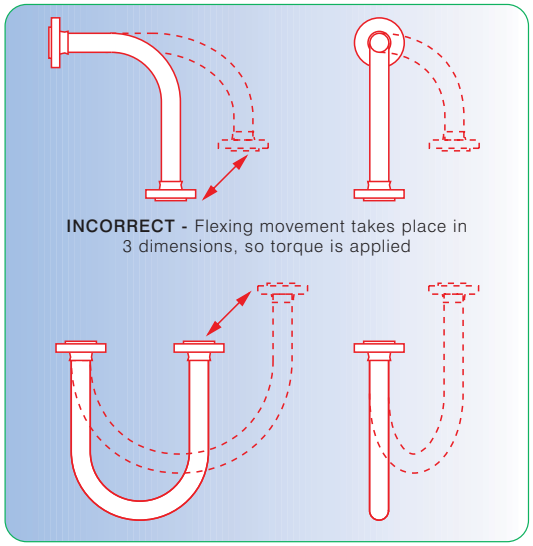


The Fourth Rule is that **the hose must not be subjected to torque, either during connection, or as a result of the flexing cycle.**

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 3 dimensions instead of 2, then torque will also occur:





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

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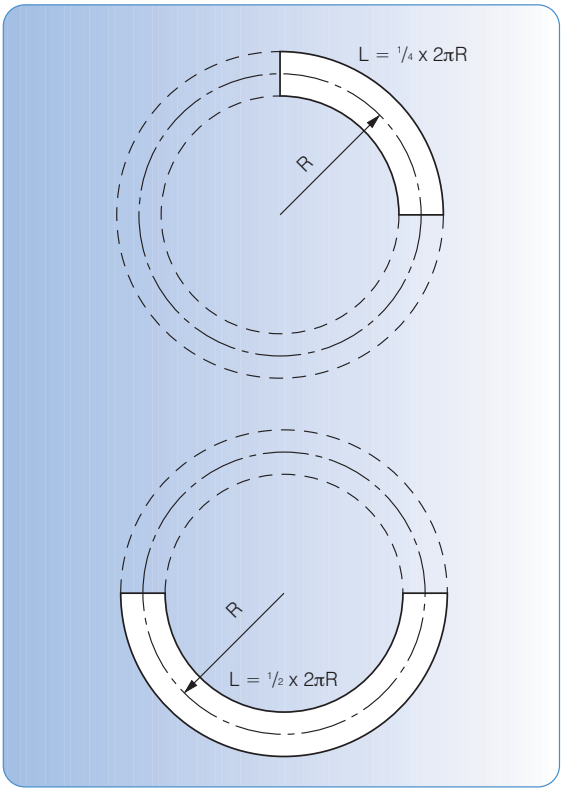
Hose Configurations & Length Calculations Continued

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 :

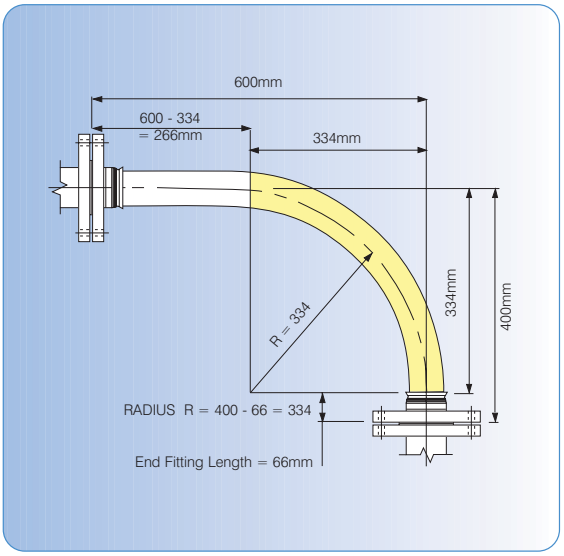
To calculate the length for a 2" bore size hose with flange end fittings, to be fitted in a 90° configuration with one leg 400mm long, the other 600mm long.

Length of Bent Section (yelllow) = 1/4 x 2πR (334)
= 1/4 x 2 x 3.142 x 334 = **525mm**

Length of top, Straight Section, including the top end fitting length
= 600 - 334 = **266mm**

Length of bottom end fitting = **66mm**

Total length of Hose Assembly = 525 + 266 + 66 = **857mm**



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 radii round bends. Measure the extended length, then scale up if necessary to determine the approximate length of the hose.

If in doubt, consult Aflex Hose.