

Visiflon (Hyperline V)

CONVOLUTED PTFE LINED FLEXIBLE HOSE



- VERY FLEXIBLE
- CHEMICAL RESISTANT
- TEMPERATURE RESISTANT



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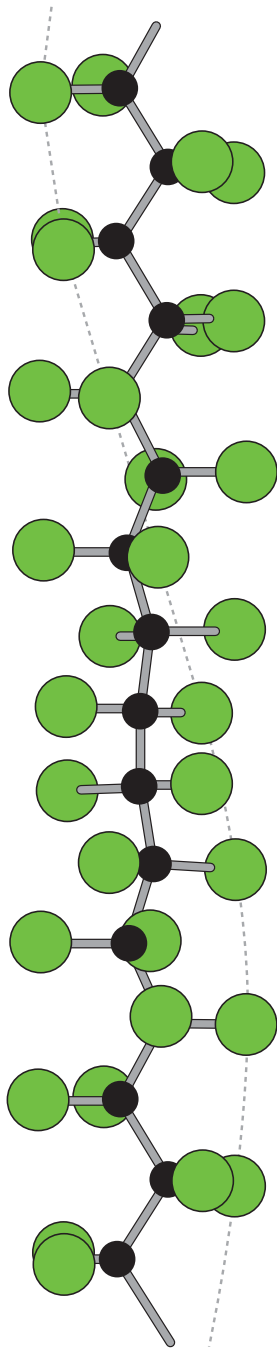
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PTFE - THE OPTIMUM CHOICE FOR VISIFLON HOSE LININGS



Section from a PTFE Molecule,
16 Angstrom Units long.

 = Fluorine Atom
 = Carbon Atom



聚四氟乙烯，英文简称PTFE，其化学结构式为：

$\text{CF}_3(\text{CF}_2\text{CF}_2)_n\text{CF}_3$ ，PTFE分子长链由碳原子构成，每个碳原子又与两个氟原子相链接。

氟原子几乎覆盖了整个螺旋状高分子链的碳原子表面，非常好的保护了内部碳原子。

此分子结构创造了PTFE其无与伦比的各项物理化学特性。

优异的化学抗性

PTFE是已知材料中化学抗性最好的，只有某些特殊用途或介质可以影响它，比如高温高压状态下的氟气/液态氟，熔融状态的某些碱性金属。

鉴于其优异特性，内衬PTFE的软管较普通软管的使用范围、化学抗性更广，是输送腐蚀性介质或某些复杂介质的理想软管。

表面不粘性

日常生活中的不粘锅厨具就已经很好的说明了PTFE表面的不沾特性。

同样，内衬PTFE软管也就较其他种类的软管在易于清洗方面更快速、可靠。

耐温范围广

不粘锅等厨具也从另一个方面展示了PTFE材料的另一个特性：耐高温。软管的PTFE材料本身可耐零下150摄氏度的低温与260摄氏度的高温，不过软管的耐温范围需要根据软管的设计与应用条件来估算。

PTFE材料的耐温范围超出了任何橡胶和塑料软管的耐温范围。

软管设计

用PTFE作为软管内衬，需要考虑的主要问题是如何用更好的软管设计来发挥PTFE的物理化学特性优势，这也是Aflex在过去三十多年一直成功的原因所在。

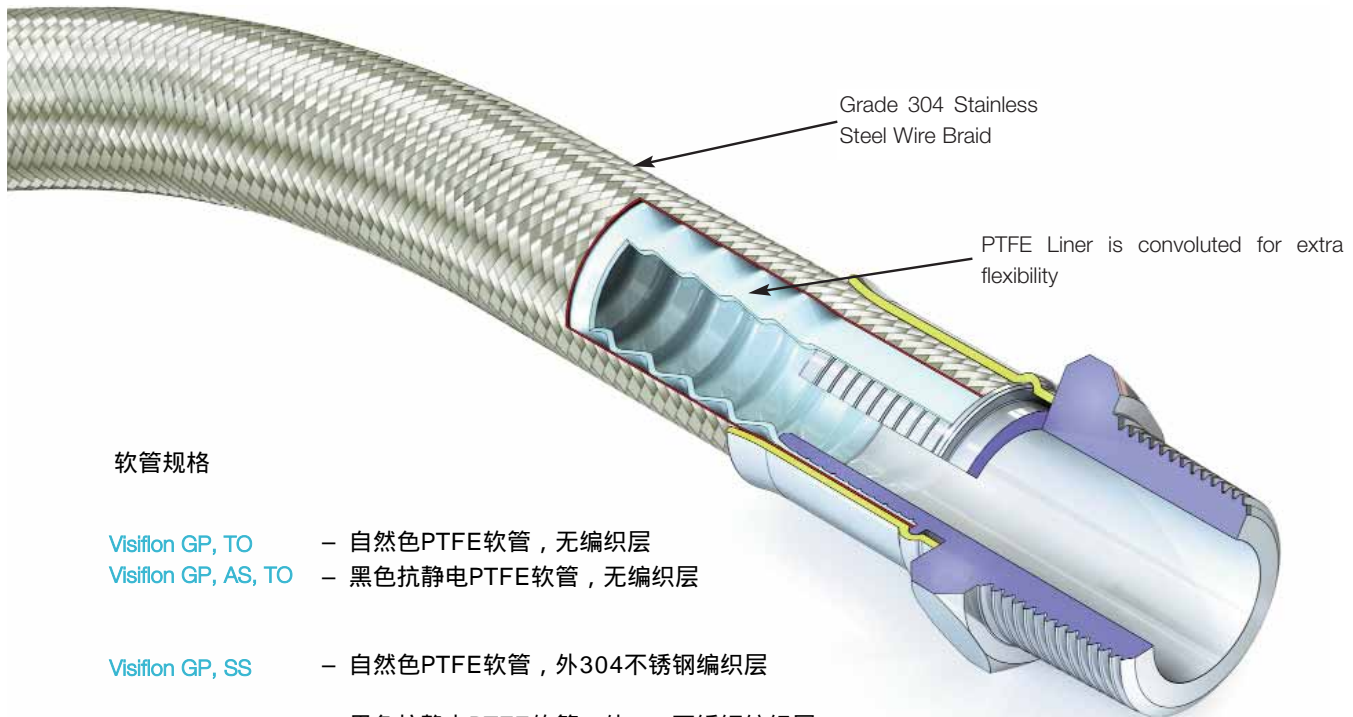
VISIFLON(HYPERLINE V)软管

Visiflon以前也叫Hyperline V（现在也沿用），Visiflon是目前的新命名。

Visiflon包含一根螺旋PTFE内衬软管，并且软管内外壁都是螺旋状的（这和Hyperline FX软管不同，后者只是内衬的外表面是螺旋状的）。

这个螺旋内衬设计使得各个尺寸的软管的柔韧性和抗扭结特性都非常出色。

Visiflon Hose Assembly with
a Fixed Male End Fitting crimped on to the hose



软管规格

- Visiflon GP, TO – 自然色PTFE软管，无编织层
- Visiflon GP, AS, TO – 黑色抗静电PTFE软管，无编织层
- Visiflon GP, SS – 自然色PTFE软管，外304不锈钢编织层
- Visiflon GP, AS, SS – 黑色抗静电PTFE软管，外304不锈钢编织层。
- *Visiflon GP, PB – 自然色PTFE软管，外黄色PP编织层。
- *Visiflon GP, AS, PB – 黑色抗静电PTFE软管，外黄色PP编织层

GRADE DESCRIPTIONS

抗静电内衬（AS）：

在输送高电阻流体时，比如溶剂与燃油或者某些多级性混合介质，流体在高速通过普通PTFE软管会在软管内壁积聚静电荷，这些静电荷最终通过接地释放掉，这很容易会导致软管产生微孔泄漏介质。

抗静电PTFE在生产过程中掺加了微量的炭黑，这就使得软管内部静电荷的释放更安全，并且软管符合国际相关标准。

不锈钢编织（SS）：

不锈钢编织可以保护PTFE内衬增强软管对内外压力的抵抗性。

PP编织（PB）：

聚丙烯网编织层比不锈钢编织层更轻，并且易于操作员掌握，不伤手。

不过，工作温度和压力要受到PP编织材质的影响。

请注意：PB软管一般需要特殊定制。



Visiflon软管规格：

下面列出来的规格是针对非防静电软管的，对于AS防静电软管规格也一样，只是需要增加一个“AS”作为参考，并且产品编码以“-110-”替代“-100-”。

Nominal Hose Size	*Actual Hose Bore Size		Hose Grade	Outside Diameter of Tube or Braid		Minimum Bend Radius		Maximum Working Pressure (MWP)		Weight per Unit Length		Hose Part Number
in	mm	in		mm	in	mm	in	Bar	psi	Kg/mtr	lbs/Ft	
3/8	6.3	1/4	TO	10.70	0.420	25	1	4	58	.057	.038	71-100-06
			SS	11.95	0.470	19	3/4	60	870	.144	.096	71-100-06-01-02
			PB	13.00	0.512	25	1	30	435	.091	.061	71-100-06-01-21
1/2	9.5	3/8	TO	14.10	0.555	38	1 1/2	4	58	.076	.051	71-100-08
			SS	15.25	0.600	25	1	47	680	.195	.130	71-100-08-01-02
			PB	16.80	0.662	38	1 1/2	23.5	340	.125	.084	71-100-08-01-21
5/8	12.7	1/2	TO	19.80	0.780	50	2	4	58	.126	.084	71-100-10
			SS	21.20	0.835	38	1 1/2	40	580	.296	.194	71-100-10-01-02
			PB	23.00	0.906	50	2	20	290	.188	.126	71-100-10-01-21
3/4	16.0	5/8	TO	21.20	0.835	75	3	3	43	.166	.111	71-100-12
			SS	22.70	0.894	50	2	32	460	.376	.251	71-100-12-01-02
			PB	24.70	0.973	63	2 1/2	16	230	.226	.151	71-100-12-01-21
1	22.0	7/8	TO	29.00	1.143	89	3 1/2	3	43	.235	.157	71-100-16
			SS	30.60	1.204	63	2 1/2	26	380	.533	.310	71-100-16-01-02
			PB	32.90	1.300	75	3	13	190	.314	.210	71-100-16-01-21
1 1/4	28.0	1 1/8	TO	34.20	1.349	100	4	2	29	.342	.229	71-100-20
			SS	36.00	1.420	75	3	25	360	.729	.489	71-100-20-01-02
			PB	39.00	1.537	89	3 1/2	12.5	180	.444	.298	71-100-20-01-21
1 1/2	35.0	1 3/8	TO	45.00	1.773	150	6	2	29	.415	.278	71-100-24
			SS	47.00	1.850	115	4 1/2	20	300	1.044	.699	71-100-24-01-02
			PB	50.00	1.970	130	5	10	150	.600	.402	71-100-24-01-21
2	47.0	1 7/8	TO	59.00	2.325	200	8	2	29	.631	.423	71-100-32
			SS	61.00	2.400	130	5	15	220	1.378	.923	71-100-32-01-02
			PB	64.00	2.521	150	6	7.5	110	.917	.614	71-100-32-01-21

Visiflon软管总成如果装配特定的“液压”或PTFE TAIL接头，需要将接头连接处的螺旋内管剥离出来。（详细请看第7页）

注意：此样本上所列的大部分尺寸软管或接头都是有现货，价格也是相对固定，但是对某些不常用的产品可能没有库存，对小数量的此类订单可能会产生一个最小订单费用或装配费用。Aflex软管会据此提前通知你们。

软管属性：

温度和工作压力：

- Visiflon TO Grades - 上述的最大工作压力MWP仅限于100°C (212°F)以下的情况下

- Visiflon SS Grades - 最大工作压力MWP在130°C-230°C之间每升高一度耐压减少1%。

- Visiflon PB Grades - 最大工作压力MWP在80°C-100°C之间每升高一度耐压减少5%。

耐真空度：

Visiflon SS软管在130°C以下耐受完全真空。

Visiflon TO和PB软管在80°C以下可以耐受完全真空。

流速：

由于软管内壁的螺旋结构使得介质容易产生涡流，势必会对流速产生影响，在输送气体时也可能产生“蜂鸣”噪声。对于某些应用可能不是很合适，此种情况下可以选用我们的Hyperline FX或Corroline软管来替代。

VISIFLON软管的购买方式-散装软管或总成

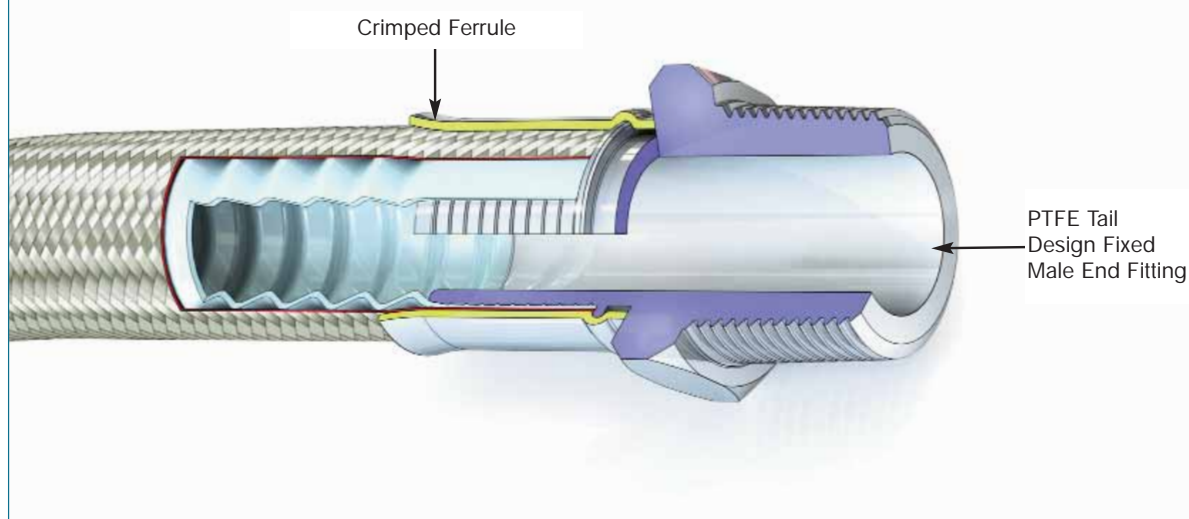
供应方式：

Visiflon软管既可以以总成形式也可以直接零散的提供软管给客户，对于零散软管，客户可以购买我们提供的相配套接头自己扣压装配，也可以购买标准的“液压”接头或PTFE TAIL接头。

散装软管：Visiflon软管可以零散提供给客户自己进行扣压组装，也可以整卷整托盘形式购买。如果想自己扣压软管，客户既需要从我们公司购买软管也需要购买相应接头与套筒，特别的：如果你想用PTFE TAIL接头来装配总成，就必须购买我们公司生产的此类接头。对于液压接头只需要购买普通标准接头即可。

总成装配需要参照第7页的准则进行操作，并且操作人员需要经过我们的培训。

ASSEMBLIES :



Aflex可以提供扣压了接头的完整Visiflon软管总成。

我们提供的接头材质既可以是316L不锈钢也可以是镀锌低碳钢，种类包括：

- 60° BSP Cone Seat Female Unions (also flat seat)
- Flat Seat Lug Nut Female Unions
- BSPT or NPT Fixed Males
- NPT Fixed Females
- 37° JIC Female Fittings
- 37° JIC/NPT Male Unions
- 37° JIC/NPT Female Unions
- Tube Fittings
- Standpipe Fittings

请注意：不锈钢和碳钢“液压”接头和碳钢PTFE TAIL接头内外表面并没有进行精加工，因此对某些特定行业或卫生级别要求较高的行业并不适用，这类行业要求接头表面光洁度一般要求比较高。对此类行业，可以选用不锈钢PTFE TAIL接头。

VISIFLON HOSE ASSEMBLY INSTRUCTIONS



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 (see list) on to the hose ends.
3. Open the hose bore, by screwing in then pulling out the correct Visiflon Opening Tool (Manual or Motorised). For hydraulic fittings, use the basic tool. For PTFE tail fittings, add the correct collar to the tool.
4. Insert the end fitting, then push the ferrule fully over the hose up to the end fitting.
5. Crimp the ferrule to the correct diameter as given in Aflex Document AS-42 for Hydraulic Inserts, or AS-VI-01 for PTFE Tail Inserts. These are available on an I-Bay system - apply to Aflex Hose for access codes. Check using a Vernier or Micrometer.
6. Pressure test the assembly with air or water to 1.5 x listed Maximum Working Pressure before use in application.

Part Numbers for Visiflon Hose Ferrules (GP or GP, AS Grade Liner) :

Visiflon Hose Size & Grade	PTFE TAIL		HYDRAULIC TAIL	
	Mild Steel	Stainless Steel	Mild Steel	Stainless Steel
3/8" GP, SS	01-120-06-06-04	01-120-06-06-02	01-170-06-06-04	01-170-06-06-03
3/8" GP, PB	X	01-180-06-06-02	01-170-06-06-04	01-170-06-06-03
1/2" GP, SS	01-120-08-08-04	01-120-08-08-02	01-170-08-08-04	01-170-08-08-03
1/2" GP, PB	01-150-08-08-04	01-180-08-08-02	01-170-08-08-04	01-170-08-08-03
5/8" GP, SS	X	01-180-10-10-02	01-170-10-10-04	01-170-10-10-03
3/4" GP, SS	01-150-12-12-04	01-240-12-12-02	01-170-12-12-04	01-170-12-12-03
3/4" GP, PB	01-180-12-12-04	01-240-12-12-02	01-170-12-12-04	01-170-12-12-03
1" GP, SS	01-150-16-16-04	01-150-16-16-02	01-170-16-16-04	01-170-16-16-03
1" GP, PB	01-180-16-16-04	01-180-16-16-02	01-170-16-16-04	01-170-16-16-03
1 1/4" GP, SS	01-150-20-20-04	01-150-20-20-02	01-190-20-20-04	01-190-20-20-02
1 1/4" GP, PB	X	01-155-20-02-02	01-190-20-20-04	01-190-20-20-02
1 1/2" GP, SS	01-150-24-24-04	01-150-24-24-02	01-190-24-24-04	01-190-24-24-02
1 1/2" GP, PB	01-155-24-24-04	01-155-24-24-02	01-190-24-24-04	01-190-24-24-02
2" GP, SS	01-150-32-32-04	01-150-32-32-02	01-190-32-32-04	01-190-32-32-02
2" GP, PB	01-155-32-32-04	01-155-32-32-02	01-190-32-32-04	01-190-32-32-02

Note: **X** = This ferrule is not currently available.

碱金属、卤素、卤化物输送：

PTFE容易与氟气、三氟化氯和熔融状态的碱金属反应，不能用PTFE软管输送上述物质。

当用内衬PTFE软管输送氯、溴（气体或液体）时，介质会透过软管内衬PTFE层。泄漏出来的很微量的此类物质很容易与周围空气中的水分结合后腐蚀外编织层和橡胶包覆层。

重卤素化合物，比如氟化氢、氯化氢、光气（碳酰氯）、四氯化碳和其他高含量卤素有机化合物都容易被PTFE管壁吸收并渗透到管外壁。

其他渗透性强的液体与气体：

三氧化硫、甲基丙烯酸甲酯、己内酰胺和冰醋酸等也都被PTFE管壁吸收并渗透到管外壁。

不过PTFE材作为一种疏水性（不容易吸收水）材料，一般情况下对这些化合物的抗性都非常好。在某些特殊的场合下，PTFE的对易于挥发的物质有很好的防扩散性能，比如输送汽车燃油，PTFE软管比其他塑料或橡胶软管都要适合。

气体/液体循环应用：

在某些应用中：软管时而通液体时而又换成气体，周期往复。

这种情况下，软管所输送介质的温度和压力都会影响软管的使用寿命，无论软管是什么材质的，在某些复杂的输送条件下软管内衬很容易损坏。

比如，软管被用于间歇性的输送热蒸汽和水，橡胶层在和内衬很容易在冷热交替进行的输送过程中损坏，PTFE内衬软管也不列外。

总成用作连接部件：

如果总成被用于两个系统的连接部件，总成的长度和它的相关配件构造都要符合下文将要介绍的“软管连接配置说明”。

这种情况下，总成的接头的配件一定要正确装配，用正确的工具、扳手、螺母和螺栓来固定。连接总成一定要完美的固定住，保证不会有泄漏发生，但是又不能固定的过紧而损坏密封垫圈等。

在用于输送昂贵或者危险性非常高的流体或气体时，软管和用作连接的总成一定要在实地进行压力测试，可以用无毒害的介质，在1.5倍最大工作压力的情况下进行检测。

特殊用途：

Aflex PTFE内衬软管对下述应用情况并不适合：

所有放射性应用，包括高能辐射、伽马射线（会使得PTFE分解）

所有医疗移植应用

所有航空航天行业应用

VISIFLON HOSE : QUALITY ASSURANCE CERTIFICATES AND APPROVALS

Visiflon Hose and

Quality Assurance, Certification and Approvals

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

Tested and 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 BS EN ISO/IEC 17050

Are available for all products.

HOSE CONFIGURATION & LENGTH CALCULATIONS

- for BEND RADIUS

Hose Configuration Requirements

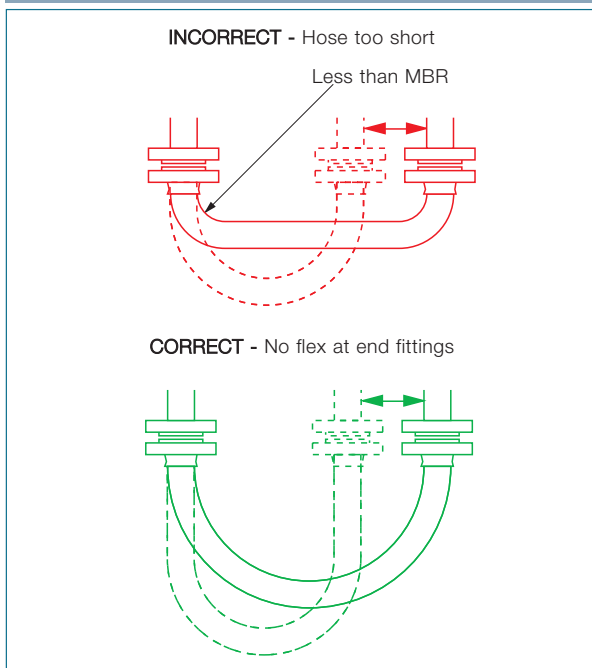
Hose Assemblies are usually connected at both ends in service. They may then either remain in a fixed, or static configuration or in a flexing, or dynamic configuration.

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.

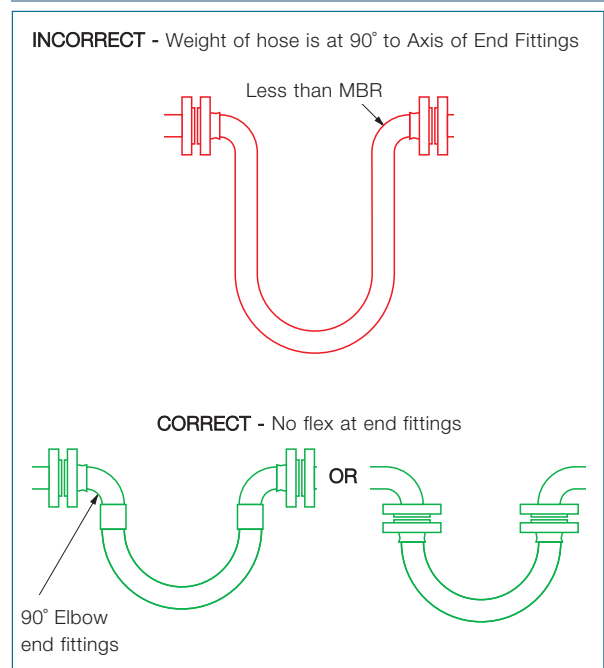
The most common situation when this is likely to occur is when the hose is flexed at the end fitting, with stress being applied to the hose at an angle to the axis of the end fitting. Typically, this happens either because the length of the hose is too short, or because the weight of the hose plus contents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



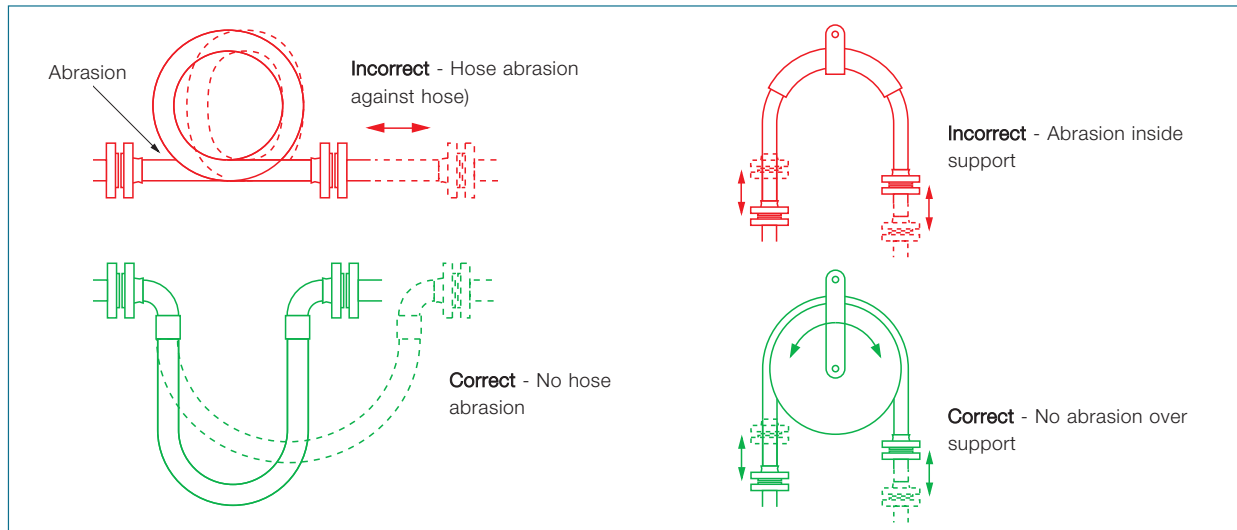
HOSE CONFIGURATION & LENGTH CALCULATIONS

- 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.

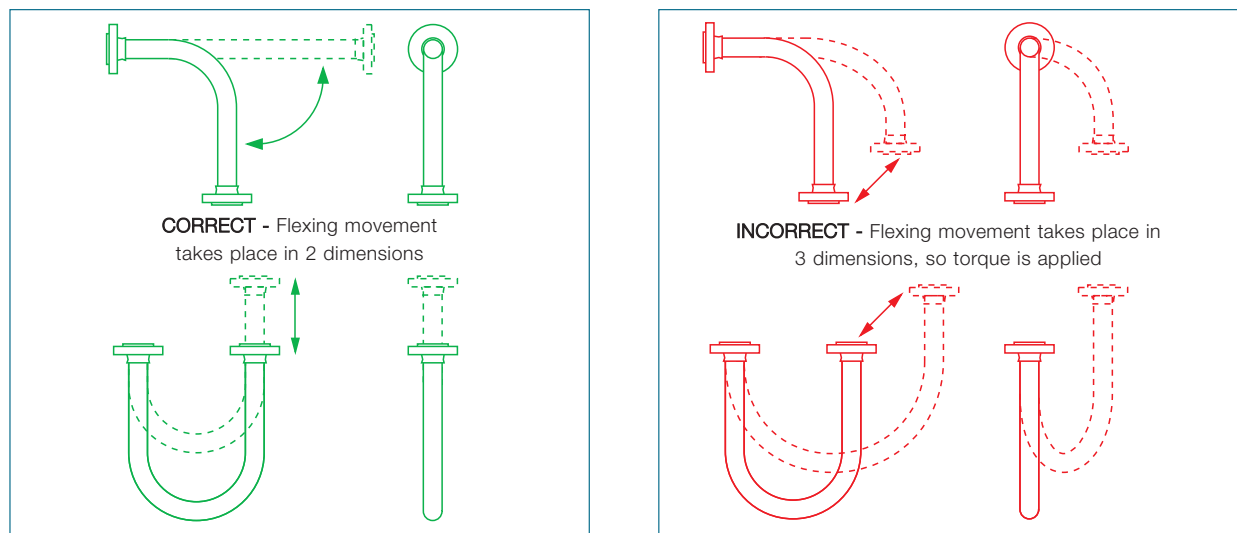
In some cases, the length, configuration and angle of the hose can be designed to avoid abrasion. In others, static or moving support frames or support wheels are required.



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 Pharmaline and Pharmalex 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 practice to take whatever steps are necessary to eliminate torque. If in doubt, consult Aflex Hose.

HOSE CONFIGURATION & LENGTH CALCULATIONS

- for LENGTH CALCULATIONS

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 $\frac{1}{4}$ of a full circumference, and the radius of the bend is R , then the length of the hose around the bend is = $\frac{1}{4} \times 2\pi R$. Or half way round, in a U-shape, = $\frac{1}{2} \times 2\pi R$.

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.

$$\begin{aligned} \text{Length of Bent Section (yellow)} &= \frac{1}{4} \times 2\pi R \text{ (334)} \\ &= \frac{1}{4} \times 2 \times 3.142 \times 334 = \mathbf{525\text{mm}} \end{aligned}$$

$$\begin{aligned} \text{Length of top, Straight Section, including the top end fitting length} \\ &= 600 - 334 = \mathbf{266\text{mm}} \end{aligned}$$

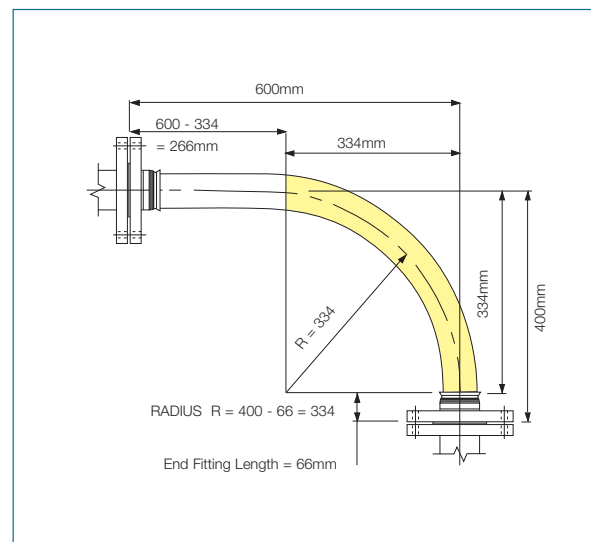
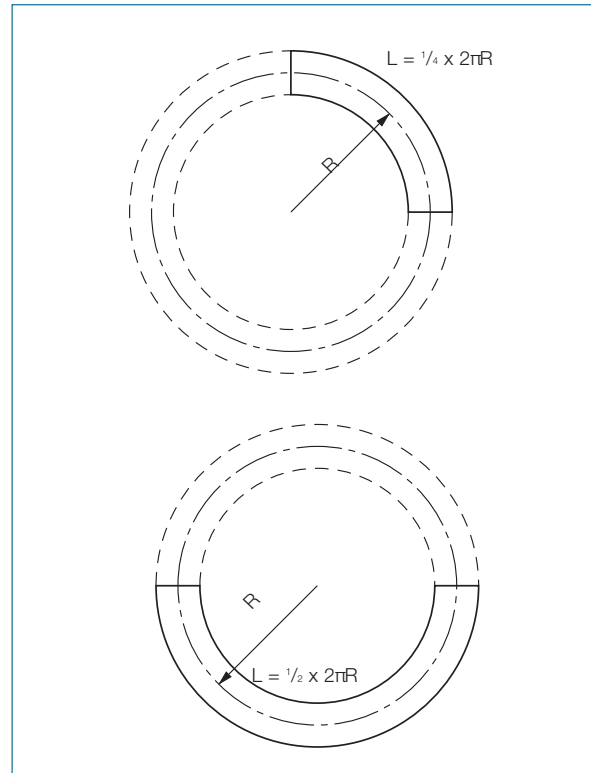
$$\text{Length of bottom end fitting} = \mathbf{66\text{mm}}$$

$$\text{Total length of Hose Assembly} = 525 + 266 + 66 = \mathbf{857\text{mm}}$$

Things to consider

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



CONDITIONS OF SALE

Definitions

- (1) "Aflex Hose" shall mean Aflex Hose Limited
- (2) "Aflex Hose Products" shall mean those products the Customer is purchasing from Aflex Hose.
- (3) "Customer" shall mean the individual or entity that is purchasing Aflex Hose Products hereunder.
- (4) "Full Product Brochure" shall mean the brochure for each specific product available at <http://www.aflex-hose.com/products/>.

General

(5) These Conditions of Sale form the basis of the contract of sale between Aflex Hose and the Customer. In the event of any conflict between the terms and conditions set forth in these Conditions of Sale and any other Customer document, these Conditions of Sale shall govern, unless otherwise agreed to in writing and authorized and signed for by a Director or General Manager of Aflex Hose.

(6) Unless otherwise agreed to in writing, delivery will be at cost from Aflex Hose's facilities Brighouse, West Yorkshire, England. Title and all risks of loss or damage pass to the Customer upon delivery to the Customer or third party carrier. Delivery dates specified by Aflex Hose are only Aflex Hose's best estimates and Aflex Hose's only responsibility will be to use reasonable commercial efforts to meet all specified delivery dates.

Customer Responsibilities and Obligations

(7) It is the Customer's strict responsibility to review all of the usage conditions and usage limitations given for the Aflex Hose Products which are intended for use in a particular application, to ensure that the application conditions are in compliance with those usage limitations. The usage conditions and limitations are referred to in these Conditions of Sale, and are further specified in the relevant Full Product Brochure. The Customer shall consult the latest, up to date hose product information and Full Product Brochure at the time of ordering, which are only available and downloadable from the Aflex Hose website at <http://www.aflex-hose.com/products/>, or on request from Aflex Hose. The Customer here represents and warrants that it has read and understands the applicable Full Product Brochure and the usage conditions and the usage limitations set forth therein, and has ensured their compliance with the application conditions.

(8) If the Customer sells or assigns any Aflex Hose Products to any other person or entity, the Customer shall ensure that the final end user of the Aflex Hose Products is supplied with these Conditions to Sale, the applicable Full Product Brochures, the Aflex Hose website address, together with notification of the requirement to review the usage conditions and limitations. The Customer shall include the terms and conditions set forth herein in its Conditions of Sale to any third party. The Customer hereby agrees and acknowledges that Aflex Hose shall have no liability whatsoever for claims arising in whole or in part out of the Customer selling or assigning the Aflex Hose Products to a third party that does not use the Aflex Hose Products in accordance with Aflex Hose's usage requirements and limitations ("Non-Conforming Use Claims"). The Customer shall indemnify and hold harmless Aflex Hose, its officers, directors, employees, affiliates and representatives for any and all claims, damages, penalties and losses arising out of or related to Non-Conforming Use Claims.

(9) The Customer agrees and acknowledges that for any intended hose application in which special conditions apply which are not defined, or not defined sufficiently in the Product Brochure, the Customer shall write to Aflex Hose requesting written advice relating to any usage limitations resulting from special conditions. The Customer shall ensure the design suitability and safety of the Aflex Hose Products in their intended applications, giving particular consideration to any special condition relating to, but not restricted 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, or any other condition which may cause premature hose failure. The Customer shall

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 any persons. In applications where any type of hose failure would lead to financial losses if the hose is not replaced immediately, the Customer agrees and acknowledges that it shall be the Customer's responsibility to order and hold in stock spare hose(s) accordingly. The Customer shall advise Aflex Hose in writing at the time of placing the enquiry and on any purchase order if there are any special requirements for the hose, including special cleaning, or drying, or extra testing requirements which are in addition to normal industrial standards. The Customer agrees and acknowledges that Aflex Hose, its officers, directors, employees, affiliates and representatives shall not be held liable for any claims or obligations arising out of the Customer's failure to fulfill any or all of its responsibilities set forth in this Section 9.

(10) If the Customer has any doubts concerning these or any other usage conditions and limitation or safety parameters, the Customer shall consult Aflex Hose at the number and address in the Notice Provisions below and request a written response to any queries.

Hose Service Life; 24 Month Warranty

(11) 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. As such, Customer acknowledges that, except as provided below in Sections 12, 13 and 14 Aflex Hose is not guaranteeing a minimum service life of any of the Aflex Hose Products.

(12) 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 with the service life prediction prior to the order being placed.

(13) If such a written undertaking is not sought and given, Aflex Hose shall not be held liable for any Aflex Hose Product failure which the Customer considers to be premature, excepting failures which are due to faulty materials or manufacturing defects which occur within 24 months or 12 months, as applicable, of supply as provided in Section 14 below.

(14) Aflex Hose warrants its Aflex Hose Products to be free from faulty materials or manufacturing defects from the date of the delivery, for 24 months; provided, however, that all Hose Assemblies which are "ETH" (Electrical Trace Heated) Grade are only warranted for 12 months.

(15) AFLEX HOSE MAKES NO WARRANTY OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED OTHER THAN AS SPECIFICALLY STATED HEREIN, AND THERE ARE NO WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE OBLIGATIONS AND WARRANTIES SPECIFICALLY STATED HEREIN.

Product Failure

(16) In the event of a product failure during the applicable warranty period set forth in Section 14, the Customer shall provide Aflex Hose with written notification within forty-eight (48) hours of discovering the fault. Aflex Hose requires that the Aflex Hose Products 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 fluids, gases and any cleaning products passed through the hose, and the total time that the hose has been in service also the original order number and the Serial Number for the hose. The Customer may send its own witness to the examination if required. Aflex Hose will provide a Non-Conformance Report to the Customer. The Customer shall bear the cost of returning the Aflex Hose Products that have failed; provided, however, as set forth in Section 17 below, Aflex Hose shall reimburse the Customer for any shipping costs if it is determined that the failure is covered by the warranty set forth in Section 14.

CONDITIONS OF SALE CONTINUED

(17) If Aflex Hose determines that the faulty materials or a manufacturing defect in the hose is responsible for the hose failure, Aflex Hose's maximum liability shall be the invoice value of the failed hose itself, or the invoice value of the whole customer order as determined by Aflex Hose in its sole discretion, along with any reasonable costs for removal and replacement of the hose, and costs for packing and despatching the failed hose back to Aflex Hose.

Untested Hose for Self Assembly by Customers

(18) Aflex Hose sometimes supplies "loose" hose, without end fittings attached to a Self Assembly Customer, who will then cut the hose to length and attach end fittings to make up Hose Assemblies for their own use, or for sale to their own customers.

(19) Unless the Customer requests, and Aflex Hose confirms that the 'loose' hose is pressure tested before supply, such testing is not normally applied by Aflex Hose, because this testing requirement is otherwise satisfied by the Self Assembly Customer during his own testing of the finished Hose Assemblies made up using the "loose" hose. Self Assembly Customers agree and acknowledge that they are solely responsible for carrying out hydrostatic pressure testing of 100% of such assemblies to 1½ times the Maximum Working Pressure (MWP) of the hose assembly as specified in the relevant Full Product Brochure before supply for end use, to validate both the hose and the end fitting attachment.

(20) When pressure testing braided hoses with a plastic or rubber outer cover, the cover will mask any signs of leakage for a time. The Customer agrees and acknowledges that after the hydrostatic pressure test, it is required to test each covered hose assembly with an internal helium gas pressure of 30 Bar (450 psi) for hose sizes up to 1" and 15 Bar (225 psi) for hose sizes above 1", with the hose assembly immersed in water to enable leak detection by gas bubbles, for a minimum test period of 5 minutes.

(21) The "Self Assembly" Customer agrees and acknowledges that it shall determine and approve the Design Suitability of the hose assemblies for their intended use before supply and that, except as set forth in Section 22, it shall indemnify and hold Aflex Hose harmless from any Claims and Losses arising from Design Suitability for a Self Assembly Customer. This includes proceeding in accordance with Section (7) and Section (8) above.

(22) Aflex Hose's liability is limited to Aflex Hose Products which are assembled by approved Self Assembly Customers if all the hose and fitting components were supplied by Aflex Hose or approved for use by Aflex Hose in writing, and they were assembled and tested in accordance with Aflex Hose's current Manufacturing and Testing Instructions, available to approved Self Assemblers in an I-Bay on the Aflex Hose website.

Untested Hose Assemblies

(23) Aflex Hose is sometimes requested by Customers to attach non-standard end fittings to hose assemblies which they, supply, and in some cases it is not possible to connect these fittings to the Aflex Hose pressure test system. In such cases a "concession not to test" is obtained from the Customer, and a label is attached to the hose assembly, warning that it requires pressure testing before use. The Customer agrees and acknowledges that Aflex Hose shall have no liability whatsoever if the Customer does not comply with the warning that requires pressure testing before use.

Force Majeure

(24) Aflex Hose shall not be liable for any delay in delivery, failure to deliver or default in performing in accordance with any Customer's order if the delay or default is due to: (a) fires, floods, strikes, or other labor disputes, accidents to Aflex Hose's production facilities, acts of sabotage, riots, natural disasters, difficulties procuring materials, shortages of raw materials, interference by civil or military authorities, whether legal or de facto, governmental restrictions, including but not limited to failure to obtain export licenses, delays in transportation or lack of transportation facilities, restrictions imposed by federal, state or other governmental legislation or, rules or regulations thereof, including a force majeure event occurring in respect to one of Aflex Hose's suppliers; or (b) any other cause beyond Aflex Hose's control.

Governing Law; Jurisdiction

(25) These Conditions of Sale and all rights, duties and obligations hereunder, including any and all other Customer agreements and orders shall be governed by and subject to English Law.

(26) The Customer acknowledges and agrees that any disputes arising out of or related in any way to this Agreement, including a breach of this Agreement, shall be brought exclusively in the courts of England, United Kingdom. Furthermore, Customer knowingly, voluntarily and irrevocably (a) consents to the exclusive jurisdiction of these courts, (b) waives any immunity or objection, including any objection to personal jurisdiction or the laying of venue or based on the grounds of forum non conveniens, which it may have from or to the bringing of the dispute in such jurisdiction, (c) waives any personal service of any summons, complaint or other process that may be made by any other means permitted by England, United Kingdom, (d) waives any right to trial by jury, (e) agrees that any such dispute will be decided by court trial without a jury, (f) understands that it is giving up valuable legal rights under this Section 26, including the right to trial by jury, and that it voluntarily and knowingly waives those rights.

Limitations of Liability

(27) Aflex Hose Products have not been designed or tested for use in aerospace, medical implantation or radioactive applications, and such use is therefore strictly prohibited unless written approval from Aflex Hose has been given. Customer agrees and acknowledges that it is aware of the limitations set forth in this Section 26 and hereby agrees that Aflex Hose shall not have any liability whatsoever in the event Customer uses Aflex Hose Products for aerospace, medical implantation or radioactive applications. Customer agrees to indemnify Aflex Hose, its officers, directors, employees, affiliates and representatives for any and all Claims and Losses arising out of Customer's use of the Aflex Hose Products for aerospace, medical implantation or radioactive applications.

(28) Aflex Hose 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.

(29) NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, IN NO EVENT SHALL AFLEX HOSE BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY, OR PUNITIVE DAMAGES, LOSS OF PROFITS OR REVENUE, LOSS OF PROCESS PRODUCTS, DAMAGE TO EQUIPMENT, DOWNTIME COSTS, OR LOSS OF USE EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE EXCLUSIONS AND LIMITATIONS WILL APPLY REGARDLESS OF WHETHER LIABILITY ARISES FROM FAILURE OF THE PRODUCT(S), BREACH OF CONTRACT, FAILURE TO DELIVER ON TIME, WARRANTY, TORT (INCLUDING, BUT NOT LIMITED TO, NEGLIGENCE), BY OPERATION OF LAW, OR OTHERWISE.

Notice Provisions

(30) Any written notice required to be provided to Aflex Hose shall be sent to the following address: Aflex Hose Limited, Spring Bank Industrial Estate, Watson Mill Lane, Sowerby Bridge, Halifax, West Yorkshire, HX6 3BW.

Exclusion of CISG

(31) The United Nations Convention on Contracts for the International Sale of Goods shall not apply to these Conditions of Sale and any and all other Customer documents.



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