# PHARMALINE & PHARMALEX

## PTFE Lined Hoses


- SMOOTHBORE
- CHEMICAL RESISTANT
- SELF-CLEANING
- FLEXIBLE
- KINK RESISTANT

# CONTENTS

# PTFE – THE OPTIMUM CHOICE FOR HOSE LININGS

聚四氟乙烯，英文简称PTFE，其化学结构式为：CF3(CF2CF2)nCF3，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。

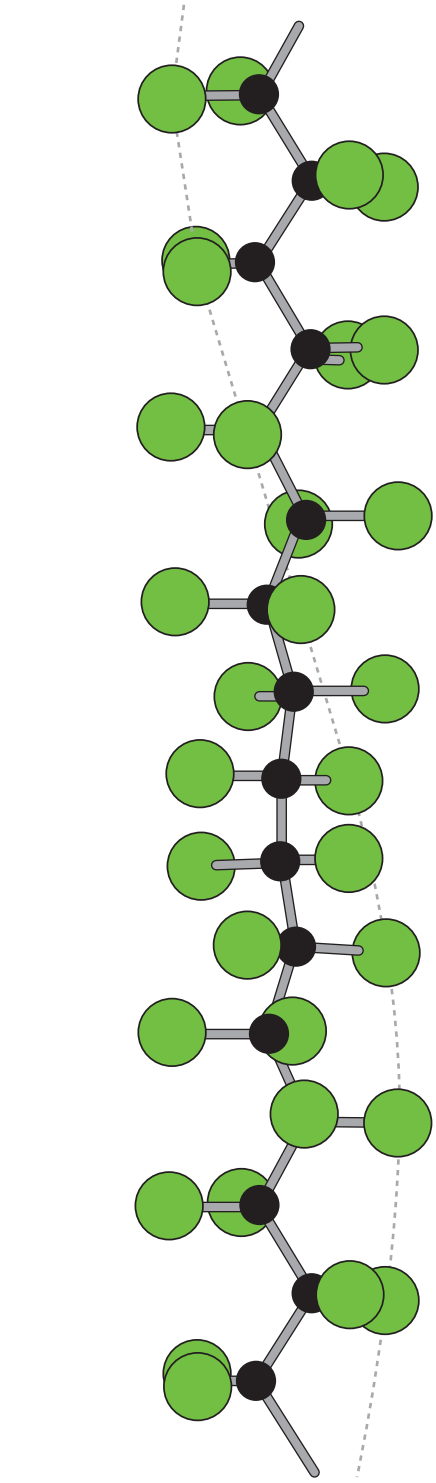
PTFE材料的耐温范围超出了任何橡胶和塑料软管的耐温范围

高电阻特性

在航空航天领域很多电线的保护套都是PTFE材质的，这主要是因为PTFE材料具有优异的电阻特性。不过，此特性在某些软管的应用中可能就是一个不利因素，在PTFE软管内部容易积聚静电电荷，从而存在某些危险，为了消除此隐患，Aflex为此研发了一种兼容方案，此软管同样符合FDA和USP VI标准。

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。



**Section from a PTFE Molecule, 16 Angstrom Units long**

**Fluorine Atom**

**Carbon Atom**

简介：

Pharmaline软管的设计开发主要目的是：既能满足客户对特氟龙软管柔韧性的要求，又为制药或生物技术应用的超洁净要求提供保证，并且兼具普通特氟龙软管的化学抗性。

Pharmaline软管不仅可以替代目前市场上的硅胶软管和硅胶包覆内衬特氟龙软管（软管依靠粘合剂粘连，不符合FDA要求），而且很大程度上提高了软管的各项性能指标。

Pharmaline软管在某些应用中可以克服硅胶软管的一些弊端，比如在经常性的高压热蒸汽灭菌过程应用中，就可以选用这款软管。（见第7页）

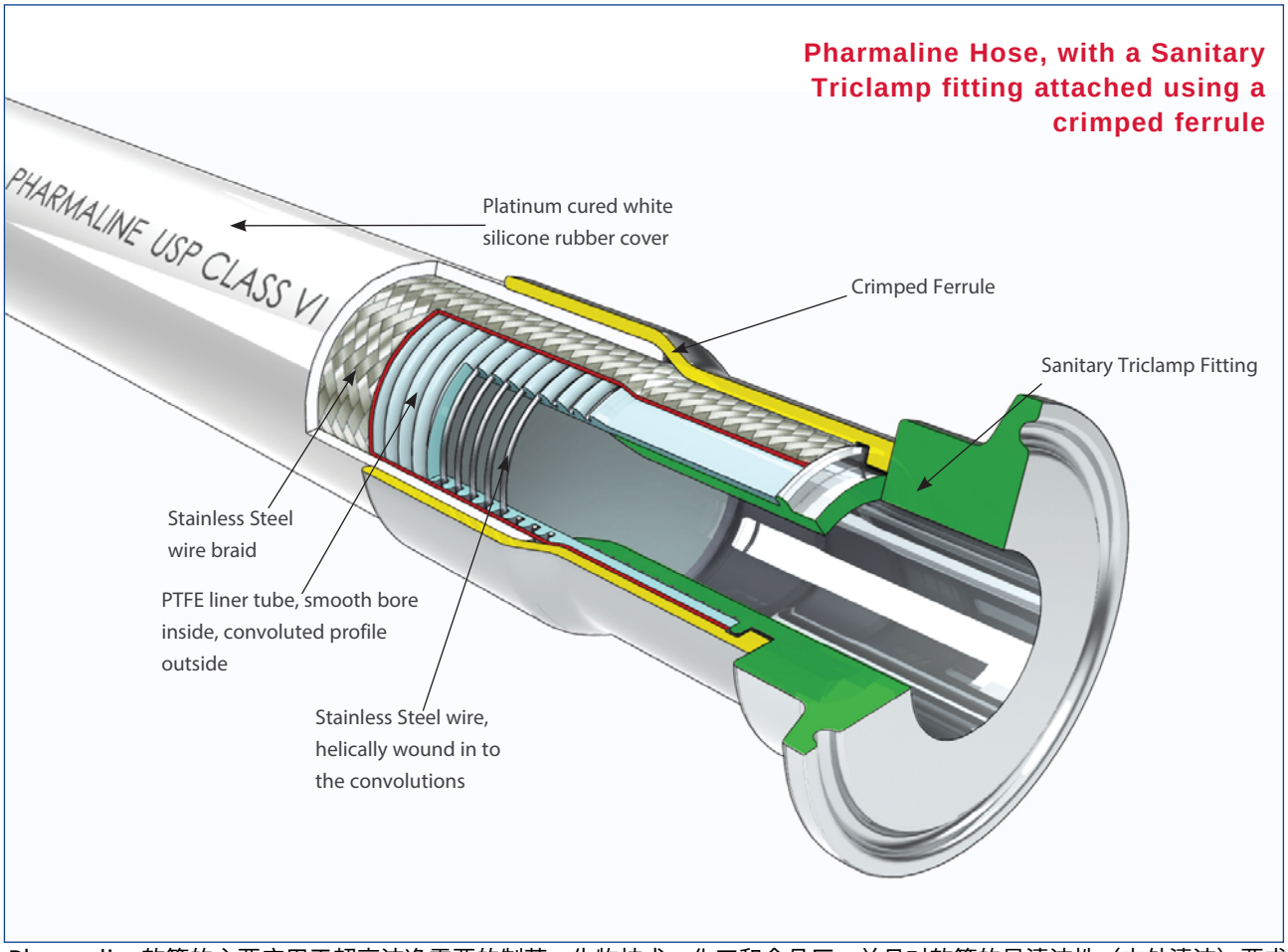
Pharmaline软管结构：

Pharmaline软管内衬建立在我们的一个专利设计上，内壁上有轻微凹凸感，但是内衬外壁是螺旋的，结合嵌入螺旋凹槽处的缠绕钢丝可显著增强软管的柔韧性与强度。

PTFE内衬外层有螺旋不锈钢丝和不锈钢编织层的双重强化，显著提高软管的扭结抗性、机械压抗性，也使得软管耐压和耐真空性能显著提高。对于3/4 ” 以上尺寸的软管，一根螺旋钢丝嵌入PTFE内衬外壁的螺旋凹槽，大幅度增强软管的强度。

一层厚铂金硫化硅胶包覆在编织层外，硅胶外壁印有软管相关信息，这包括软管的批号等。

这种强化的PTFE内衬结构足够使软管承受真空和大幅度的扭结，而无需内部特殊结构或将内衬和外层橡胶粘连在一起，此结构的软管内衬显著提高了当前市场上普通标准的内衬特氟龙软管的性能，是理想的软管内衬设计。（竞争者的软管内衬与包覆层需要不符合FDA认证的粘合剂作粘连，而且PTFE或者FEP内衬层很薄，这样粘合剂很容易通过管内壁渗入流体中，而使得介质受污染）




Pharmaline软管的主要应用于超高洁净需要的制药、生物技术、化工和食品厂，并且对软管的易清洁性（内外清洁）要求比较的行业。

Pharmaline软管也适合于普通工业应用，特别是那些需要处理高温流体和气体的应用环境，很容易由于接触软管而引发事故，烫伤操作员，比如处理热油和热蒸汽的情况下，就可以选用此款软管。

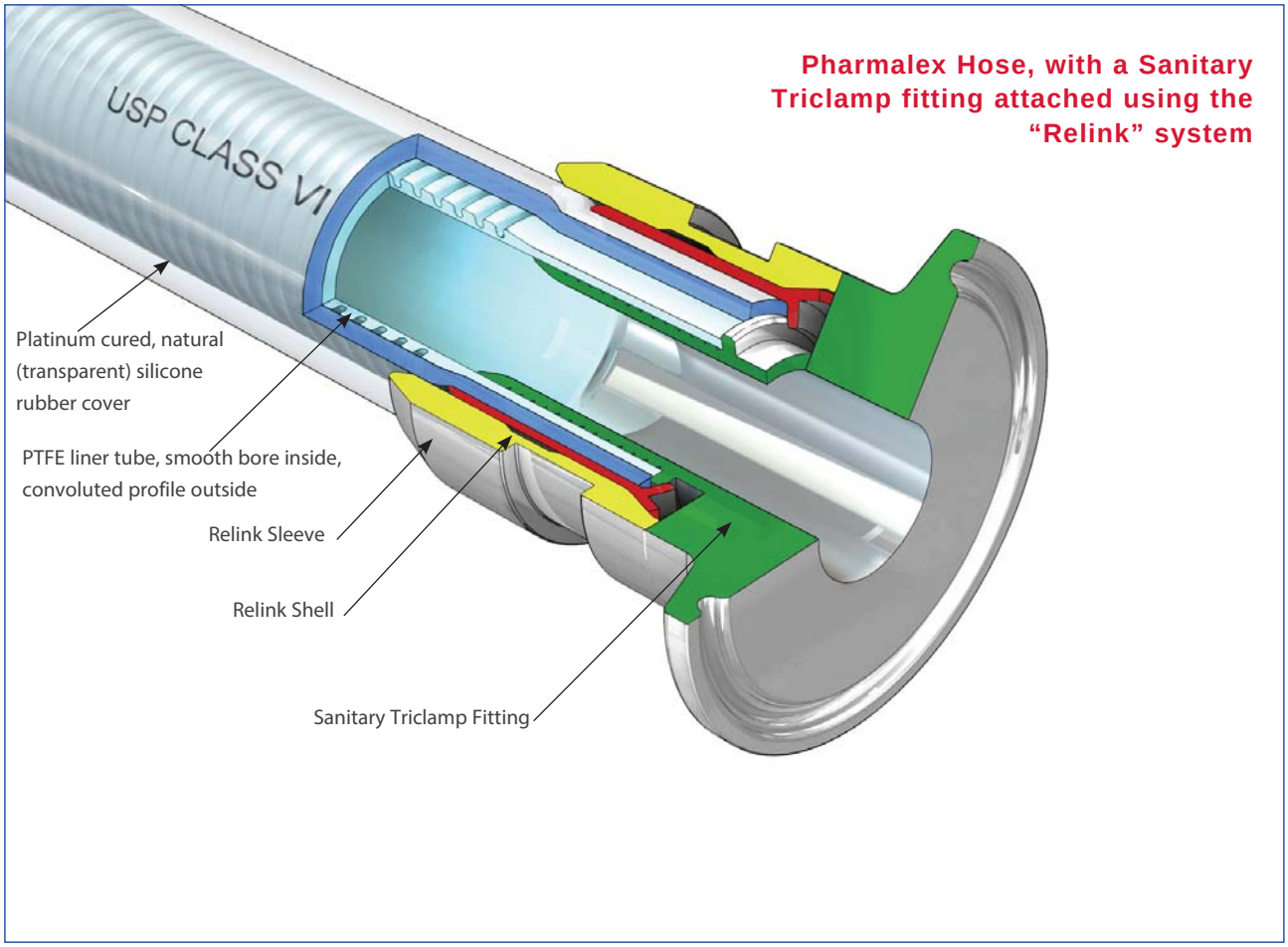
简介：

Pharmalex软管较Pharmaline软管更轻，但是耐压要低一些。

Pharmalex软管在某些应用中可以克服硅胶软管的一些弊端，比如在经常性的高压热蒸汽灭菌过程应用中，就可以选用这款软管。（见第7页）

Pharmalex软管结构：

Pharmalex软管内衬设计和Pharmaline软管内衬结构一样，但是无编织层，也没有强化螺旋钢丝，并且外包是透明铂金硫化硅胶，不是白色硅胶，这样整个软管呈现半透明状态，使用者可以透过软管观察到流体的状态。




**Pharmalex Hose, with a Sanitary Triclamp fitting attached using the "Relink" system**

Pharmalex软管主要用于替代硅胶软管，应用于对压力要求不是很高的制药、生物技术、化工和其他流体处理行业，软管本身质量也很轻，便于操作。

PHARMALINE软管规格（GP和AS）

| Hose Bore Size | | Actual Hose Bore Size | | O/D of Cover | | Minimum Bend Radius | | Maximum Working Pressure | | Burst Pressure | | Weight per Unit Length | | *Maximum Continuous Length | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | Psi | Bar | Psi | Bar | lb/ft | kg/mtr | Ft | Mtrs |
| 1/4 | 6.4 | 0.270 | 6.8 | 0.460 | 11.6 | 3/4 | 19 | 1100 | 80 | 4641 | 320 | 0.11 | 0.17 | 60 | 18 |
| 3/8 | 9.5 | 3/8 | 9.5 | 0.610 | 15.5 | 1 | 25 | 1000 | 70 | 4061 | 280 | 0.14 | 0.22 | 60 | 18 |
| 1/2 | 12.7 | 1/2 | 12.7 | 0.770 | 19.5 | 1 1/2 | 38 | 870 | 60 | 3480 | 240 | 0.25 | 0.37 | 60 | 18 |
| 5/8 | 16.0 | 5/8 | 16.0 | 0.960 | 24.4 | 2 | 50 | 725 | 50 | 2900 | 200 | 0.35 | 0.52 | 60 | 18 |
| 3/4 | 19.0 | 3/4 | 19.0 | 1.070 | 27.3 | 2 1/2 | 63 | 650 | 45 | 2610 | 180 | 0.42 | 0.65 | 60 | 18 |
| 1 | 25.4 | 1 | 25.4 | 1.370 | 34.8 | 4 | 100 | 580 | 40 | 2320 | 160 | 0.57 | 0.88 | 60 | 18 |
| 1 1/4 | 32.0 | 1.250 | 31.75 | 1.785 | 45.30 | 5 1/4 | 130 | 500 | 35 | 2030 | 140 | 0.85 | 1.30 | 60 | 18 |
| 1 1/2 | 38.0 | 1.530 | 38.8 | 2.035 | 51.7 | 6.70 | 170 | 430 | 30 | 1740 | 120 | 1.14 | 1.698 | 55 | 17 |
| 2 | 50.0 | 2.030 | 51.5 | 2.560 | 65.7 | 8.270 | 210 | 400 | 28 | 1624 | 112 | 1.58 | 2.355 | 42 | 13 |

PHARMALEX软管规格（GP和AS）

| Hose Size | | Hose Actual I/D | | O/D over Silicone Cover | | Minimum Bend Radius | | Maximum Working Pressure | | Burst Pressure | | Weight per Unit Length | | *Maximum Continuous Length | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | Psi | Bar | Psi | Bar | lb/ft | kg/mtr | Ft | Mtrs |
| 1/4 | 6.4 | 0.270 | 6.8 | 0.456 | 11.6 | 1 1/4 | 30 | 109 | 7.5 | 435 | 30 | 0.06 | 0.09 | 60 | 18 |
| 3/8 | 9.5 | 0.375 | 9.5 | 0.610 | 15.5 | 1 1/2 | 38 | 87 | 6.0 | 348 | 24 | 0.09 | 0.14 | 60 | 18 |
| 1/2 | 12.7 | 0.500 | 12.7 | 0.767 | 19.5 | 2 1/2 | 63 | 84 | 5.8 | 334 | 23 | 0.14 | 0.21 | 60 | 18 |
| 5/8 | 16.0 | 0.625 | 16.0 | 0.960 | 24.5 | 3 | 75 | 75 | 5.0 | 300 | 20 | 0.18 | 0.27 | 60 | 18 |
| 3/4 | 19.0 | 0.750 | 19.0 | 1.075 | 27.3 | 4 | 100 | 62 | 4.3 | 247 | 17 | 0.21 | 0.32 | 60 | 18 |
| 1 | 25.4 | 1.000 | 25.4 | 1.370 | 34.8 | 6 | 150 | 52 | 3.5 | 203 | 14 | 0.33 | 0.49 | 60 | 18 |

尺寸超过1寸的也可订购，软管连续长度超过36米请下单时标注。

耐压测试：

软管总成在运送给客户之前，都需要进行一个1.5倍最高工作压力的静态压力测试，并且根据需要出具一根压力测试认证。

散装软管不需要进行压力测试，不过客户如果要装配接头使用时，需要作一个简单的气体压力测试（将总成置于水中）。

注意：上述爆破压力和最大工作压力针对的是软管总成（扣压接头）。

可拆卸接头式软管总成耐压请看22页。

耐温范围：

-73?C至+204?C

超过130?C后，温度每升高1?C最大工作压力就相应降低1.5%

耐真空性能：

Pharmaline软管在140?C以下都可以耐受完全真空，Pharmalex软管在100?C以下可以耐受完全真空。

流速：

软管流速是螺旋内壁软管（容易产生涡流降低介质流速）的2倍以上，有特定流速要求，请联系AFLEX咨询

气密性：

Pharma软管的气密性比其他品牌同类产品要好很多（漏气量是其他品牌的1/2），这和其管壁生产工艺有很大关系，Pharma软管管壁挤压力度更强，减少了微孔存在的可能性。

Rolling U 弯折寿命：

Pharma软管的弯曲寿命是普通PTFE内衬软管的15倍还多

柔韧性：

Pharma软管较普通PTFE平滑内衬软管更容易弯曲，更柔软。

耐扭结特性：

此系列特氟龙软管比其他品牌的平滑PTFE内衬软管耐纠结性能有大幅度提高。

清洗与灭菌系统-CIP,SIP和高压锅灭菌

CIP和SIP-PTFE内衬软管的化学抗性非常好，可以耐受所有的CIP,SIP和高压锅灭菌过程，你所有考虑的只有一件事：有可能，软管内衬会在清洗过程中产生静电影响软管使用，如果需要消除此影响，可以采用AS抗静电软管。

AS软管和静电生成原因在介绍软管内衬时已详细介绍，请参考。

使用高电阻介质来进行CIP操作时，比如介质为甲苯，需要采用AS软管。

另外容易产生静电的情形是：在清洗过程中，清洗介质为湿蒸汽或清洗溶剂（WFI）经由氮气、压缩空气或其他气体来推动时，由于液体与气体不能相溶，这样就产生一个“ 多级性 ”混合介质，这就很容易产生静电，这样的过程一般推荐使用AS软管。

如果你的使用环境容易产生静电，但是又不愿意采用黑色的PTFE软管内衬，我们还有替代方式，请咨询我们。

高压灭菌-高压灭菌一般没有高速流动的介质，所以不会有静电的产生顾虑。不锈钢编织SS或HB哈氏合金编织的Aflex软管（GP和AS）都是可以完全适应高压灭菌使用条件。

EPDM橡胶包覆、硅胶包覆的软管一般都可以承受100次30分钟的高压灭菌过程，在其相应的灭菌温度（121 ° C或135 ° C），特定的使用要求，请咨询Aflex。

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容易被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高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，包括高能量辐射、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

# PHARMALINE & PHARMALEX HOSE : SPECIAL USAGE CONDITIONS

Aflex品牌系列软管

Aflex自1973年就开始生产PTFE软管，这之后一直引领流体输送用PTFE软管最新的设计理念与技术创新，Corroline系列软管是我们最新研发、拓展的特氟龙软管。

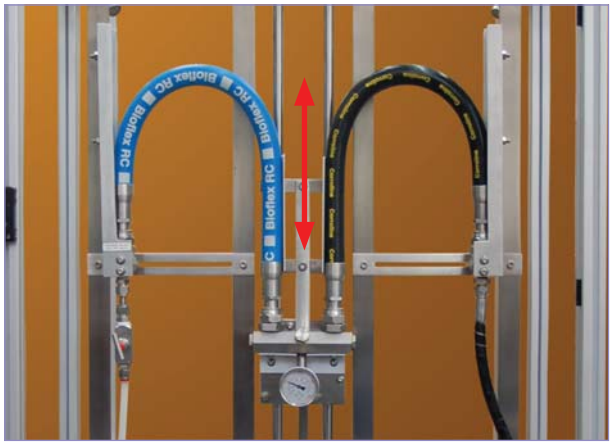
PHARMALINE 和 PHARMALEX软管是Aflex软管系列最新研发产品。

Technically trained Aflex Hose sales staff are available to respond quickly and effectively to every kind of enquiry, and to advise the optimum hose solution for any application.

其他品牌类似产品

Aflex品牌的软管应用范围广，针对特定流体输送应用我们都有相应的PTFE软管想对应。除此系列软管外，你还可以访问我们的网站浏览关于Corroflon、Bioflex、Pharmaline和Pharmalex系列软管。

ROLLING 'U' TEST




配件自足：

Afelx软管系列产品之所以会取得成功，一个很大的原因就是Afelx是全球唯一从原材料到成品自给自足的特氟龙软管设计与生产公司，公司在英国约克郡和美国宾夕法尼亚都有设厂。

- PTFE颗粒被挤压成平滑软管或螺旋软管
- 不锈钢丝被螺旋缠绕或编织在软管外壁
- 软管外层经常包覆橡胶
- 接头也由我们自己购买钢料，在数控机床上车出来。
- 最后，根据客户的要求，软管被组装成总成交付给最终客户。

由于，Afelx软管各生产加工步骤都是由自己来完成，这样Aflex软管就可以保证产品质量的可靠性和设计的独一无二，相比较我们的竞争对手也可以降低制造成本。

Rolling U 形弯曲测试是我们对所有软管进行的众多测试项目的一项，用来证明其应用的独特性。

Rolling U 形弯曲测试用于测试软管的弯曲寿命，Corroline软管经检测后被确认其弯曲寿命至少是同类型其他品牌软管的100倍。

BS EN ISO 9001：2008

Aflex所有产品的生产都严格遵循BS EN ISO 9001：2008质量管理体系，都在NQA（国家质量保证部）注册、评估过。

USP CLASS VI 和ISO 10993-5，6，10，11指南

GP（一般PTFE）和AS（抗静电PTFE）级内衬PTFE材质、铂金硫化硅胶层（白色和透明）、蓝色EPDM都各自依据USP规范协议做过检测，检测结果符合USP CLASS VI <88>的规范要求。

更进一步，GP（一般PTFE）和AS（抗静电PTFE）级内衬PTFE材质也符合USP CLASS VI和ISO 10993-6，10，11指南所规定的在温度121 ° C 下 “ 无任何毒副作用 ” 。

普通一般PTFE和抗静电内衬PTFE材质、铂金硫化硅胶层（白色和透明）按照USP相关协议进行检测后确认符合UPS CLASS VI <87>规范要求，经过L929 MEM ELUTION检测后确认无细胞毒性。

一般PTFE）和抗静电PTFE内衬PTFE材质也通过了更严格的USP CALSS VI和ISO 10993-5规范（121 ° C 下检测）。

USP<661> 塑料制品物理化学测试

GP（一般PTFE）和AS（含炭黑）内衬PTFE材质外螺旋、内平滑PTFE软管依据USP针对塑料制品所规定的物理化学测试要求进行检测后确认其符合：USP34, NF 29, 2011. Monograph <661> Containers, Physicochemical Test-Plastics

FDA

软管所有内衬PTFE材质都符合FDA 21 CFR 177.1550标准，抗静电PTFE材质符合FDA 21 CFR 178.3297标准。

3-A 卫生级标准

生产软管所需的PTFE材料从原料到生产完全符合3-A卫生级标准。

知名医药公司的获准

全球大多数知名医药生产公司都已经批准Aflex作为其软管/总成的供应商。

BPSA 析出物检测

Aflex所提供的软管内衬（GP/AS）PTFE软管都分别依据BPSA指导方法进行了实验检测，结果满足其要求。

具体的检测评估报告复印件可以提供给客户。

CE标识（仅限欧盟）

Aflex软管已经通过苏黎世工程部评估，确认软管总成符合97/23/EC（欧盟）评估模块D1中就设备压力的规范要求，被授权可以在产品上使用CE标识，可配合软管数据表和合格声明一起发布使用。

ATEX 94/9/EC指令认证（具有爆炸危险的气体）

软管、总成及其各组件适用于Gas Zones 1 & 2和Dust Zones 21 & 22

EN10204材质认证

适用我们所有的软管和软管总成组件

BS EN ISO/IEC 17050认证

适用于我们所有的产品

SAE J1737燃油软管认证

Bioflex软管经检测已被获准依据SAE J1737标准应用于汽车燃油的输送用途。

软管总成测试

每一根总成在出厂前都需要在1.5倍最大工作压力下的压力测试，并且会出具检测报告。

# HOW TO ORDER PHARMALINE & PHARMALEX HOSE ASSEMBLIES

## PHARMALINE & PHARMALEX HOSE ASSEMBLIES

Pharmaline & Pharmalex hose is custom built into hose assemblies after the hose size and grade, length and end fittings have been selected.

The specification and information contained in this brochure can be used to make these selections, but if there are any doubts concerning the hose usage limitations or performance capabilities, customers should request expert advice from Aflex Hose.

## SELECTING THE HOSE GRADE

There are two types of PTFE hose liner tube available, natural GP grade and antistatic (black) AS grade, fully described on page 12.

## SELECTING THE HOSE ASSEMBLY LENGTH

The lengths of Pharmaline & Pharmalex hose assemblies are as specified by the customer and the length is measured from the sealing face at one end fitting to the same at the other end of the hose.

Length tolerances are normally +5% -0%.
Maximum hose assembly lengths are the same as "Maximum Continuous Lengths" as given under Specifications on page 6.
Minimum hose assembly lengths are calculated by adding the lengths of both the hose end fittings as listed ("A" dimensions), then add the minimum "visible" length of hose between the fittings (normally not less than 2", 50mm).
If the hose must be flexed, however, then there must be a sufficient length of visible hose to conform to the required flexing configuration (see pages 22 - 25).
Lengths may be stated in Feet & Inches, Inches or decimal Metres or Millimetres. Units used must be stated.

## SELECTING THE END FITTINGS

The range of standard end fittings and materials are given on pages 12 - 20.

## STAINLESS STEEL END FITTING MATERIALS

**Non-Lined Spigots (including Flange Retainers)** - are all made from Grade 316L SS
**Cam and Groove Female Fittings** - are made from Grade 316C SS (Body) and 316L SS (Spigot)
**Swivelling Nuts and Flanges** - are all made from Grade 304 SS
**Ferrules** - ferrules are made from Grade 304 SS.

The equivalent specification for the different Grades of Stainless Steel are listed below:

### Specification Equivalents List

| Grade | BS - British Standard | AISI - American Standard or C = Casting Grade | EN - European Norm |
|---|---|---|---|
| 316L SS | BS 316 S11 | AISI 316 L | EN 1.4404 |
| 316C SS | BS 316 C16 | CF8M | EN 1.4408 |
| 304 SS | BS 304 S15 | AISI 304 | EN 1.4301 |

To special order, end fitting components can be made in non-standard grades of SS such as 1.4571, 1.4435, or other materials such as Hastelloy or Monel.

## HOW TO ORDER

The quantity, hose size, grade, length and fittings must be specified in full.

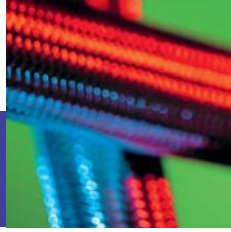
**EITHER** by a full, written description. The hose grade can be specified by the code initials e.g. "Pharmaline AS" defines an antistatic PTFE lined Pharmaline hose.
The quantity, length and fittings can then be written in - e.g. "4 off x 1" bore Pharmaline AS hose x 3.00 metres long. Both ends ANSI 150# S/S Flanges".

**OR** by Part Numbers, as defined on page 10
Any special requirements relating to the hose construction, or information required on Tags, or Certificates, or special testing requirements, must be specified in full on the enquiry or purchase order.

## CONDITIONS OF SALE

Pharmaline and Pharmalex hose and hose assemblies are only supplied on the basis that the customer has read and accepted the Conditions of Sale as given on page 25.

# PART NUMBERS for PHARMALINE and PHARMALEX HOSE ASSEMBLIES



Pharmaline and Pharmalex Hose Assemblies are defined by an individual Part Number made up of (5) entries:

(1)

| Hose Size | Size Part No. |
|---|---|
| 1/4" | 04 |
| 3/8" | 06 |
| 1/2" | 08 |
| 5/8" | 10 |
| 3/4" | 12 |
| 1" | 16 |
| *1 1/4" | *20 |
| *1 1/2" | *24 |
| *2" | *32 |

* These sizes are only available in Pharmaline

(2)

| Hose Type | Type Part No. |
|---|---|
| Pharmaline GP | PHL |
| Pharmaline AS (Antistatic PTFE Liner) | PHLAS |
| Pharmalex GP | PHX |
| Pharmalex AS (Antistatic PTFE Liner) | PHXAS |

(3)

| Length |
|---|
| The overall hose length between the sealing faces at each end is given as the Length Part No, either in decimal Metres followed by "m" or Inches followed by "in". |

(4 & 5)

| Assembled End Fitting Description *All Components in Stainless Steel | End Fitting Part No. |
|---|---|
| JIC Female | 02 |
| Fixed Male Pipe, NPT Thread | 03 |
| Fixed Female Pipe, NPT Thread | 06 |
| JIC-to-NPT Male Union | 08 |
| JIC-to-Female Male Union | 08F |
| Straight Sanitary Tri Clamp, 1.984" Diameter | |
| 0.870" Exit Diameter (Standard) | 10 |
| 1.370" Exit Diameter (Step-Up) | 10/S |
| Straight Mini Sanitary, 0.984" Diameter | |
| 0.370" Exit Diameter (Standard) | 11 |
| 0.620" Exit Diameter (Step-Up) | 11/S |
| *ANSI 150# Swivelling Flange | 12 |
| Cam and Groove, Locking Arm Swivelling Female | 16 |
| Cam and Groove Male | 17 |
| Tube Adaptor | 32 |
| Tube Adaptor with Nut and Ferrule | 32/FN |

*For flange only, Carbon Steel Zinc Plated, add "/ZP" or Epoxy coated add "/EC"

Note: ELBOWS - Elbow Fittings for all types are indicated by adding "/90°" for 90° elbows.

Example: a 3/4" bore Pharmaline Hose Assembly with an Antistatic PTFE Liner.

End (1) - a 3/4" ANSI 150# Swivel Flange

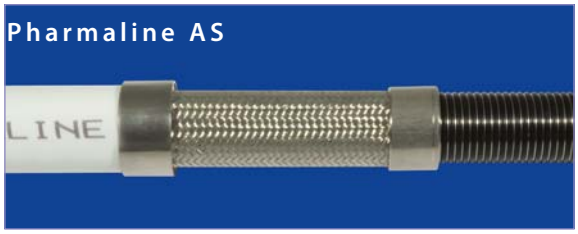
End (2) - a 90° Elbow Sanitary Triclamp

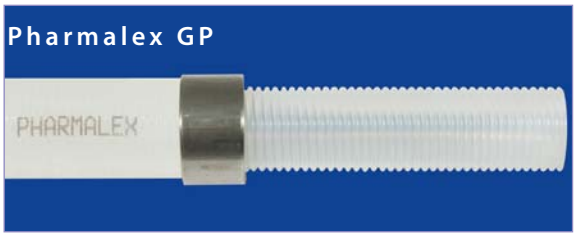
Length - 4ft 6 inches

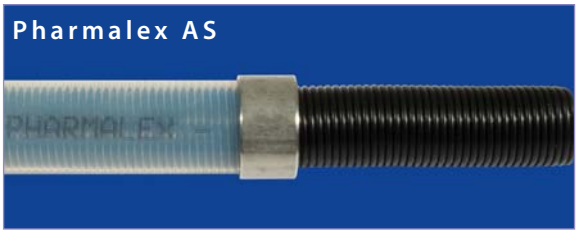
Part No: 12-PHLAS-54in-12-10/90

(1) (2) (3) (4) (5)

# PHARMALINE & PHARMALEX HOSE - GP and AS PTFE LINERS


## PURPOSE - GP GRADES

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 & Approval

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

FDA 21 CFR 177.1550

Both the PTFE liner tube and the platinum cured silicone rubber cover have been tested and conform to the requirements of **USP Class VI**. Additionally, the PTFE liner tube meets the requirements of **USP Class VI** at 121˚C (250˚F) - see page 9.

Pharmaline hose (but not Pharmalex Hose) in sizes 3/4" and above includes a Grade 304 SS wire helically wound in the external convolutions, to reinforce the hose against kinking.

## EC - ELECTRICAL CONTINUITY

**(Also known as "Electrically Bonded")**

Electrical continuity requires that the hose assembly supplied is electrically continuous, or conductive, between metal end fittings at each end of the hose. This can apply whether the hose is GP or AS grade.

The requirements for this are specified in the German Document BRG 132 and EN ISO 8031:2009 Annex A, when tested in accordance with EN ISO 8031:2009 C, which requires that the resistance between end fittings shall be $<10^2$ ohms per assembly. For hose assemblies which meet this requirement a Grade "M" marking can be applied in accordance with EN ISO 8031:2009 Annex A if requested.

**Pharmaline Hose Assemblies with crimped fittings are all electrically continuous.**

**Pharmaline hose assemblies with Relink fittings are not normally Electrically Continuous, but can be made EC by a special Assembly Procedure RRF-SA-001/2. Consult Aflex Hose for details.**

**Pharmalex hose assemblies are not Electrically Continuous.**

## PURPOSE - AS GRADES

AS Grade 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.

### Design & Approval

AS Grade hose has an anti-static PTFE liner manufactured from FDA 21 CFR 177.1550 approved PTFE, and less than 2.5% of "high purity" Carbon Black material to FDA requirement 21 CFR 178.3297 and European Commission Directive 2007/19/EC. AS Grade also conforms to the requirements of USP Class VI, at 37˚C (99˚F), 70˚C (158˚F) and 121˚C (250˚F) - see page 9.

### Antistatic Hose Assemblies

When "AS" (Antistatic) grade hose is specified, then the hose or hose assembly supplied will be tested in accordance with EN ISO 8031:2009 and meet the Antistatic requirements of EN ISO 8031:2009 Annex A. This requires, for an antistatic liner or antistatic cover, that the resistance between an appropriately placed foam electrode and a metallic end fitting will be between $10^3$ to $10^8$ ohms per assembly. For hose assemblies which meet these requirements an appropriate Grade "Ω" marking can be applied in accordance with EN ISO 8031:2009 Annex A if requested.

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.

# PHARMALINE & PHARMALEX SWIVEL FLANGE FITTINGS

## Flange Specification

- ANSI B16.5 (also ASME B16.5) Class 150# and 300#
- DIN PN10, PN16 and PN40
- JIS 10K
- Other Pressure Ratings and Flange Specifications are also available.

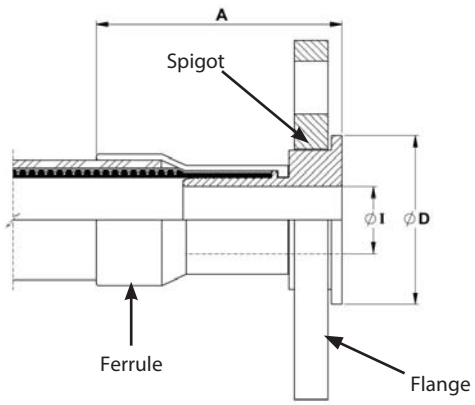
Note: DIN PN10, 16 and 40 Flanges all have identical dimensions, and so are fully interchangeable.

## Pressure Ratings

- ANSI 150# = 230 psi (16 Bar), ANSI 300# = 460 psi (32 Bar)
- DIN PN10 = 145 psi (10 Bar), DIN PN16 = 230 psi (16 Bar), DIN PN40 = 580 psi (40 Bar)

## End Fitting Materials

- Flanges in Grade 304 SS
- Flange Retainers in Grade 316L SS
- Ferrules, in Grade 304 SS


(Fully described on page 4)

| Nominal Hose Size | | *Fitting Length A | | | | Flared Diameter D | | | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ASA150 | | PN | | ASA150 | | **PN10/16/40 | | | | | |
| in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 2.79 | 71 | 2.87 | 73 | 1.38 | 35 | 1.77 | 45 | 3/8 | 9.53 | 0.77 | 1.69 |
| 3/4 | 20 | 3.15 | 80 | 3.19 | 81 | 1.69 | 43 | 2.28 | 58 | 5/8 | 15.88 | 1.06 | 2.35 |
| 1 | 25 | 3.27 | 83 | 3.74 | 95 | 2.00 | 50 | 2.68 | 68 | 3/4 | 20.24 | 1.36 | 3.00 |
| 1 1/4 | 32 | 3.90 | 100 | 4.17 | 106 | 2.50 | 63 | 3.00 | 78 | 1 | 26.20 | 1.72 | 3.79 |
| *1 1/2 | 40 | 4.09 | 104 | 4.53 | 115 | 2.88 | 73 | 3.47 | 88 | 1 1/4 | 31.75 | 2.49 | 5.50 |
| *2 | 50 | 4.17 | 106 | 4.49 | 114 | 3.63 | 92 | 4.00 | 102 | 1 3/4 | 44.45 | 3.57 | 7.87 |

*These sizes are not available in Pharmalex Hose.

# PHARMALINE & PHARMALEX FEMALE and MALE CAM & GROOVE FITTINGS

## End Fitting Specification

- Generally in accordance with A-A-59326 (replaces MIL-C-27487) and EN14420-7:2004 (replaces DIN 2828), and all are fully interchangeable.

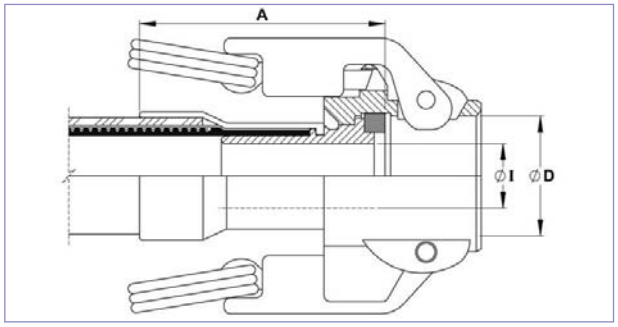
## Temperature and Pressure Ratings

- All sizes up to 230 psi (16 Bar)
- Up to 212˚F (100˚C) Buna N Gasket or 400˚F (204˚C) FEP Gasket.

## End Fitting Materials

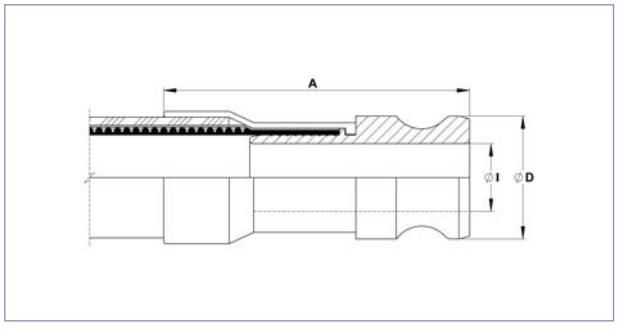
- Female Spigot and Male in Grade 316L SS
- Female Body in Grade 316C SS
- Ferrules, in Grade 304 SS
- Standard Gasket is Buna N (Nitrile) Rubber.
- FEP encapsulated Silicone Rubber Gaskets also available.

## SWIVELLING, LOCKING ARM FEMALE CAM AND GROOVE FITTINGS


| Nominal Hose Size | | *Fitting Length A | | Cam Sleeve Inside Diameter D | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | Kgs | Lbs |
| 3/4 | 20 | 3.22 | 82.0 | 1.260 | 32 | 0.625 | 15.88 | 0.42 | 0.93 |
| 1 | 25 | 3.39 | 86.5 | 1.456 | 37 | 0.797 | 20.24 | 0.59 | 1.30 |
| *1 1/2 | 40 | 3.97 | 101.0 | 2.126 | 54 | 1.25 | 31.75 | 1.15 | 2.50 |
| *2 | 50 | 4.09 | 104.0 | 2.520 | 64 | 1.75 | 44.45 | 1.40 | 3.08 |

## MALE CAM AND GROOVE FITTINGS


| Nominal Hose Size | | ØD | | *Fitting Length A | | Non-Lined Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | Kgs | Lbs |
| 3/4 | 20 | 1.260 | 32.0 | 3.50 | 89.0 | 0.625 | 15.88 | 0.35 | 0.77 |
| 1 | 25 | 1.456 | 37.0 | 3.97 | 101.0 | 0.797 | 20.24 | 0.45 | 0.99 |
| *1 1/2 | 40 | 2.106 | 53.5 | 4.88 | 124.0 | 1.25 | 31.75 | 0.84 | 1.84 |
| *2 | 50 | 2.480 | 63.0 | 5.47 | 139.0 | 1.75 | 44.45 | 1.10 | 2.42 |

*These sizes are not available in Pharmalex Hose.

# PHARMALINE & PHARMALEX SANITARY & MINI SANITARY TRICLAMP (TRICLOVER) FITTINGS


## End Fitting Specification

- Generally in accordance with BS4825:Pt 3 and ASME BPE-a-2007, or DIN 32676 (The DN sizes)

## Temperature and Pressure Ratings

For Standard Clamp and Standard (EPDM) Gasket

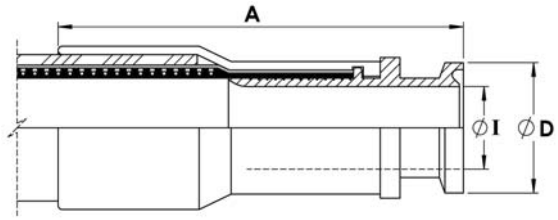
- Pressures up to 230 psi (16 Bar)
- Temperatures up to 250˚F (120˚C)
- Higher Pressures and Temperatures with Special Clamps and Gaskets.

## End Fitting Materials

- Fittings in AISI 316L = EN 1.4404 = BS 316 S11. Internal Bores all Electropolished to <15µin Ra (<0.375µ mtr).
- Ferrules, in Grade 304 SS.

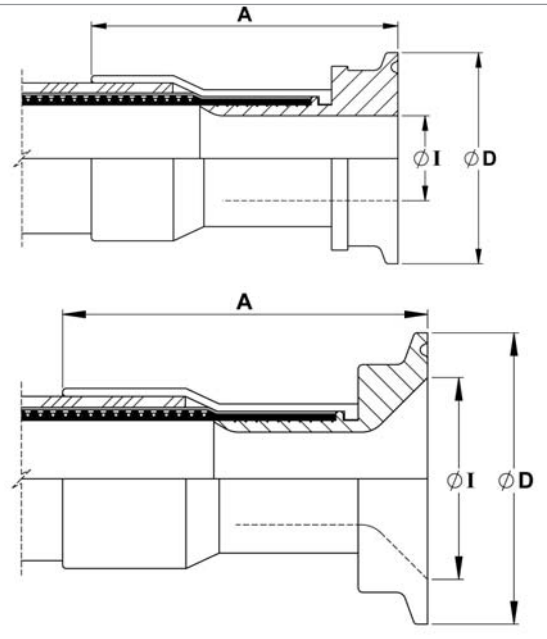
## *Outlet Diameters (Inch pipe sizes only)

The outlet diameters as listed are in accordance with BS4825. The ASME specification, however, requires these diameters to be 0.005" (0.125mm) less in each case. An Outlet Diameter tolerance of +0.000 -0.005" has therefore been applied, so that the same fitting satisfies the requirements of both specification.




### MINI-SANITARY TRICLAMP (TRICLOVER) FITTINGS

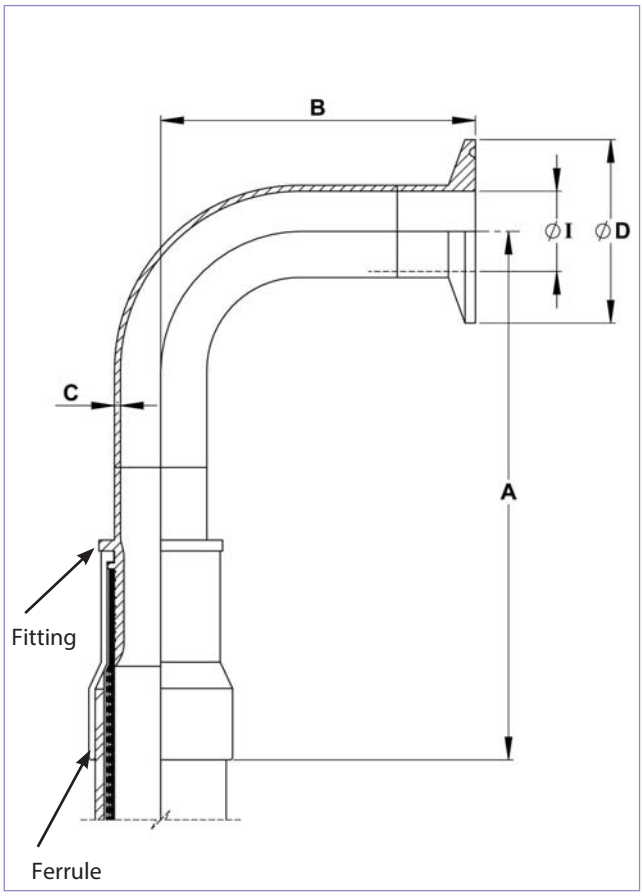
| Nominal Hose Size | Nominal Pipe Size | *Fitting Length A | | Flange Dia. D | | *Outlet Dia. I | | Weight/ Fitting | |
|---|---|---|---|---|---|---|---|---|---|
| | | in | mm | in | mm | in | mm | Kgs | Lbs |
| 1/2" | 1/2" & DN10 | 2.8 | 72 | 0.984 | 25.0 | 3/8 | 9.5 | 0.05 | 0.11 |
| 1/2" | 3/4" | 2.8 | 72 | 0.984 | 25.0 | 5/8 | 16.0 | 0.04 | 0.09 |
| 3/4" | 3/4" | 3.1 | 79 | 0.984 | 25.0 | 5/8 | 16.0 | 0.05 | 0.11 |




### SANITARY TRICLAMP (TRICLOVER) FITTINGS

| Nominal Hose Size | Nominal Pipe Size | *Fitting Length A | | Flange Dia. D | | *Outlet Dia. I | | Weight/ Fitting | |
|---|---|---|---|---|---|---|---|---|---|
| | | in | mm | in | mm | in | mm | Kgs | Lbs |
| 1/2" | 1" | 2.7 | 69 | 1.984 | 50.5 | 7/8 | 22.2 | 0.13 | 0.28 |
| 3/4" | DN15 | 3.0 | 77 | 1.156 | 34.0 | 5/8 | 16.0 | 0.12 | 0.26 |
| 1" | 1" | 3.2 | 82 | 1.984 | 50.5 | 7/8 | 22.2 | 0.25 | 0.54 |
| 1" | DN25 | 3.2 | 82 | 1.984 | 50.5 | 1 | 26.0 | 0.24 | 0.52 |
| 1" | 1 1/2" | 3.2 | 82 | 1.984 | 50.5 | 1 3/8 | 34.9 | 0.22 | 0.48 |
| *1 1/2" | 1 1/2" | 3.9 | 98 | 1.984 | 50.5 | 1 3/8 | 34.9 | 0.27 | 0.59 |
| *1 1/2" | DN40 | 3.9 | 98 | 1.984 | 50.5 | 1 1/2" | 38.0 | 0.25 | 0.56 |
| *2" | 2" | 4.1 | 103 | 2.516 | 64.0 | 1 7/8 | 47.6 | 0.39 | 0.86 |
| *2 | DN50 | 4.1 | 103 | 2.516 | 64.0 | 1.975 | 50.0 | 0.37 | 0.82 |
| *2" | 2 1/2" | 4.3 | 110 | 3.047 | 77.5 | 2 3/8" | 60.3 | 0.42 | 0.93 |
| *2" | DN65 | 4.3 | 110 | 3.047 | 77.5 | 2.600 | 66.0 | 0.40 | 0.88 |
| *2" | 3" | 4.3 | 110 | 3.579 | 91.0 | 2 7/8" | 73.0 | 0.68 | 1.50 |
| *2" | DN80 | 4.3 | 110 | 4.176 | 106.0 | 3.191 | 81.0 | 1.12 | 2.47 |

# PHARMALINE & PHARMALEX 90° ELBOW SANITARY TRICLAMP (TRICLOVER) FITTINGS


## End Fitting Specification

- Generally in accordance with BS4825:Pt 3 and ASME BPE-a-2007

## End Fitting Materials

- Fittings in Grade AISI 316L = EN 1.4404 = BS 316 S11
- Internal Bore average 15µin Ra, Electropolished if required
- Ferrules, in Grade 304 SS

## Temperature and Pressure Ratings

For Standard Clamp and Standard (EPDM) Gasket

- Pressures up to 230 psi (16 Bar)
- Temperatures up to 250˚F (120˚C)
- Higher Pressures and Temperatures with Special Clamps and Gaskets

## *Outlet Diameters

The outlet diameters as listed are in accordance with BS4825. The ASME specification, however, requires these diameters to be 0.005" (0.125mm) less in each case. An Outlet Diameter tolerance of +0.000 -0.005" has therefore been applied, so that the same fitting satisfies requirements of both specifications.

| Nominal Hose Size | | Centre Line To Fitting End A | | Centre Line to Face B | | Flange Diameter D | | *Outlet Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 5.78 | 147 | 1.60 | 41.0 | 0.984 | 25.0 | 3/8 | 9.5 | 0.13 | 0.30 |
| 3/4 | 20 | 6.41 | 163 | 1.60 | 41.0 | 0.984 | 25.0 | 5/8 | 16.0 | 0.20 | 0.45 |
| 1 | 25 | 6.53 | 166 | 2.00 | 51.0 | 1.984 | 50.5 | 7/8 | 22.2 | 0.35 | 0.77 |
| *1 1/2 | 40 | 7.99 | 203 | 2.75 | 70.0 | 1.984 | 50.5 | 1 3/8 | 34.9 | 0.59 | 1.30 |
| *2 | 50 | 9.33 | 237 | 3.50 | 88.9 | 2.16 | 64.0 | 1 7/8 | 47.6 | 0.93 | 2.05 |

*These sizes are not available in Pharmalex Hose.

# PHARMALINE & PHARMALEX NPT and BSPT FIXED MALE AND NPT FIXED FEMALE FITTINGS

## End Fitting Specification

NPT Taper Threads to American National Standard Pipe Taper Thread design to ANSI/AMSE B1.20.1

BSPT Threads to British Standard Pipe Taper Thread design to BS21

Alternatives - Parallel Threads, Metric Threads and Others.

## End Fitting Materials

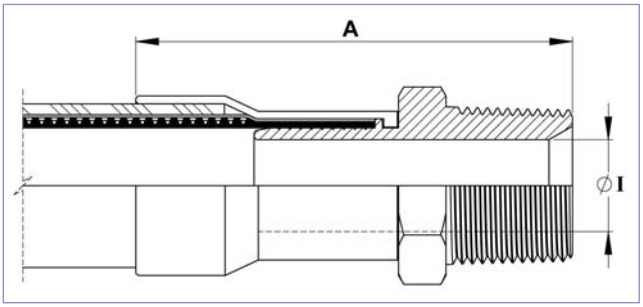
- Fittings in Grade 316L SS
- Ferrules, in Grade 304 SS

Alternatives - Fittings in Zinc Plated Carbon Steel

## Temperature and Pressure Ratings

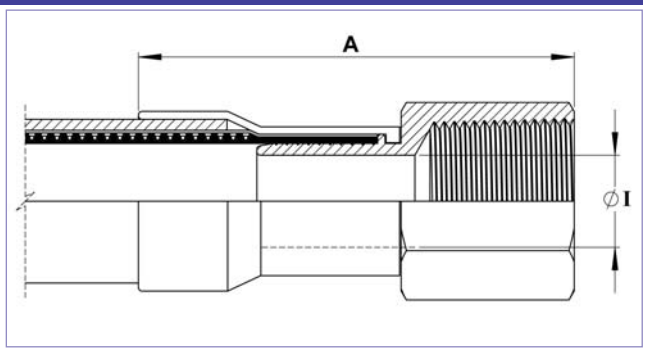
As for the relevant size of hose on Page 5.

## FIXED MALE NPT or BSPT


| Nominal Hose Size | | NPT or BSPT Thread Size | *Fitting Length A | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|
| in | mm | in | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 1/2 | 3.30 | 84 | 0.38 | 9.53 | 0.10 | 0.22 |
| 3/4 | 20 | 3/4 | 3.74 | 95 | 0.63 | 15.88 | 0.18 | 0.40 |
| 1 | 25 | 1 | 4.13 | 105 | 0.80 | 20.24 | 0.29 | 0.64 |
| 1 1/4 | 32 | 1 1/4 | 4.90 | 124 | 1.00 | 26.20 | 0.45 | 0.99 |
| *1 1/2 | 40 | 1 1/2 | 5.19 | 132 | 1.25 | 31.75 | 0.60 | 1.32 |
| *2 | 50 | 2 | 5.78 | 142 | 1.75 | 44.45 | 0.84 | 1.85 |

## NPT FIXED FEMALE


| Nominal Hose Size | | NPT Thread Size | *Fitting Length A | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|
| in | mm | in | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 1/2 | 3.42 | 87 | 0.38 | 9.53 | 0.18 | 0.40 |
| 3/4 | 20 | 3/4 | 3.66 | 93 | 0.63 | 15.88 | 0.22 | 0.49 |
| 1 | 25 | 1 | 4.13 | 105 | 0.80 | 20.24 | 0.33 | 0.73 |
| 1 1/2 | 40 | 1 1/2 | 4.80 | 122 | 1.25 | 31.75 | 0.75 | 1.65 |
| 2 | 50 | 2 | 4.96 | 126 | 1.75 | 44.45 | 1.06 | 2.34 |

*These sizes are not available in Pharmalex Hose.

# PHARMALINE & PHARMALEX 60° CONE SEAT FEMALE UNIONS and BSP FLAT SEAT LUG NUT FEMALE FITTING

## End Fitting Specification

BSPP Threads to British Standard Pipe Parallel Thread design to BS21, 60° Cone Seat design, or Flat Seat.

Alternatives - Cone Seat Female Union Fittings can be supplied with a BSPP/BSPT Taper Male Adaptor if required.

## Temperature and Pressure Ratings

As for the relevant size of hose on Page 5.

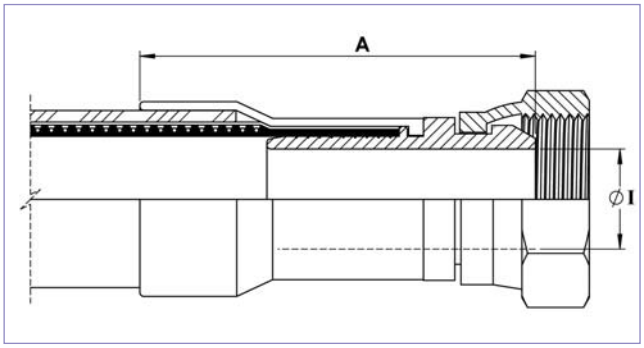
## End Fitting Materials

- Spigots in Grade 316L SS
- Nuts in Grade 316L SS
- Ferrules, in Grade 304 SS

Alternatives

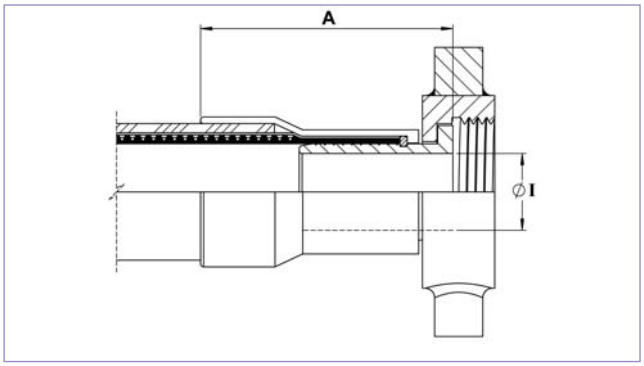
- Cone Seat Female Unions can be supplied in Zinc Plated Carbon Steel if required.
- Lug Nuts can be supplied in Gun Metal (Bronze) if required.

## BSP 60° CONE SEAT FEMALE UNION FITTING


| Nominal Hose Size | | NPT or BSPT Thread Size | *Fitting Length A | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|
| in | mm | in | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 1/2 | 3.27 | 83 | 0.37 | 9.35 | 0.11 | 0.25 |
| 3/4 | 20 | 3/4 | 3.62 | 92 | 0.63 | 15.88 | 0.15 | 0.34 |
| 1 | 25 | 1 | 3.86 | 98 | 0.80 | 20.24 | 0.24 | 0.53 |
| 1 1/4 | 32 | 1 1/4 | 4.25 | 108 | 1.00 | 25.4 | 0.44 | 0.97 |
| 1 1/2 | 40 | 1 1/2 | 4.65 | 118 | 1.25 | 31.75 | 0.72 | 1.59 |
| 2 | 50 | 2 | 4.80 | 122 | 1.75 | 44.45 | 0.99 | 2.19 |

## BSP FLAT FACE LUG NUT FEMALE FITTING


| Nominal Hose Size | | BSPP Thread Size | *Fitting Length A | | Fitting Bore Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|
| in | mm | in | in | mm | in | mm | Kgs | Lbs |
| 1 | 25 | 1 | 3.70 | 94 | 0.80 | 20.24 | 0.25 | 0.55 |
| 1 1/2 | 40 | 1 1/2 | 3.66 | 93 | 1.25 | 31.75 | 0.61 | 1.33 |
| 2 | 50 | 2 | 3.70 | 94 | 1.75 | 44.45 | 0.88 | 1.95 |

*These sizes are not available in Pharmalex Hose.

# PHARMALINE & PHARMALEX 37° JIC FEMALE FITTINGS and UNIONS

## End Fitting Specification

- SAE J514 37° Flare JIC Female Fitting
- 37° JIC Male-to-NPT Male/Female Adaptors
- NPT Threads to ANSI B2.1

## Temperature and Pressure Ratings

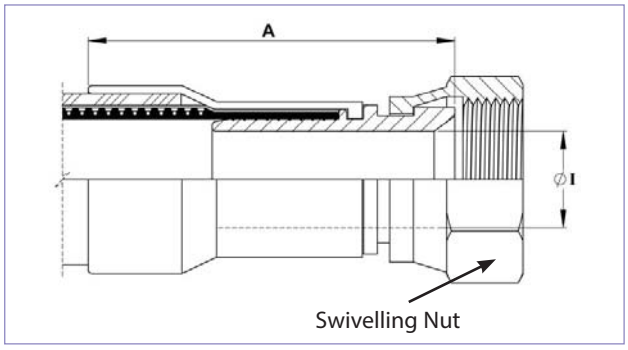
Same Maximum Working Pressure and Temperature as for the relevant size of Hose, on page 5

## End Fitting Materials

- Spigots in Grade 316
- Nuts in 316L SS
- Ferrules, in Grade 304 SS

Note - Not usable with SAE 45° Flare fittings which have the same thread.

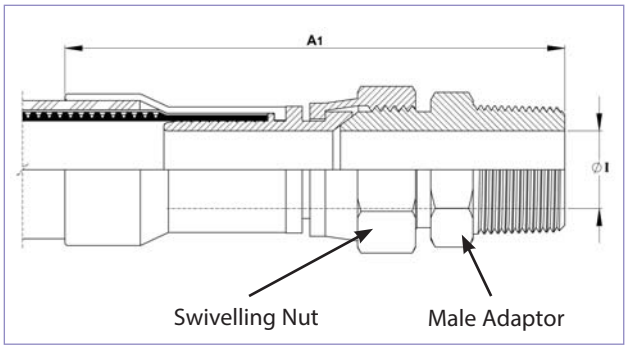
Alternatives - Can be supplied in other materials, such as zinc plated carbon steel, Hastelloy, Monel etc.


| Nominal Hose Size | | 37° JIC Thread Size | *Fitting Length A | | Fitting Inner Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|
| in | mm | in | in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 3/4 -16 | 2.76 | 70 | 0.38 | 9.5 | 0.11 | 0.24 |
| 3/4 | 20 | 1 1/16 -12 | 3.07 | 78 | 0.63 | 15.9 | 0.15 | 0.34 |
| 1 | 25 | 1 5/16 -12 | 3.23 | 82 | 0.80 | 20.2 | 0.23 | 0.52 |
| 1 1/2 | 40 | 1 7/8 -12 | 4.00 | 102 | 1.25 | 31.7 | 0.72 | 1.58 |
| 2 | 50 | 2 1/2 -12 | 4.33 | 110 | 1.75 | 44.4 | 0.99 | 2.18 |

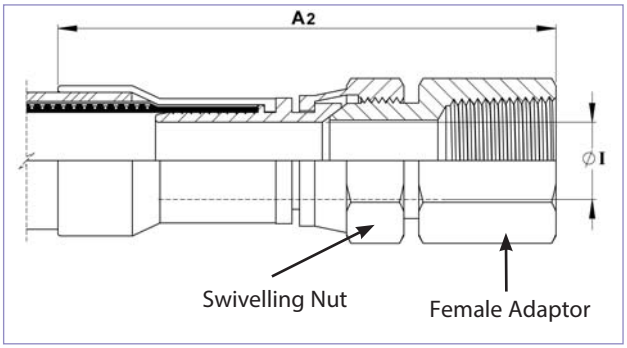
*These sizes are not available in Pharmalex Hose.

### JIC TO NPT MALE UNION (Including a JIC MALE-TO-NPT MALE ADAPTOR)




| Nominal Hose Size | | *Male Union Length A1 | | Weight/Fitting | |
|---|---|---|---|---|---|
| in | mm | in | mm | Kgs | Lbs |
| 1/2 | 13 | 4.13 | 105 | 0.22 | 0.48 |
| 3/4 | 20 | 4.92 | 125 | 0.33 | 0.72 |
| 1 | 25 | 5.43 | 138 | 0.52 | 1.15 |

### JIC TO NPT FEMALE UNION (Including a JIC MALE-TO-NPT FEMALE ADAPTOR)




| *FemaleUnion Length A2 | | Fitting Inner Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|
| in | mm | in | mm | Kgs | Lbs |
| 4.25 | 108 | 0.38 | 9.5 | 0.21 | 0.47 |
| 4.80 | 122 | 0.63 | 15.9 | 0.33 | 0.74 |
| 5.12 | 130 | 0.80 | 20.2 | 0.68 | 1.50 |

# PHARMALINE & PHARMALEX TUBE ADAPTOR (GROOVED STANDPIPE) FITTINGS

## Specifications

- Compatible with existing Industrial Standard Tube Fitting Components.

## Temperature and Pressure Ratings

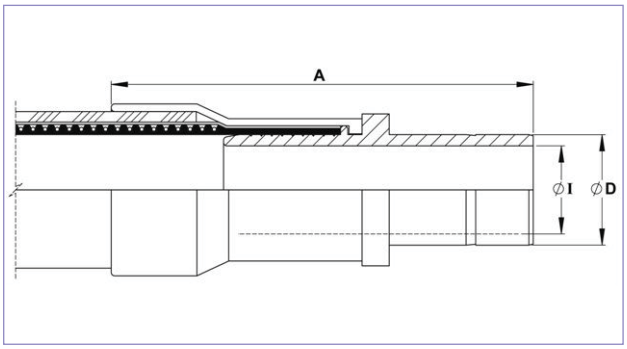
As for the relevant size of hose on Page 5.

## End Fitting Materials

- Fitting in Grade 316L SS
- Ferrules, in Grade 304 SS

Alternatives -Can be supplied with matching Female Nuts & Ferrules (clamping Ferrules) to suit.

## NON LINED TUBE ADAPTOR (GROOVED STANDPIPE) FITTING


| Nominal Hose Size | | *Fitting Length A | | Diameter D | | Fitting Inside Diameter I | | Weight/Fitting | |
|---|---|---|---|---|---|---|---|---|---|
| in | mm | in | mm | in | mm | in | mm | Kgs | Lbs |
| 3/4 | 20 | 3.10 | 79.0 | 3/4 | 19.05 | 0.58 | 14.70 | 0.18 | 0.40 |
| 1 | 25 | 3.58 | 91.0 | 1 | 25.4 | 0.80 | 20.32 | 0.20 | 0.44 |

## FIXED DIP PIPES

### Description

Fixed Dip Pipes are fairly rigid, thick wall PTFE tubes, either straight or 90˚ elbowed, which are directly crimped to the end of Pharmaline and Pharmalex 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.

### How to order

Specify the size and material of the dip pipe, whether it is straight or 90˚ elbowed. Give the length of the find 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 4 Bar Pressure, and are not suitable for use at pressures higher than 3 Bar. They are usable at negative pressure up to full vacuum.

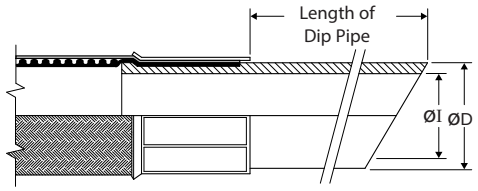
If higher pressure ratings are required, consult Aflex Hose.

### Lengths

Dip Pipes are supplied as standard in 1 metre lengths, but can be supplied in any length to individual requirements.

| Nominal Hose Bore Size | | Approximate Dip Pipe Dimensions | | | |
|---|---|---|---|---|---|
| | | Outside Diameter D | | Inside Diameter I | |
| in | mm | in | mm | in | mm |
| 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 (STRAIGHT)




## 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

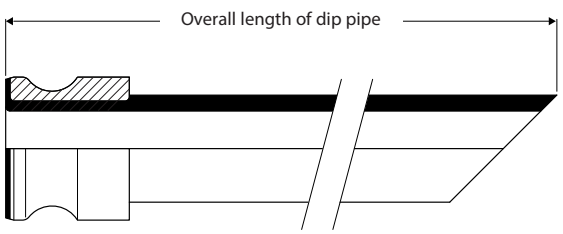
A straight, or 90˚ elbowed anti-static PTFE Dip Pipe, fitted with a Flange or Cam & Groove Male PTFE Lined & Flared end fitting.

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



# RELINK
## A self-assembly, re-usable end fitting attachment system from Aflex Hose Ltd - Patent Pending.
## For use with PHARMALINE and PHARMALEX PTFE lined hose products.

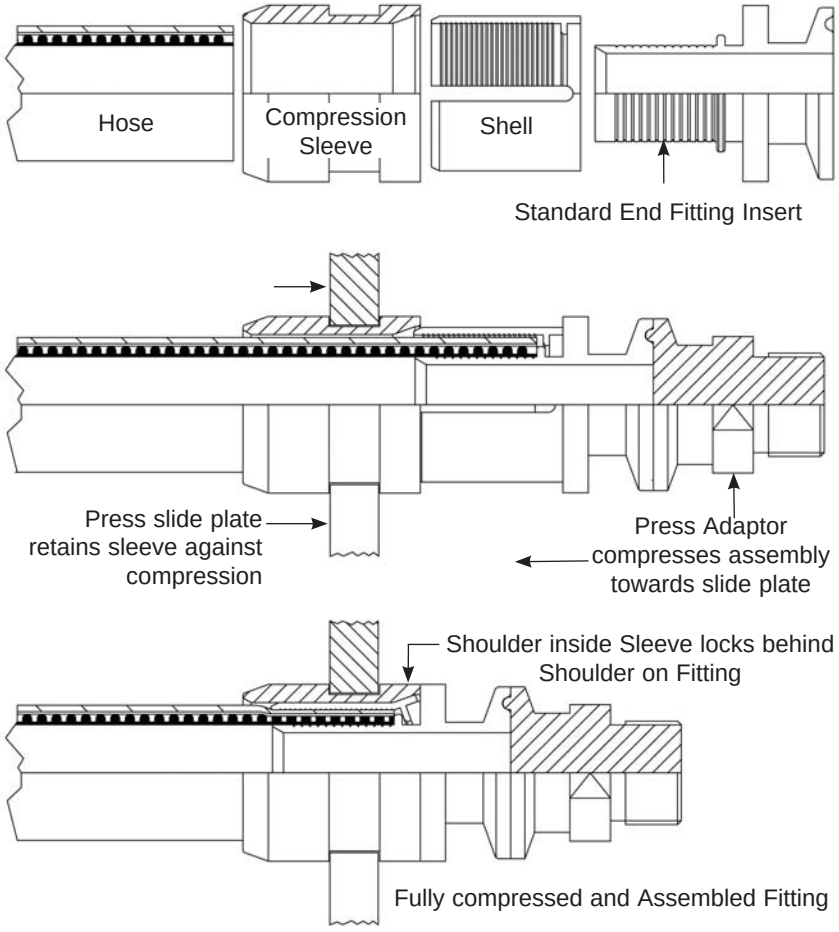
### Introduction

Aflex Hose have developed a revolutionary new concept for end fitting attachment for their Pharmaline and Pharmalex hose products which can be easily assembled by customers on site, using a simple manually operated hydraulic press. It is called Relink.

The same press can also be used to disassemble the end fitting, in order that the main components can be re-used.

The concept of re-usable self assembly end fittings is not new, and several designs have been available for many years, but they have never been a complete success. This is due to difficult and unreliable assembly methods, the high cost of components, and the lack of availability of a wide range of fitting designs. The new Relink End Fitting design overcomes these problems, and offers many other important technical advantages.

**Relink System**




### Advantages of the Relink End Fitting System

**- Uses Standard Aflex End Fitting Inserts**

Relink can be used to assemble all the standard end fittings, including Sanitary Clamp (Triclover) fittings, ensuring ex. stock availability of many different types of fittings.

**- Reliable Joint**

Other self assembly, reusable fittings all include screwthreads, which can be over-tightened, or under-tightened, and often have low "blow-off" pressure ratings. Relink fittings do not use screwthreads, and always provide a positive, pressure tight joint .

**- Hygienic Design**

The patented system applies a non rotating, radial pressure to the hose without any "screwing" of the end fitting, so a true hygienic joint can be made when used with Aflex hygienic end fittings.

**- Tamper-Proof**

Other reusable/self assembly designs, can be accidentally loosened or disassembled manually or with a spanner during or after connection in the application. The Relink End Fitting can only be disassembled using the Relink Press, after disconnection from the application.

**Relink Sizes, Part Numbers and Pressure Ratings**

| Nominal Hose Size | | Hose Bore | | Pharmaline & Pharmalex Hose, Part Numbers for: | | Maximum Working Pressure for Relink Hose Assemblies | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Pharmaline | | Pharmalex | |
| in | mm | in | mm | Relink Shell | Relink Sleeve | Psi | Bar | Psi | Bar |
| 1/4" | 6.40 | 0.270 | 6.80 | 40-220-04-04-03 | 40-221-04-04-02 | 230 | 16 | 101 7.0 | |
| 3/8" | 9.50 | 0.375 | 9.50 | 40-220-06-06-03 | 40-221-06-06-02 | 230 | 16 | 87 | 6.0 |
| 1/2" | 12.70 | 0.500 | 12.70 | 40-220-08-08-03 | 40-221-08-08-02 | 230 | 16 | 79 | 5.5 |
| 5/8" | 16.00 | 0.625 | 16.01 | 40-220-10-10-03 | 40-221-10-10-02 | 230 | 16 | 72 | 5.0 |
| 3/4" | 19.00 | 0.750 | 19.00 | 40-220-12-12-03 | 40-221-12-12-02 | 230 | 16 | 58 | 4.0 |
| 1" | 25.40 | 1.000 | 25.40 | 40-220-16-16-03 | 40-221-16-16-02 | 230 | 16 | 50 | 3.5 |

**Note:** Hose assemblies with Relink fittings are not electrically continuous (not "EC"). Only Pharmaline Hose assemblies with crimped fittings are electrically continuous.

## EXAMPLE SHOWN: A RELINK TRICLAMP ASSEMBLY

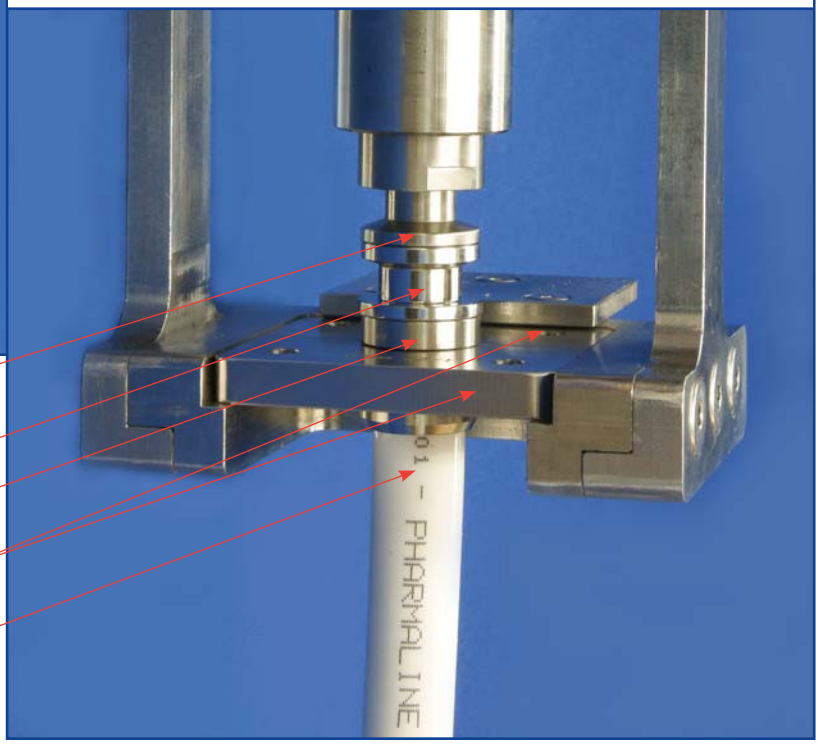

The Relink Triclamp components and the hose are assembled, and inserted into the Press by encapsulating the groove in the Compression Sleeve between the two Slide Plates as shown.

The Press Triclamp Adaptor is then pressed down, to engage the Triclamp Fitting Insert and commence compression.

When the Compression Sleeve touches the shoulder on the Fitting, the assembly is completed. The Adaptor is reversed, freeing the assembled fitting for removal by sliding out of the Slide Plates.

To recover the Fitting, the hose is cut off at the back of the Fitting, and the Triclamp Fitting Spigot is pressed out, using the Press and a Relink Extraction Tool. The Sleeve and Spigot are then available for re-use.

### FULLY COMPRESSED TRICLAMP FITTING




PRESS TRICLAMP ADAPTOR

TRICLAMP FITTING

COMPRESSION SLEEVE

SLIDE PLATES

HOSE

# PHARMALINE & PHARMALEX STANDARD and PURETAG LABELLING and COLOUR CODING SYSTEMS

## STANDARD LABELLING

All Pharmaline and Pharmalex hose assemblies are labelled with the following information:

- Manufacturer's Name (Aflex Hose)
- Hose Size and Grade
- Max. Working Pressure
- Unique Serial Number
- Month & Year of Manufacture
- Aflex Hose Telephone Number
- CE Mark (if applicable)

This information is normally etched on to a loose stainless steel Ring mounted on the hose.

In some cases, at the discretion of Aflex Hose, the information may be etched on to a thin stainless steel plate which is clamped to the hose, or on to the end fitting ferrule at one end. This may be necessary for example, if the customer requires additional information which may not fit on to a Ring.

Customers may specify which labelling system they require, and may request additional information on the label.

## PURETAG LABELLING AND COLOUR CODING

**Puretag Labelling and Colour Coding (Patent Pending)**

A label and/or Colour Code is encapsulated on to the braid by a transparent platinum cured silicone rubber cover which is integrally vulcanised and fully bonded to the rubber cover on the hose. The label is replaceable if required.

Further information is available on the Puretag product information document on the website.

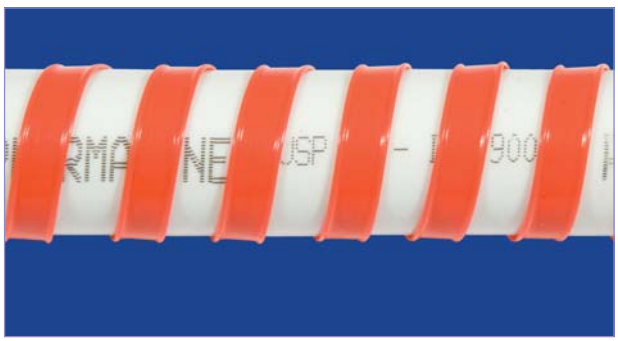
Note: 1/2" size, Colour Code only, no text.

## SPIRAL STRIP COLOUR CODING

**Colour Coding**

A coloured PTFE spiral strip is wound on to the hose.

It can be left loose, or it can be encapsulated under a transparent, heat-shrunk polyolefin sleeve.



# 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.

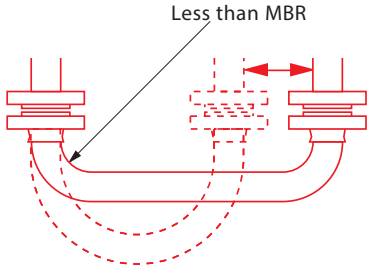
Whether static or dynamic, the First Rule concerning the configuration of the hose is that the bend radius of the hose must never be less than the Minimum Bend Radius (MBR) for the hose as listed in the relevant hose brochure.

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.

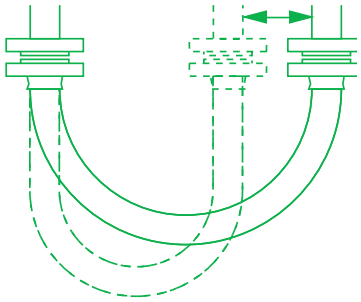
The Second Rule, therefore, if possible, is to design the configuration to ensure that any flexing in the hose takes place away from the end fittings.

## (Dynamic) Configuration

**INCORRECT** - Hose too short

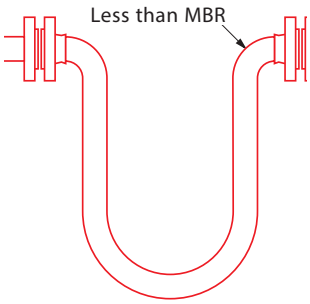



**CORRECT** - No flex at end fittings

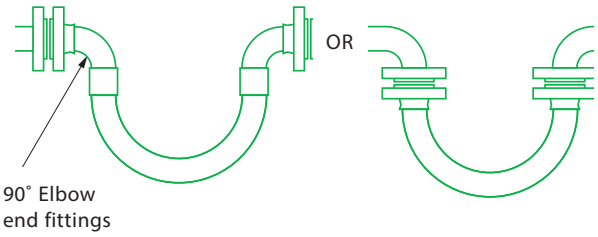


## (Static) Configuration

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



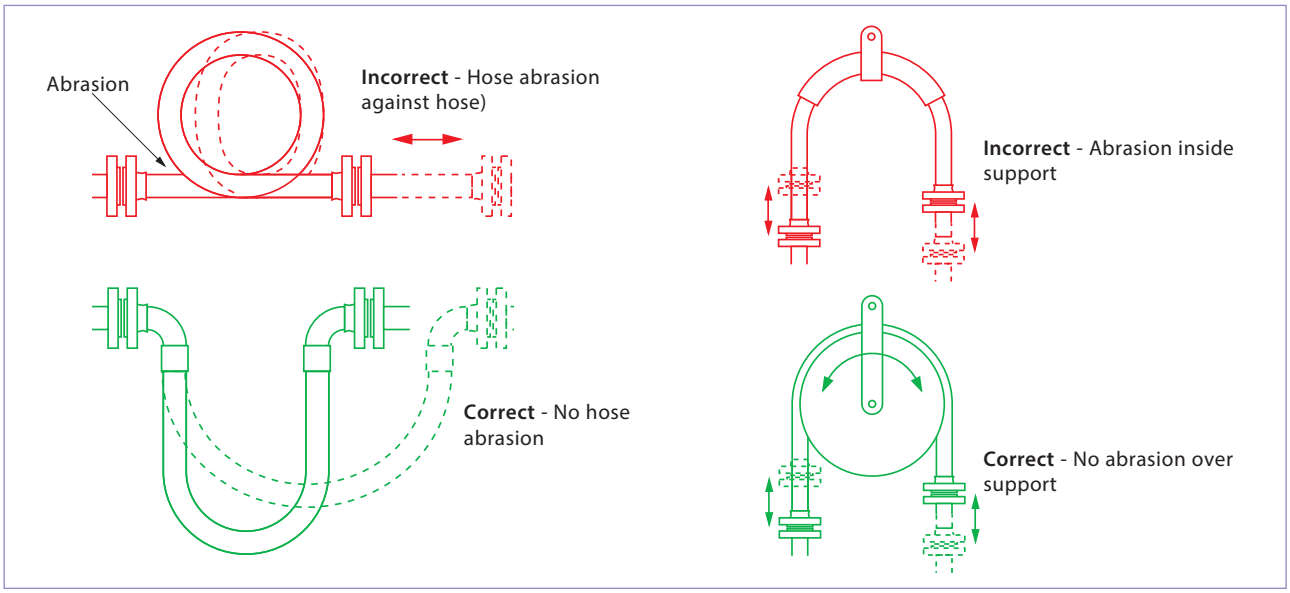

**CORRECT** - No flex at end fittings



# 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.

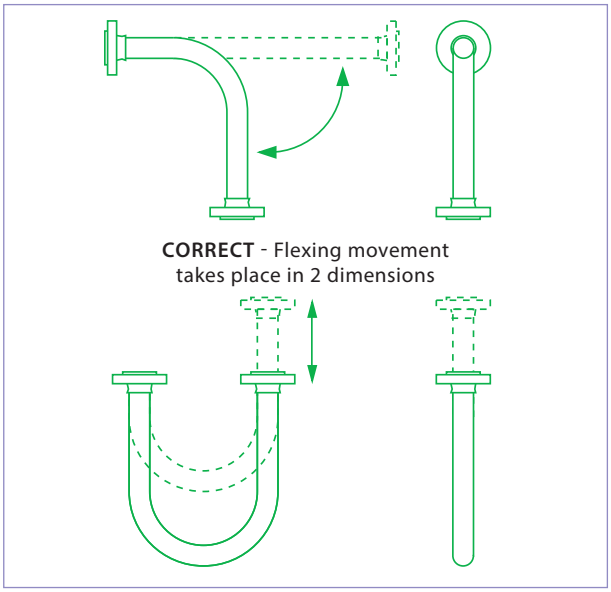
In some cases, the length, configuration and angle of the hose can be designed to avoid abrasion. In others, static or moving support frames or support wheels are required.

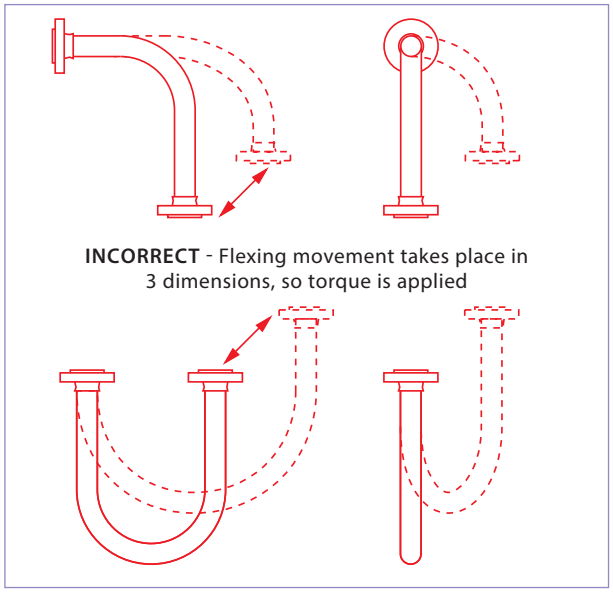



The Fourth Rule is that the hose must not be subjected to torque, either during connection, or as a result of the flexing cycle.

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:

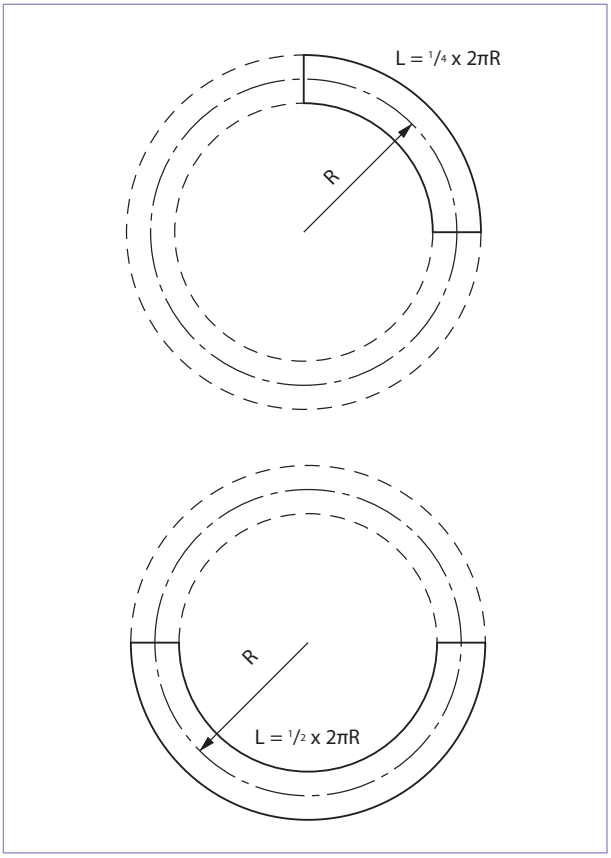



Both Pharmaline and Pharmalex hose have good resistance to a small level of torque, much better resistance that rubber or SS hose types, but it is still the best practice to take whatever steps are necessary to eliminate torque. If in doubt, consult Aflex Hose.

## 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 (yellow)= 1/4 x 2πR (334)

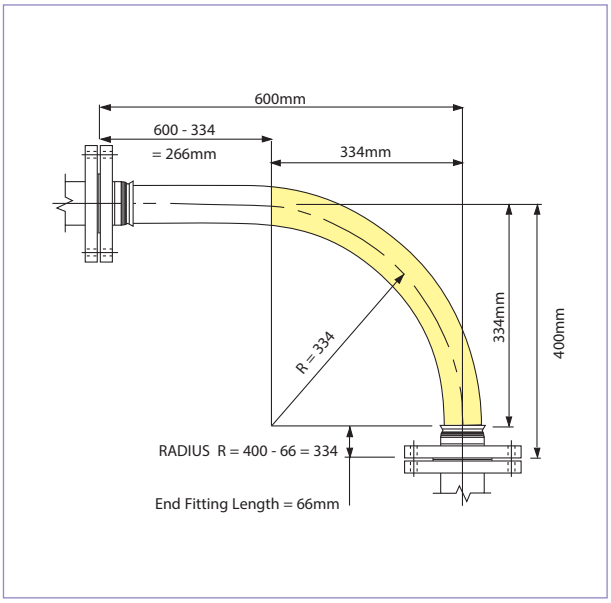
= 1/4 x 2 x 3.142 x 334 = **525mm**

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.

# 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.

**(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 $1^1/_2$ 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.


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

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