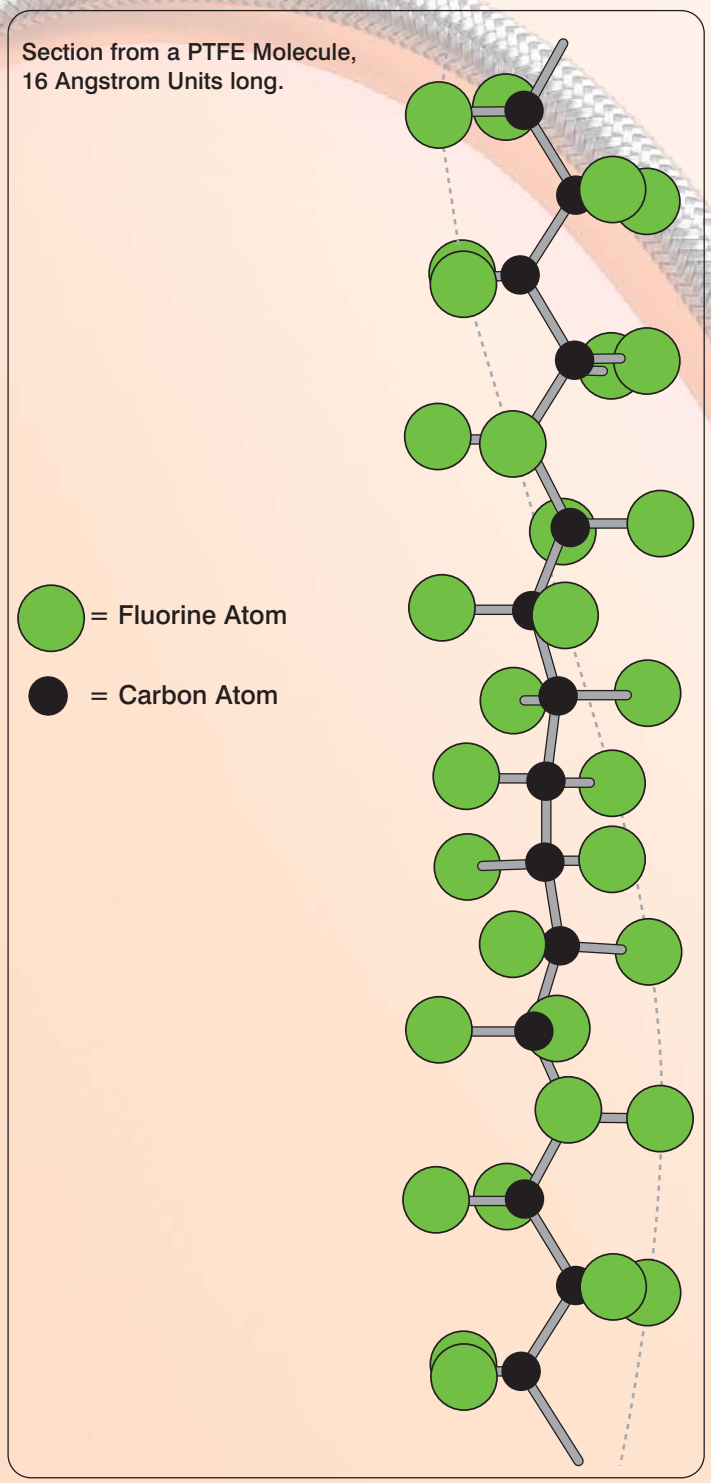
Smoothbore

PTFE Lined Flexible Hose

Contents

PTFE - The Optimum Choice For Hose Linings



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 quickly, easily and 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 -150˚C up to +260˚C, dependent upon the hose design and the application conditions.

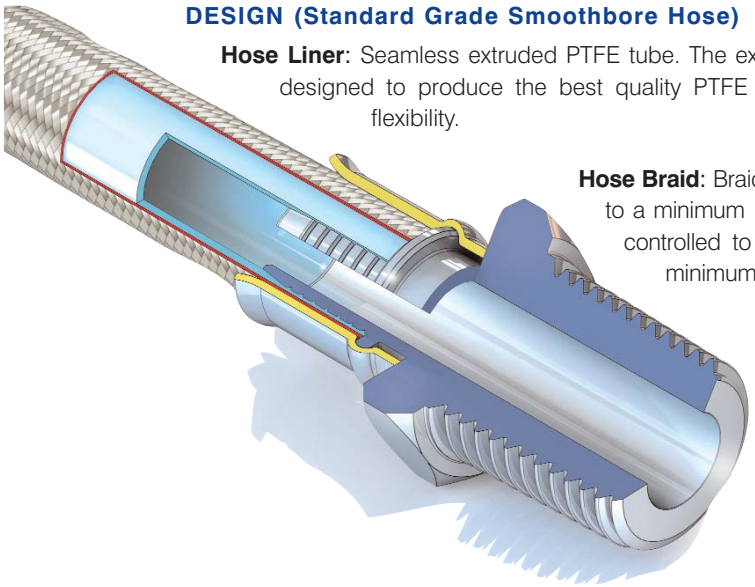
This is the widest temperature range of any rubber or plastic hose lining material.

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.

Smoothbore Hose Design, Grades Available, and How To Order

DESIGN (Standard Grade Smoothbore Hose)



Hose Liner: Seamless extruded PTFE tube. The extrusion, heat treatment and quality control programmes are designed to produce the best quality PTFE tube possible, ensuring minimum porosity and maximum flexibility.

Hose Braid: Braided from AISI grade 304 stainless steel wire, bright hard drawn to a minimum 1700 N/mm2 tensile strength. The braiding process is closely controlled to ensure even tensions and the correct braid angle, to give minimum expansion/contraction under pressure.

GRADES AVAILABLE, and APPLICATIONS

There are 3 standard grades available, with a Single SS wire braid:

Grade SW, SB - Standard Wall, Single Braid
For general purpose use, including high and low pressure steam, chemicals, paints, inks, adhesives, brake fluids, fuels, oils, detergents, refrigerants and foodstuffs.

PTFE lined hose is the optimum hose product wherever excellent chemical resistance, temperature resistance and/or internal "non-stick" cleanability are primary requirements of the application.

Grade HW, SB - Heavy Wall, Single Braid

For heavy duty use, also for use with gases up to 150 Bar pressure, and for hot/cold cycling applications.

Grade MW, SB - Medium Wall, Single Braid, also called Hyperline SB

The Hyperline name is applied to Aflex PTFE hose products which have an oversize bore, to enable assembly with standard Hydraulic End Fittings. In most cases, these sizes are the same as the conventional "dash" hose size range, as indicated in the specifications.

- All these grades are all described and specified on page 5.

- All can be supplied with a second, "Double" braid, designated DB instead of SB, as specified on page 6.

- Other options are also available, as given on page 7, which include:

AS Grade (Antistatic PTFE Liner Tube)
HPG Grade (High Pressure Gas quality hose)
HI Grade (High Burst strength hose)
MPSS Grade (Multi-Pack Braid hose)

Plastic or Rubber Covers can also be extruded on to the braid as an outer cover for the hose, as described on Page 8.

HOW TO ORDER SMOOTHBORE HOSE

Either write the hose specification in full, using the Grade letters.

Example: "500 metres of 1/2" bore HW, AS, DB" refers to 1/2" bore Heavy Wall, Antistatic PTFE lined hose with a Double Braid of SS wire.

Or use the Aflex Part Numbers as listed on pages 5 to 7. Example (hose as above) "500 metres of Part Number 70-210-08-02-02"

Specifications for Single Braid Hose and Hose Properties

SPECIFICATIONS

For Single Stainless Steel wire braid hose, for Standard Grade and AS Grade

STANDARD WALL, SINGLE BRAID (SW, SB)

Bore Size (Nominal)	Bore Size (Actual)		PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in	mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/8	3.17	0.125	0.76	0.030	5.85	0.230	22	7/8	290	4220	.065	.044	70-100-02-01-02
3/16	4.76	0.188	0.76	0.030	7.40	0.291	40	1 5/8	265	3856	.080	.054	70-100-03-01-02
1/4	6.35	0.250	0.63	0.025	8.50	0.335	60	2 3/8	240	3492	.093	.062	70-100-04-01-02
5/16	7.94	0.313	0.63	0.025	10.15	0.400	70	2 7/8	200	2910	.110	.074	70-100-05-01-02
3/8	9.53	0.375	0.63	0.025	11.75	0.463	80	3 2/8	190	2765	.124	.083	70-100-06-01-02
1/2	12.70	0.500	0.76	0.030	14.95	0.589	110	4 3/8	150	2183	.207	.139	70-100-08-01-02
5/8	15.88	0.625	0.76	0.030	18.35	0.722	150	6	110	1601	.255	.171	70-100-10-01-02
3/4	19.05	0.750	0.76	0.030	21.65	0.852	200	7 7/8	80	1164	.315	.211	70-100-12-01-02
1	25.40	1.000	1.00	0.039	28.15	1.108	300	11 7/8	55	800	.430	.288	70-100-16-01-02

HEAVY WALL, SINGLE BRAID (HW, SB)

Bore Size (Nominal)	Bore Size (Actual)		PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in	mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/8	3.17	0.125	1.00	0.039	6.10	0.240	20	7/8	290	4220	.068	.046	70-200-02-01-02
3/16	4.76	0.188	1.00	0.039	7.65	0.301	29	1 1/8	270	3929	.087	.058	70-200-03-01-02
1/4	6.35	0.250	1.00	0.039	9.25	0.364	30	1 2/8	260	3783	.113	.076	70-200-04-01-02
5/16	7.94	0.313	1.00	0.039	10.90	0.429	40	1 5/8	230	3347	.135	.091	70-200-05-01-02
3/8	9.53	0.375	1.00	0.039	12.50	0.492	55	2 2/8	200	2910	.153	.103	70-200-06-01-02
1/2	12.70	0.500	1.00	0.039	15.60	0.614	85	3 3/8	160	2328	.240	.161	70-200-08-01-02
5/8	15.88	0.625	1.30	0.051	19.10	0.752	110	4 3/8	130	1892	.292	.196	70-200-10-01-02
3/4	19.05	0.750	1.30	0.051	22.05	0.868	145	5 6/8	92	1339	.344	.231	70-200-12-01-02
1	25.40	1.000	1.50	0.059	28.80	1.134	260	10 2/8	69	1004	.470	.315	70-200-16-01-02

MEDIUM WALL SINGLE BRAID (MW, SB), also referred to as HYPERLINE SB

Bore Size (Nominal)	Bore Size (Actual)		Dash Size Reference (if any)	PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in		mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/16	2.0	0.079	-2	1.00	0.040	5.00	0.197	13	1/2	450	6500	.045	.030	70-300-02-01-02
1/8	3.5	0.138	-3	1.00	0.040	6.45	0.254	20	3/4	290	4200	.070	.047	70-300-03-01-02
3/16	5.0	0.200	-4	0.76	0.030	7.65	0.301	45	1 3/4	230	3350	.078	.052	70-400-03-01-02
1/4	6.7	0.264	-5	0.76	0.030	9.30	0.366	60	2 3/8	205	3000	.110	.074	70-400-04-01-02
5/16	8.5	0.335	-6	0.76	0.030	10.72	0.422	70	2 3/4	180	2600	.136	.091	70-400-05-01-02
3/8	10.0	0.394		0.76	0.030	12.75	0.500	80	3	180	2600	.166	.111	70-400-06-01-02
1/2	13.6	0.536	-10	0.76	0.030	16.35	0.644	130	5	140	2000	.210	.141	70-400-08-01-02
5/8	16.6	0.654	-12	0.84	0.033	19.50	0.768	163	6 1/2	110	1600	.280	.188	70-400-10-01-02
3/4	19.8	0.780		1.00	0.040	22.50	0.860	180	7	95	1400	.327	.219	70-400-12-01-02
1	26.4	1.040		1.00	0.040	30.10	1.190	230	9	80	1160	.524	.351	70-400-16-01-02

** For Anti-Static Grade, add 10, eg 110, 210 etc to the Part Number*
For High Pressure Gas Grade, add 20, eg 120, 220 etc.

Note: *Many of the sizes of hose and fittings listed in this brochure are available as ex-stock items and are priced accordingly. However, some of the less popular items are not always in stock, and may therefore incur a minimum order charge or a set-up charge for smaller quantities. Aflex Hose will advise when the enquiry is made.*

Temperature & Pressure

- Temperature affects the Maximum Working Pressure (MWP) as listed above, so for temperatures above 130˚C reduce the MWP by 0.75% for each 1˚C above 130˚C. Example: at 180˚C, reduce the MWP by (180 - 130) x 0.75 = 37.5%.
- Pressure Ratings above 150 Bar (2200 psi) only apply for the transfer of non-penetrating fluids. If gases or penetrating fluids are used at higher pressures, HPG grade hose is required.
- Maximum Working Pressures (MWP) listed are calculated on the basis of a 3:1 safety factor relative to the burst pressure, so Burst Pressure = 3 x MWP. If MWP is required based on a 4:1 safety factor, multiply the listed value by 0.75.

Specifications for Double Braid Hose

SPECIFICATIONS

For Double Stainless Steel wire braid hose (DB Grade) and Antistatic (AS, DB) Grade.

STANDARD WALL, DOUBLE BRAID (SW, DB)

Bore Size (Nominal)	Bore Size (Actual)		PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in	mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/8	3.17	0.125	0.76	0.030	6.85	0.270	20	7/8	360	5238	.100	.067	70-100-02-02-02
3/16	4.76	0.188	0.76	0.030	8.70	0.343	30	1 1/4	330	4802	.135	.091	70-100-03-02-02
1/4	6.35	0.250	0.63	0.025	10.05	0.396	40	1 5/8	290	4220	.160	.107	70-100-04-02-02
5/16	7.94	0.313	0.63	0.025	11.55	0.455	50	2	250	3638	.190	.127	70-100-05-02-02
3/8	9.53	0.375	0.63	0.025	13.35	0.526	60	2 3/8	230	3347	.214	.143	70-100-06-02-02
1/2	12.70	0.500	0.76	0.030	16.40	0.646	90	3 5/8	180	2629	.341	.229	70-100-08-02-02
5/8	15.88	0.625	0.76	0.030	19.95	0.785	130	5 1/8	135	1964	.416	.279	70-100-10-02-02
3/4	19.05	0.750	0.76	0.030	23.10	0.910	170	6 3/4	100	1455	.503	.337	70-100-12-02-02
1	25.40	1.000	1.00	0.039	29.60	1.165	270	10 3/4	70	1019	.700	.469	70-100-16-02-02

HEAVY WALL, DOUBLE BRAID (HW, DB)

Bore Size (Nominal)	Bore Size (Actual)		PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in	mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/8	3.17	0.125	1.00	0.039	7.05	0.278	18	3/4	350	5093	.108	.072	70-200-02-02-02
3/16	4.76	0.188	1.00	0.039	8.90	0.350	25	1	320	4656	.140	.094	70-200-03-02-02
1/4	6.35	0.250	1.00	0.039	10.75	0.423	26	1 1/8	310	4511	.183	.123	70-200-04-02-02
5/16	7.94	0.313	1.00	0.039	12.35	0.486	35	1 1/2	275	4001	.210	.141	70-200-05-02-02
3/8	9.53	0.375	1.00	0.039	14.10	0.555	50	2	240	3492	.243	.163	70-200-06-02-02
13/32	10.32	0.406	1.00	0.039	15.05	0.593	60	2 3/8	230	3347	.258	.173	70-500-13-02-02
1/2	12.70	0.500	1.00	0.039	16.90	0.665	75	3	200	2910	.374	.251	70-200-08-02-02
5/8	15.88	0.625	1.30	0.051	20.75	0.817	100	4	155	2255	.452	.303	70-200-10-02-02
3/4	19.05	0.750	1.30	0.051	23.80	0.937	135	5 3/8	110	1601	.532	.356	70-200-12-02-02
1	25.40	1.000	1.50	0.059	30.70	1.209	250	9 7/8	84	1222	.730	.489	70-200-16-02-02
1 1/4	31.75	1.250	1.50	0.059	36.90	1.453	400	15 3/4	75	1091	.905	.637	70-200-20-02-02
1 1/2	38.10	1.500	1.50	0.059	43.75	1.722	800	31 1/2	65	946	1.170	.784	70-200-24-02-02
2	50.80	2.000	1.50	0.059	56.40	2.221	1200	47 1/4	40	582	1.610	1.079	70-200-32-02-02

MEDIUM WALL, DOUBLE BRAID (MW, DB) also referred to as HYPERLINE SB, DB)

Bore Size (Nominal)	Bore Size (Actual)		Dash Size Reference (if any)	PTFE Tube Wall Thickness		Braid Outside Diameter		Minimum Bend Radius		Maximum Working Pressure		Weight per Unit Length		*Part Number
	mm	in		mm	in	mm	in	mm	in	Bar	psi	Kg/mt	Lbs/Ft	
1/16	2.0	0.079	-2	1.00	0.040	6.00	0.236	11	1/2	540	7800	.075	.050	70-300-02-02-02
1/8	3.5	0.138	-3	1.00	0.040	7.45	0.293	18	3/4	350	5000	.111	.074	70-300-03-02-02
3/16	5.0	0.200	-4	0.76	0.030	8.80	0.347	35	1 3/8	340	4900	.128	.086	70-400-03-02-02
1/4	6.7	0.264	-5	0.76	0.030	11.00	0.433	50	2	320	4600	.170	.114	70-400-04-02-02
5/16	8.5	0.335	-6	0.76	0.030	11.82	0.466	60	2 3/8	270	3900	.215	.144	70-400-05-02-02
3/8	10.0	0.394		0.76	0.030	14.20	0.560	80	3	230	3300	.260	.174	70-400-06-02-02
1/2	13.6	0.536	-10	0.76	0.030	17.35	0.684	110	4 3/8	180	2600	.350	.234	70-400-08-02-02
5/8	16.6	0.654	-12	0.84	0.033	20.80	0.820	140	5 1/2	130	1900	.450	.300	70-400-10-02-02
3/4	19.8	0.780		1.00	0.040	24.00	0.946	160	6 1/2	120	1700	.520	.350	70-400-12-02-02
1	26.4	1.040		1.00	0.040	31.70	1.249	210	8 1/4	100	1400	.830	.550	70-400-16-02-02

** For Anti-Static Grade, add 10, eg 110, 210 etc to the Part Number.*
For High Pressure Gas Grade, add 20, eg 120, 220 etc.

Note: *Many of the sizes of hose and fittings listed in this brochure are available as ex-stock items and are priced accordingly. However, some of the less popular items are not stocked, and may therefore incur a minimum order charge or a set-up charge for small quantities.*

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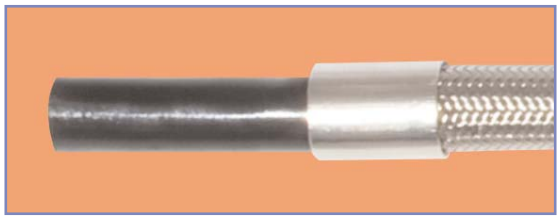
- Temperature affects the Maximum Working Pressure (MWP) as listed above, so for temperatures above 130˚C reduce the MWP by 0.75% for each 1˚C above 130˚C. Example: at 180˚C, reduce the MWP by (180 - 130) x 0.75 = 37.5%.
- Pressure Ratings above 150 Bar (2200 psi) only apply for the transfer of non-penetrating fluids. If gases or penetrating fluids are used at higher pressures, HPG grade hose is required.
- Maximum Working Pressures (MWP) listed are calculated on the basis of a 3:1 safety factor relative to the burst pressure, so Burst Pressure = 3 x MWP. If MWP is required based on a 4:1 safety factor, multiply the listed value by 0.75.

Alternative Hose Liner and Braid Design Options

ALTERNATIVE PTFE HOSE LINER DESIGN OPTIONS

Anti-Static PTFE Linings (AS Grade)



When electrically resistive fluids like solvents and fuels, or multiphase mixtures are passed through natural PTFE hose at high flow rates, a static charge build up may occur on the inner wall of the PTFE liner, which may eventually discharge to the nearest earth creating a leak path through the liner. Anti-static PTFE includes a small quantity of a special carbon black which ensures safe static charge dissipation, in accordance with International Standards.

All the Sizes and Grades of hose can be supplied with an AS liner, to special order.

High Pressure Gas PTFE Liner (HPG Grade) - available to special order

For high specification applications, particularly using gas at pressures above 100 Bar/1500 psi upto 300 Bar/4500 psi, it is necessary to apply a special “Post Sintering” treatment to the PTFE tube liner.

This process is only applicable to Heavy Wall, non-AS Grades of hose, and provides the HPG grade product which is capable of operation at high gas pressures without degradation and porosity development in the structure of the PTFE liner.

ALTERNATIVE BRAID DESIGN OPTIONS

Double Braid Hose (Grade DB) - available to special order

Double Braid hose specifications are given on page 6.

Double Braid Hose is used where higher working pressures, or improved resistance to kinking is required.

“Hiburst” Hose (HI Grade) - available to special order

Hiburst hose has an inner braid of Polyaramid Fibre (Kevlar/Tecnora) and a second outer braid of SS wire. This provides a hose with even higher burst and working pressure capabilities than DB hose. Consult Aflex Hose for details.

“Multi-Pack Braid” (MPSS Grade) - available to special order

Multi-Pack braid is a stainless steel wire braid in which multiple lengths of fine guage wires are tightly packed together in the braid construction. This provides a very high burst pressure and maximum working pressure than the standard DB product.

MPSS Grade Hose can be supplied either as a single or a double Multi-Pack braided product. Consult Aflex Hose for details.

Note: Most of the Grades described on this page are not ex-stock, and are only made to Special Order. Consult Aflex for details.

Plastic or Rubber Hose Covers

ALTERNATIVE PTFE HOSE COVER DESIGN OPTIONS

Purpose

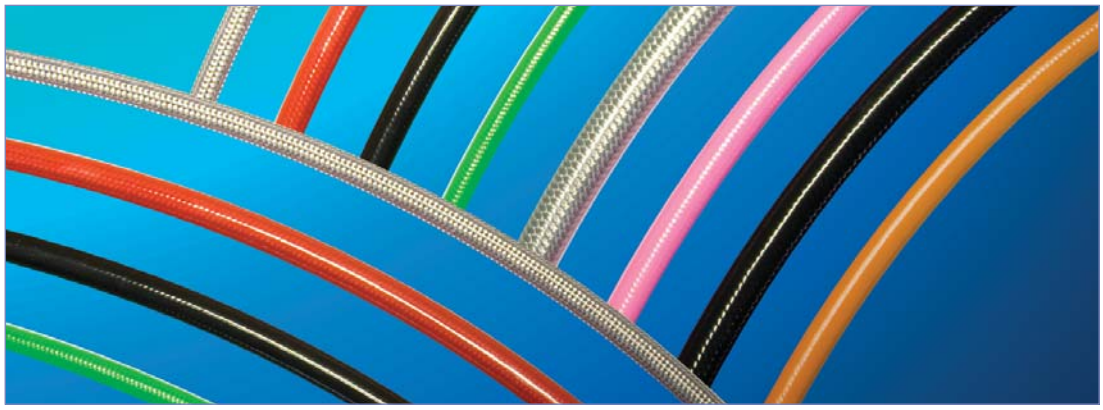
For many applications, it is required that Smoothbore PTFE hose of all sizes, grades and braids should have an outer cover of a flexible plastic, or rubber.

This is usually required to protect the braid, or to colour the hose, or to allow printing on to the hose.

Plastic Covers - available to special order

PVC - flexible PVC covers are the most popular, either transparent, or a wide range of solid or semi-transparent colours.

A particular application is for -3 size single braid, pvc covered hose, used as a brake hose for motorbikes, motorsport and special vehicles.



Nylon II, Hytrel, Sarlink and other types of flexible thermoplastics are also widely used.

Text can be continuously printed along the hose length, usually in black.

Rubber Covers - available to Special Order

Aflex Hose also have rubber extrusion facilities, and can continuously extrude rubber covers on to all grades of hose.

EPDM rubber in blue or black(antistatic), or platinum cured Silicone rubber in transparent or white are available to special order. Other colours and types of rubber may also be available. Consult Aflex Hose for details.

Limitations in Use - The application of a plastic or rubber cover limits the usage conditions of the hose, particularly the maximum operating temperatures, as given below.

Flexible PVC +60˚C/140˚F, Nylon II +120˚C/250˚F, EPDM +121˚C/250˚F, Silicone +200˚C/390˚F.

Smoothbore Hose Supply, Random Lengths or Hose Assemblies

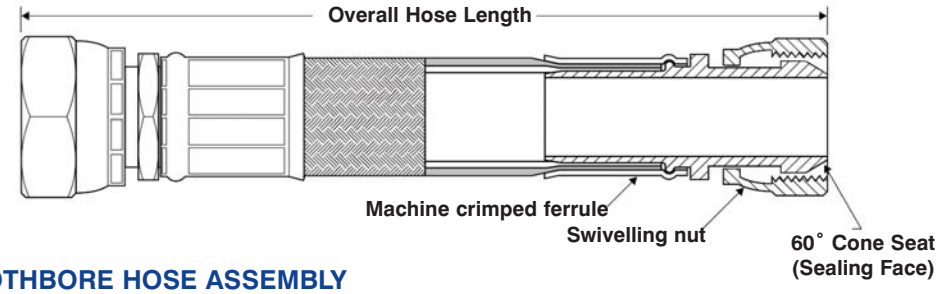
SMOOTHBORE HOSE IN RANDOM LENGTHS

If required, all hose specifications can be supplied in random production lengths, supplied either in coils or on reels, for customers to assemble hoses using their own end fittings or end fittings purchased from Aflex. It is the Customer's own responsibility to pressure test the hose assemblies to ensure that both the hose and the fittings are both fault-free, and suitable for the application.

Stainless steel braided hose from Aflex Hose is always supplied specially cleaned and degreased, with all traces of oil removed from the braid.

SMOOTHBORE HOSE ASSEMBLIES

Smoothbore hose can also be supplied in the form of made up assemblies with end fittings attached by machine crimping at each end. Normally, 10% of all assemblies are hydrostatically pressure tested to 1.5 times the maximum working pressure. More extensive testing of the hoses is also possible, as is pneumatic (air or helium under water) testing.



SMOOTHBORE HOSE ASSEMBLY

Standard end fittings are BSP cone or flat seat female unions and BSP Taper or NPT fixed males, available in zinc plated mild steel or AISI 316 stainless steel. Other types of end fittings available include stainless steel NPT Fixed Female fittings, JIC fittings, Tube Fittings, standpipes, weld-on fittings, and many others.

Note: stainless steel and carbon steel Hydraulic Tail end fittings (used on MW hose) and carbon steel PTFE Tail end fittings (used on SW & HW hose) do not always have a fine machined surface through the bore, and so are not suitable for certain specialised or hygienic applications which require a smooth bore. In such applications, stainless steel PTFE Tail end fittings should be used.

SMOOTHBORE HOSE - ASSEMBLY INSTRUCTIONS

1. Cut the hose to the required length, preferably using a hose cut off machine with a hardened steel blade, allowing for the length of the end fitting.

2. Assemble the correct ferrules, as listed (see 4 below).

3. Insert the end fitting, then push the ferrule forward over the hose and up to the stop on the end fitting.

4. Crimp the ferrule to the correct crimp diameter.

   The correct ferrules and crimp diameters are listed in Aflex documents, which are available on an I-Bay for registered customers, who are given the necessary Access Codes.

   - For SW and HW Hose, both SB and DB, Document AS-04
   - For MW (Hyperline SB) Hose, SB only, Document AS-42

5. Pressure Test the hose assembly before use to 1.5 times the hose Maximum Working Pressure as listed in the Document.

Smoothbore Hose: Special Usage 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 50˚C, 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 GASES

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 gases 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 moulding presses, in order to heat the mould, 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 - spanners, 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 sealing surfaces.

In applications involving the transfer through the hose of expensive or dangerous fluids or gases, the connections must be pressure tested first before being put in to service. This should be done with some harmless media, 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.

SPECIAL APPLICATIONS

Aflex Hose PTFE lined hose products are prohibited from use in the following, special applications:

- Radioactive Applications involving high energy radiation, including Gamma radiation (degrades PTFE).
- Medical Implantation Applications (Not tested for use).
- Aerospace Applications (exclusive contract applies).

Smoothbore Hose and Quality Assurance, Certification and Approvals, and Hose Testing

BS EN ISO 9001:2008

Aflex products are all manufactured in accordance with BS EN ISO 9001: 2008 Quality Management Systems independently assessed and registered by National Quality Assurance Limited (NQA).

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.

Automotive Fuel Hose - SAE J1737

Approved for automotive fuel hose use in accordance with SAE J1737.

CE Marking (Europe only)

Aflex has been assessed by Zurich Engineering 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.

Correct Hose Configuration & Length Calculations - for Bend Radius

Hose Configuration Requirements

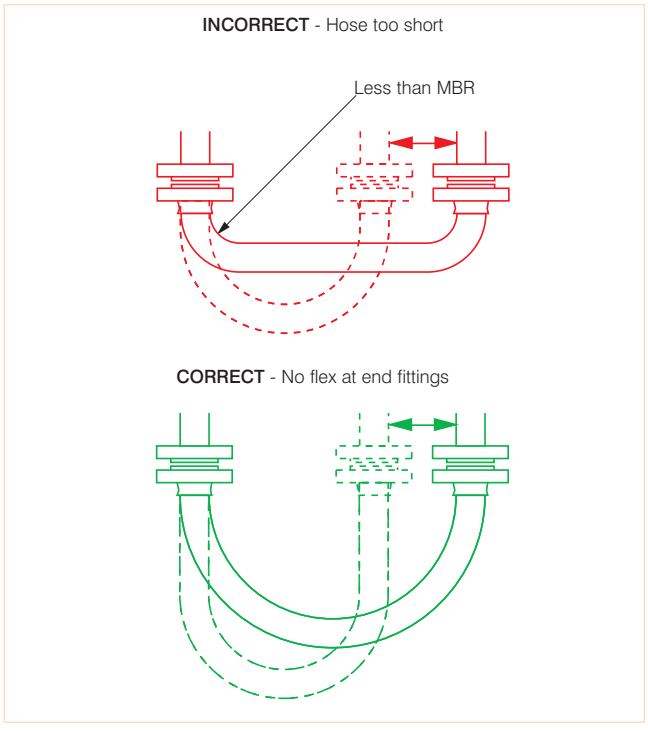
Hose Assemblies are usually connected at both ends in service. They may then either remain in a fixed, or static configuration or in a flexing, or dynamic configuration.

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.

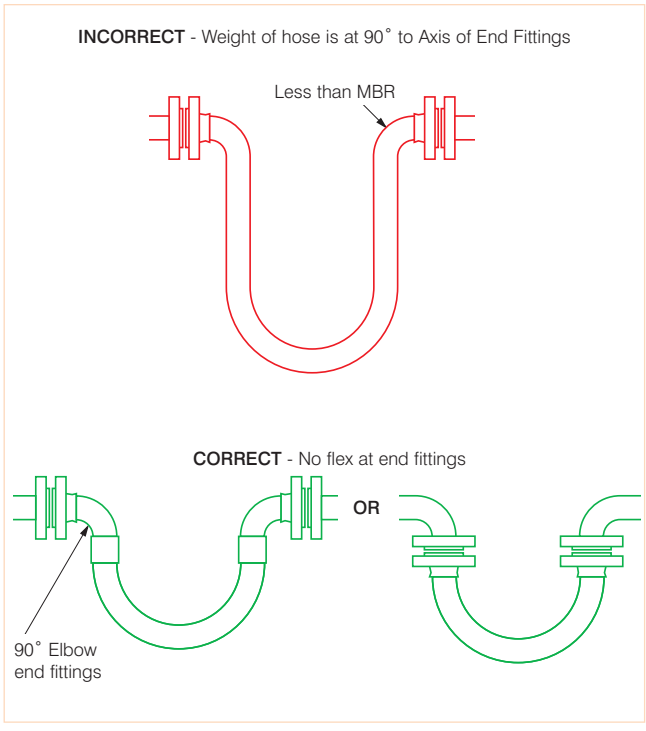
The most common situation when this is likely to occur is when the hose is flexed at the end fitting, with stress being applied to the hose at an angle to the axis of the end fitting. Typically, this happens either because the length of the hose is too short, or because the weight of the hose plus contents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



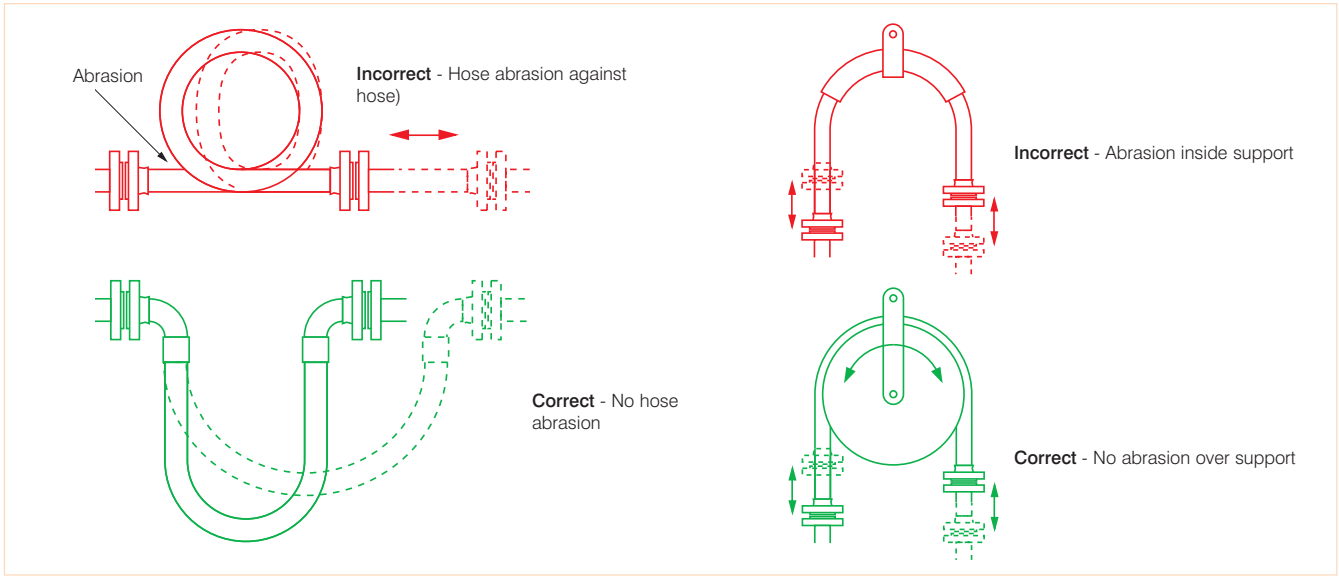
(Static) Configuration



Correct Hose Configuration & Length Calculations - for Abrasion & Torque

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

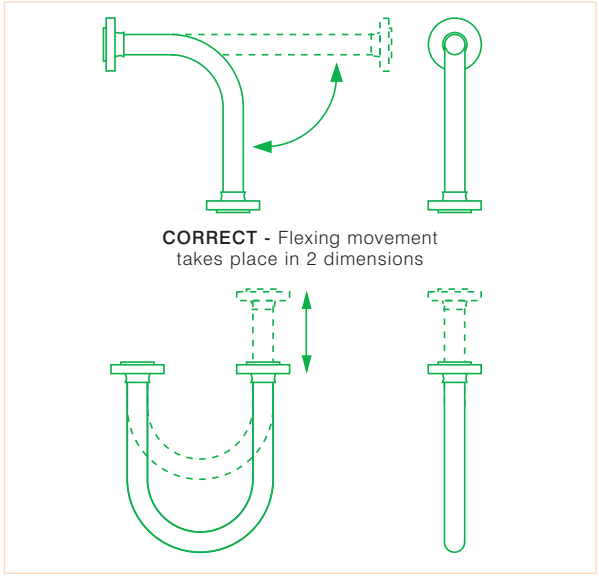
In some cases, the length, configuration and angle of the hose can be designed to avoid abrasion. In others, static or moving support frames or support wheels are required.

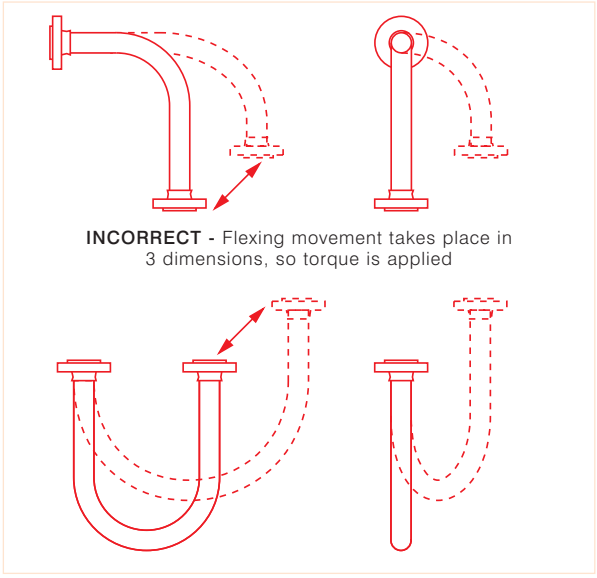


The Fourth Rule is that the hose must not be subjected to torque, either during connection, or as a result of the flexing cycle.

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:





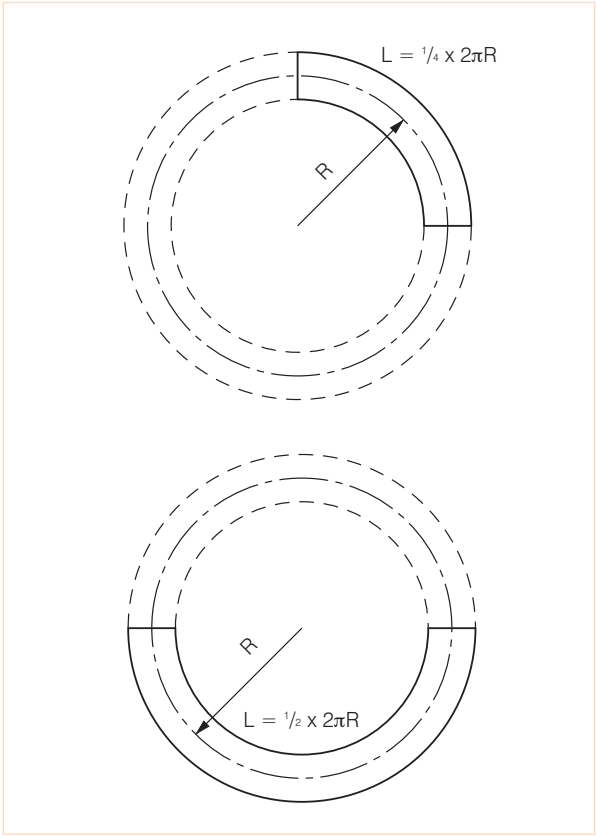
Both Corroflon and Bioflex hose have good resistance to a small level of torque, much better resistance that rubber or SS hose types, but it is still the best practice to take whatever steps are necessary to eliminate torque. If in doubt, consult Aflex Hose.

Hose Configurations & Length Calculations - for Length Calculation

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 = $2\pi R$, 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 $2\pi R$. Or half way round, in a U-shape, = $^1/2$ x $2\pi R$.



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:

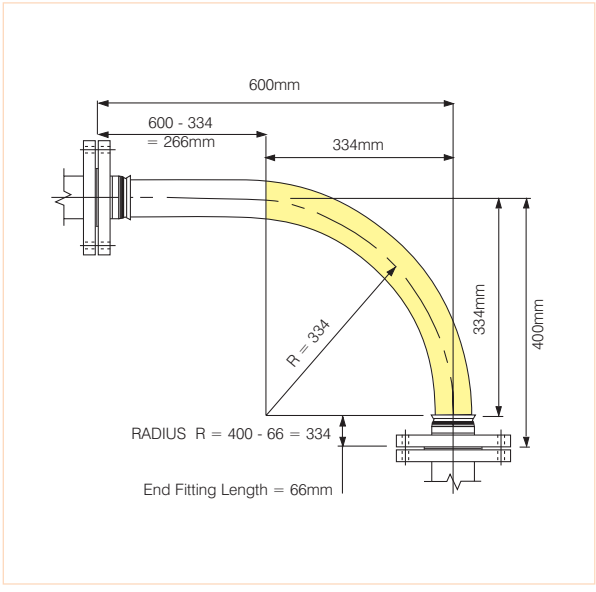
Example :
To calculate the length for a 2" bore size hose with flange end fittings, to be fitted in a 90° configuration with one leg 400mm long, the other 600mm long.

Length of Bent Section (yellow) = $^1/4$ x $2\pi R$ (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.

卓航科技

杭州卓航科技有限公司

地址：浙江省杭州市滨江区现代印象广场 1 幢 2015 室

邮编：310053

电话：0571—87386775

传真：0571—87389775