PHARMALINE N&X
Smoothbore Flexible PTFE Hose

CHEMICAL RESISTANT
KINK RESISTANT
SELF CLEANING
FLEXIBLE
HYGIENIC
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Pages 26 & 27
PTFE, or Polytetrafluoroethylene, comprises of long-chain molecules of carbon atoms, each linked to two fluorine atoms. The fluorine atoms provide a helical spiral which surrounds the carbon chain and protects it. It is this structure which creates the unique properties for which PTFE is well-known.

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

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

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

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

- **Excellent Temperature Range**
  The cookware application also demonstrates another of PTFE’s many attributes - temperature resistance. PTFE itself can be used as a hose liner at temperatures from -150°C up to +260°C, dependent upon the hose design and the application conditions.

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

- **Very High Electrical Resistance**
  Most aerospace electrical wiring has a PTFE cover, due to the excellent electrical resistance of PTFE. This property is however, a disadvantage in some hose applications where there is a risk of developing an electrostatic charge inside the hose bore. Aflex Hose have developed a non-contaminant, FDA and USP Class VI compliant solution to this problem.

- **Hose Design**
  The only issue with PTFE as a hose lining material is the best way it can be integrated in to the hose design. This is where Aflex Hose have a proven record of success over the last 40 years.
The World’s Leading Manufacturer of PTFE Flexible Hose

Aflex Hose, founded in 1973, pioneered the concept of PTFE lined flexible hose for the transfer of process fluids. Over the years since then, hundreds of thousands of custom-built PTFE Lined hoses have been designed and manufactured by Aflex Hose to cope with the most difficult of operating conditions, and Aflex have continuously developed and expanded their product range having pioneered and introduced Antistatic hose, EPDM and Silicone Rubber Covered hose and many other innovations in response to customer demands.

Total Manufacture

The primary reason for the success of the Aflex Hose range of products is that Aflex is the only PTFE hose company in the world to carry out all the hose design and manufacturing operations in house, from raw materials to finished products, at Aflex Hose plants in Yorkshire (UK) and Pennsylvania (USA).

- PTFE powder is extruded into tube and convoluted.
- Stainless steel wire is wound and braided onto the tube.
- Rubber extruders are used to apply external covers.
- End fittings are machined from bar stock on state of the art CNC lathes.
- And, finally, the hoses are assembled to individual customer requirements.

Because Aflex Hose perform all these operations in house, Aflex is able to achieve unbeatable levels of build quality, design excellence and economy of scale, which are unmatched by our competitors.

Pharmaline N and X Hose Design

Pharmaline and Pharmalex hose were developed and introduced by Aflex Hose in 2005, specifically to provide customers with a new smooth bore, silicone covered PTFE lined hose which had better flexibility than the other products which were available commercially.

In response to customers requests, Pharmaline N and X hoses have been designed and introduced to replace Pharmaline and Pharmalex with hoses that have further improved flexibility and kink resistance. At the heart of the Pharmaline hose designs is the PTFE liner tube, smoothbore on the inside and convoluted on the outside. Most of the sizes now include a 316 SS helical reinforcing wire wound in to the convolutions, as well as an improved convolution profile. These support the tube against the effects of severe flexing and vacuum.

Pharmaline PTFE Liner Tube

The internal surface around the inside of the bend is kept smooth by the axial compression of the rib sections against the helix wire - See ‘The Inside Story’ in the ‘videos’ section of our website www.aflex-hose.com.
Pharmaline N and X Hose Descriptions

**Design Features**

Pharmaline N includes a grade 316 stainless steel wire braid for additional strength and resistance to high internal pressures. Pharmaline X does not include a braid and is designed for lighter duty, lower pressure applications.

Pharmaline N and X hose designs provide superior alternatives to silicone rubber hose and tube for use in Pharmaceutical, Biotech and Fine Chemical manufacturing and research plants. The excellent chemical resistance of the PTFE liner, and the ease of cleaning and resistance to steam sterilising represent important advantages in many applications.
### Pharmaline N and X Specifications & Properties

#### Specifications for Pharmaline N Hose Grades

<table>
<thead>
<tr>
<th>Nominal Hose Bore Size</th>
<th>Actual Hose Bore Size</th>
<th>Helix Wire</th>
<th>Outside Diameter of Cover</th>
<th>Minimum Bend Radius</th>
<th>*Maximum Working Pressure</th>
<th>Burst Pressure</th>
<th>Weight per Unit Length</th>
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* Maximum Working Pressures vary with temperature as in graph below

#### Specifications for Pharmaline X Hose Grades

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<th>Nominal Hose Bore Size</th>
<th>Actual Hose Bore Size</th>
<th>Helix Wire</th>
<th>Outside Diameter of Cover</th>
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<td>2.580</td>
<td>65.6 12 300</td>
<td>29 2.0</td>
<td>1.28 1.91</td>
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</tbody>
</table>

† Maximum Working Pressures do not vary with temperature

*Maximum Working Pressures (MWP)
The lesser of the MWP for the hose and the MWP of either of the end fittings.

**Temperature Limitations**
Usable from -73°C, -100°F up to +204°C, +400°F.

**Vacuum Limitations**
Pharmaline N and X hose is usable at vacuum to -0.9bar up to 150°C, 302°F.

**Rolling U Test for Flex Life**
*View this in the ‘Videos’ section of our website*
More than 15x the flex life to failure compared with other types of rubber covered, smoothbore PTFE lined hose products.

**Flexibility**
Much less force to bend than any other equivalent smooth bore PTFE lined hose product.

**Kink Resistance** *(See website for video)*
Much more resistant to kinking than any other equivalent smooth bore PTFE lined hose product.

**Soakable**
Pharmaline N hoses are soakable.

[Diagram showing temperature and maximum working pressure graph for Pharmaline N]
Pharmaline N Hose Assemblies
Pharmaline N and X hose can be supplied loose, or as custom built 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 PTFE (Pharmaline N or X, GP grade), and antistatic PTFE (Pharmaline N or X, AS grade), both are fully described on page 10.

Selecting the Hose Assembly Length
The lengths of Pharmaline N and X 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 +2% / -0%.

Minimum hose assembly lengths are calculated by adding the lengths of the hose end fittings as listed on pages 11 to 19, the A dimensions, then adding the minimum ‘visible’ length of hose between the fittings as per the table below.

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 23 - 25).

Maximum hose assembly lengths are as per the table below.

Lengths may be stated in Feet & 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 11 - 19.

Stainless Steel End Fitting Materials

Non-Lined Spigots - are all made from Grade 316L SS = EN 1.4404

Cam and Groove Female Fittings - are made from Grade 316C SS = EN 1.4408 (Body) and 316L SS (Spigot)

Swivelling Nuts and Flanges - are all made from Grade 304 SS = EN 1.4301

Ferrules - most ferrules are made from Grade 304 SS, otherwise Grade 316SS

How to Order
The quantity, hose type, 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 N, AS” defines an antistatic PTFE lined Pharmaline N hose.

The quantity, length and fittings can then be written in - e.g. “4 off x 1” bore Pharmaline N, AS hoses x 3.00 metres long. Both ends ANSI 150# S/S Flanges”.

Or by Part Numbers, as defined on page 9. 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 N and X hose and hose assemblies are only supplied on the basis that the customer has read and accepted the Conditions of Sale as given on pages 26 & 27.
Pharmaline N and X
EN 16643 Hose Assembly Electrical Property Grades

The hose assembly electrical property grades and electrical resistance limits are defined within EN 16643 and tested in accordance with BS EN ISO 8031. Aflex Hose electrically conductive (EC) assemblies are defined in EN 16643 as electrically bonded and given the symbol M. M-grade assemblies exhibit a maximum electrical resistance of 100Ω between end fittings. Aflex Hose anti-static (AS) PTFE liners and rubber covers are termed static dissipative within EN 16643 and given the symbol Ω followed by letters that specify either the liner, cover or both; L=liner, C=cover, CL= cover & liner. Ω-grade covers or liners exhibit an electrical resistance of $10^{-3}$-$10^{-8}$Ω.

The table below identifies each EN 16643 electrical grade for a hose assembly along with a brief description and example assembly configuration.

<table>
<thead>
<tr>
<th>EN16643 Electrical Grade For Hose Assembly</th>
<th>EN16643 Description</th>
<th>Example Hose Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade M</td>
<td>Electrically bonded without static-dissipative lining or cover</td>
<td>PHAN GP Ends Mini-sanitary</td>
</tr>
<tr>
<td>M/Ω-L</td>
<td>Electrically bonded and static-dissipative lining</td>
<td>PHAN AS Ends Mini-sanitary</td>
</tr>
<tr>
<td>M/Ω-C</td>
<td>Electrically bonded and static-dissipative cover</td>
<td>Not available</td>
</tr>
<tr>
<td>M/Ω-CL</td>
<td>Electrically bonded and static-dissipative cover and lining</td>
<td>Not available</td>
</tr>
<tr>
<td>I</td>
<td>Electrically insulated (no electrical bonding AND no static-dissipative layers)</td>
<td>PHAN GP Ends ASA150 PP spigot and flange (special order)</td>
</tr>
<tr>
<td>Ω-L</td>
<td>Static dissipative lining without electrical bonding</td>
<td>PHAN AS Ends ASA150 PP spigot and flange (special order)</td>
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<tr>
<td>Ω-C</td>
<td>Static dissipative cover without electrical bonding</td>
<td>Not available</td>
</tr>
<tr>
<td>Ω-CL</td>
<td>Static dissipative cover and lining without electrical bonding</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Part Numbers for Pharmaline N and X Hose Assemblies

If required, a Pharmaline N or X Hose Assembly can be defined by an individual Part Number, made up of 5 entries as below:

1. **Hose Size**
   - \( \frac{3}{4} \)" : 04
   - \( \frac{3}{8} \)" : 06
   - \( \frac{1}{2} \)" : 08
   - \( \frac{5}{8} \)" : 10
   - \( \frac{3}{4} \)" : 12
   - 1" : 16
   - 1\( \frac{1}{4} \)" : 20
   - 1\( \frac{1}{2} \)" : 24
   - 2" : 32
   - 2\( \frac{1}{2} \)" : 40
   - 3" : 48

2. **Hose Type**
   - Pharmaline N GP (Natural PTFE Liner) : PHAN GP
   - Pharmaline N AS (Antistatic PTFE Liner) : PHAN AS
   - Pharmaline X GP (Natural PTFE Liner) : PHAX GP
   - Pharmaline X AS (Antistatic PTFE Liner) : PHAX AS

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. **Assembled End Fitting Description**
   * All Components in Stainless Steel
   - JIC Female : 02
   - Fixed Male Pipe, NPT Thread : 03
   - Fixed Female Pipe, NPT Thread : 06
   - JIC-to-NPT Male Union : 08
   - JIC-to-Female Union : 08F
   - Straight Sanitary Tri Clamp, 50.5mm, 1.984" Diameter
     - 22mm, 0.870" Exit Diameter (Standard) : 10
     - 34.9mm, 1.370" Exit Diameter (Step Up) : 10/S
   - Straight Mini Sanitary Tri Clamp, 0.984" Diameter
     - 0.370" Exit Diameter (Standard) : 11
     - 0.625" 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 Adapter : 32
   - Tube Adapter with Nut and Ferrule : 32/FN

5. **Notes**
   - **For Flange only**: Add ‘/ZP’ for Carbon Steel Zinc Plated
     Add ‘/EC’ for Epoxy Coated
   - **Elbows**: Add ‘/90°’ for Non-Lined 90° elbows

**Additional Requirements**:
- Any additional requirements which are not included in the Part Number must be written out in full in the Order, including any special labelling or colour coding.
- When purchasing Triclavers/Sanitary Fittings please specify the surface finish required.

**Example**:
A \( \frac{3}{4} \)" bore Pharmaline N Hose Assembly with an Antistatic PTFE Liner:
End (1) - a \( \frac{3}{4} \)" ANSI 150# Swivel Flange
End (2) - a 90° Elbow Sanitary Triclamp
and a Length of - 2.35 metres

**Hose Assembly Part No.** = 12 - PHAN AS - 2.35m - 12 - 10/90

**Entry No.**
1 2 3 4 5
Pharmaline N and X Hose Liners

Pharmaline N GP - General Purpose Liner

Pharmaline X GP - General Purpose Liner

Pharmaline N AS - Anti-Static PTFE Liner

Pharmaline X AS - Anti-Static PTFE Liner

Purpose

Pharmaline N or X GP hose 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’).

Materials & Specifications

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 covers 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 22.

Both the Braid and Helix wires are high tensile Grade 316L Stainless Steel.

Alternative colours for the silicone rubber cover are only available for Bioflex Ultra SI grade hose, to special order.

EC = Electrically Continuous, also referred to as ‘Electrically Bonded’

EC grade hose assemblies are 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 16643, when tested in accordance with EN ISO 8031, which requires that the resistance between end fittings shall be <10Ω ohms per assembly. For hose assemblies which meet this requirement a Grade ‘M’ marking is applied in accordance with EN 16643.

Pharmaline N hose assemblies are normally EC, and Pharmaline X are not EC, but if EC or not EC is a specific requirement for either hose, it must be stated on the enquiry/order.

Pharmaline N AS - Anti-Static PTFE Liner

Pharmaline X AS - Anti-Static PTFE Liner

Purpose

Pharmaline N or X 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 10⁻⁶ S/m (Siemens per Metre), or 10⁴ 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.

Materials & Specifications

Pharmaline N and X AS Grade hose has a black 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 22.

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 and meet the Antistatic requirements of EN 16643. 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 10¹ to 10⁶ ohms per assembly. For hose assemblies which meet these requirements an appropriate Grade ‘Ω’ marking is applied in accordance with EN 16643.

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.
End Fitting Specifications
- ANSI, also ASME B16.5 Class 150# and 300#, previously ASA 150 and 300
- DIN PN10, PN16 and PN40*
- JIS 10K
- Other Pressure Ratings and Flange Specifications are also available.
  *DIN PN10, PN16 and PN40 Flanges all have the same dimensions, and so are fully interchangeable

Temperature and Pressure Ratings
- ANSI 150# = 16 Bar (230 psi), ANSI 300# = 41.4 Bar (600 psi)
- DIN PN10 = 10 Bar (145 psi), DIN PN16 = 16 Bar (230 psi), DIN PN40 = 40 Bar (580 psi)

End Fitting Materials
- Flanges normally in Grade 304 SS = EN 1.4301
- Flange Retainers in Grade 316 SS = EN 1.4404
- Ferrules, most in Grade 304 SS; some sizes in Grade 316 SS

Alternative Options for Flange Component only:
- Zinc Plated Carbon Steel
- Grade 316 SS

Surface Finish:
- All surface finishes are to ASME BPE-SF-O
- If a specified finish on a particular surface is required, please state on the enquiry and order.

End Fitting Specifications

<table>
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<th>*Fitting Length A ASA150</th>
<th>Flared Diameter D ASA150</th>
<th>Fitting Inside Diameter I ASA150</th>
<th>Weight of Fitting</th>
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† 3A - Clean out of place (COP) only

End Fitting Specifications

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<th>Flared Diameter D PN10/16</th>
<th>Fitting Inside Diameter I PN10/16</th>
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<tr>
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</table>

† 3A - Clean out of place (COP) only
Pharmaline N and X Female Cam & Groove Fittings and Male Cam & Groove Fittings

End Fitting Specifications
- Generally in accordance with A-A-59326 (replaces MIL-C-27487) and EN14420-1 (replaces DIN 2828), and all are fully interchangeable.

Temperature and Pressure Ratings
- When used with a Buna N Gasket all sizes up to 16 Bar (230 psi) and up to a maximum temperature of 65°C (149°F).
- When used with FEP, Fluoro Rubber or other encapsulated gaskets all sizes up to 10 Bar (145 psi) and up to a maximum temperature of 204°C (400°F).

End Fitting Materials
- Spigot in Grade 316L SS = EN 1.4404
- Body in Grade 316C SS = EN 1.4408
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS
- Standard Gasket is Buna N (Nitrile) Rubber.
- FEP encapsulated Silicone Rubber Gaskets also available.

Surface Finish:
- All surface finishes are to ASME BPE-SF-O
  (No finish required).
- If a specified finish on a particular surface is required, please state on the enquiry and order.

Swivelling, Locking Arm Female Cam and Groove Fittings - Non-Lined

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>Fitting Length A</th>
<th>Cam Sleeve Inside Diameter D</th>
<th>Fitting Inside Diameter</th>
<th>Weight of Fitting</th>
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<tr>
<td>in</td>
<td>in</td>
<td>in</td>
<td>in</td>
<td>Kg</td>
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<tr>
<td>3/4</td>
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<td>1.26</td>
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<td>1.81</td>
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<td>46.0</td>
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</tr>
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<td>1.76</td>
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<td></td>
<td></td>
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<td>1.48</td>
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<td>3.01</td>
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Non-Lined Cam & Groove Male Fitting

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<th>Weight of Fitting</th>
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<td>in</td>
<td>in</td>
<td>in</td>
<td>in</td>
<td>Kg</td>
</tr>
<tr>
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<td>2.44</td>
<td>0.62</td>
</tr>
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<td></td>
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<td>75.0</td>
<td>0.72</td>
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<td>85.0</td>
<td>1.10</td>
</tr>
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<td>110.0</td>
<td>1.10</td>
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<td>75.8</td>
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<td>80</td>
<td>3.600</td>
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<td></td>
<td></td>
<td>91.5</td>
<td>120.8</td>
<td>1.79</td>
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Pharmaline N and X Sanitary & Mini-Sanitary Triclover Fittings

Introduction
There are many different specifications, dimensions and surface finishes for triclamp fittings. Triclovers are covered by various standards, the most widely used are in the tables displayed below. However most standards can be supplied if given the information below. Triclovers can be supplied as 3A.

- Flange diameter D and Outlet diameter I
- Hose size if known, or Aflex can recommend a hose size to suit
- The internal Surface Finish, Standard if known.

Standards
- DIN 32676 SERIES A
- DIN 37676 SERIES B (ISO 1127)
- DIN 32676 SERIES C (ASME BPE)

Temperature and Pressure Ratings
- Pressures up to 16 Bar (230 psi)
- Temperatures up to 120°C (250°F) with EPDM Gaskets
- Temperatures up to 180°C (356°F) with PTFE, Silicone or Viton Gaskets
- Higher Pressures and Temperatures with Special Clamps and Gaskets.

End Fitting Materials
- Fittings in AISI 316L = EN 1.4404 = BS 316 S11
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS
- Fittings in 1.4435 (316L)
- Fittings in 1.4571, Hastelloy, Monel, PVDF and other materials to special order

Internal Surface Finish Specifications
- ASME BPE SF3 (mechanical polish, not electropolished)
  Surface Finish, Maximum reading: <0.76µm Ra = <30µ in. Ra
- ASME BPE SF4 (mechanical polish and electropolished)
  Surface Finish, Maximum reading: <0.375µm Ra = <15µ in. Ra
  (SF4 is the highest level of surface finish specified in ASME BPE, and the standard, stocked fittings listed are all to this finish).
- DIN 32676 H4 (mechanical polish, not electropolished)
  Surface Finish, Average reading: <0.4µm Ra = <16µ in. RA
  If the standard SF4 finish is not acceptable, H4 must be requested on the enquiry/order.

<table>
<thead>
<tr>
<th>DIN 32676 SERIES A (DIN)</th>
<th>Nominal Hose Size</th>
<th>Flange Diameter D</th>
<th>Outlet Diameter I</th>
<th>*Fitting Length A</th>
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<td>in</td>
<td>METRIC DN</td>
<td>in</td>
<td>mm</td>
<td>in</td>
</tr>
<tr>
<td>¼</td>
<td>6</td>
<td>0.984</td>
<td>25.0</td>
<td>0.236</td>
</tr>
<tr>
<td>⅜</td>
<td>8</td>
<td>0.984</td>
<td>25.0</td>
<td>0.315</td>
</tr>
<tr>
<td>½</td>
<td>10</td>
<td>1.339</td>
<td>34</td>
<td>0.394</td>
</tr>
<tr>
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<td>15</td>
<td>1.339</td>
<td>34</td>
<td>0.630</td>
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<tr>
<td>¾</td>
<td>20</td>
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<td>0.787</td>
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<td>25</td>
<td>1.988</td>
<td>50.5</td>
<td>1.024</td>
</tr>
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<td>⅔</td>
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<tr>
<td>¾</td>
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<td>64</td>
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<td>91</td>
<td>2.598</td>
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<td>3</td>
<td>80</td>
<td>4.173</td>
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<td>3.189</td>
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<table>
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<th>Outlet Diameter I</th>
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<td>in</td>
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<td>in</td>
<td>mm</td>
<td>in</td>
</tr>
<tr>
<td>¼</td>
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<td>25.0</td>
<td>0.276</td>
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<td>25.0</td>
<td>0.406</td>
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<td>1.988</td>
<td>50.5</td>
<td>0.551</td>
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<td>0.713</td>
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<tr>
<td>¾</td>
<td>26.9</td>
<td>1.988</td>
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<td>0.933</td>
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<td>1.512</td>
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<td>¾</td>
<td>48.3</td>
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<td>91</td>
<td>2.839</td>
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<td>⅔</td>
<td>88.9</td>
<td>4.173</td>
<td>106</td>
<td>3.319</td>
</tr>
</tbody>
</table>

ASME BPE (DIN 32676 SERIES C)

| in | in | mm | mm | in | mm | mm |
| ¼ | 0.984 | 25.0 | 0.180 | 4.57 | 1.299 | 33 |
| ⅜ | 0.984 | 25.0 | 0.305 | 7.75 | 1.654 | 42 |
| ½ | 0.984 | 25.0 | 0.370 | 9.4 | 1.732 | 44 |
| ⅜ | 0.984 | 25.0 | 0.620 | 15.75 | 1.969 | 50 |
| ¾ | 1.988 | 50.5 | 0.870 | 22.1 | 2.283 | 58 |
| 1 ½| 1.988 | 50.5 | 1.370 | 34.8 | 2.638 | 67 |
| 2 | 2.520 | 64 | 1.870 | 47.5 | 3.071 | 78 |
| 2 ½| 3.051 | 77.5 | 2.370 | 60.2 | 2.795 | 71 |
| 3 | 3.583 | 91 | 2.870 | 72.9 | 3.169 | 80.5 |

3A Sanitary Fitting

Mini-Sanitary Triclamp Fittings

Sanitary Triclamp Fittings

13
Pharmaline N and X Sanitary Triclover Fittings - 90° Elbow

End Fitting Specifications
- BS4825 Pt 3
- ASME-BPE-a
- Others to Special Order

End Fitting Materials
- Fittings in Grade AISI 316L = EN 1.4404 = BS 316 S11
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS

Surface Finish:
- The internal surface is to ASME BPE-SF-3 (<0.76 µm Ra, not electropolished).
- If a specified finish on a particular surface is required, please state on the enquiry and order.

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.

Temperature and Pressure Ratings
- Pressures up to 16 Bar (230 psi)
- Temperatures up to 120˚C (250˚F) with EPDM Gaskets
- Temperatures up to 180˚C (356˚F) with PTFE, Silicone or Viton Gaskets
- Higher Pressures and Temperatures with Special Clamps and Gaskets.

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>Centre Line to Fitting End A</th>
<th>Centre Line to Face B</th>
<th>Flange Diameter D</th>
<th>Outlet Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>in</td>
<td>mm</td>
<td>in</td>
<td>mm</td>
<td>in</td>
</tr>
<tr>
<td>1/2</td>
<td>13</td>
<td>130.0</td>
<td>1.60</td>
<td>41.0</td>
<td>0.98</td>
</tr>
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<td>1.60</td>
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<td>25</td>
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<td>170.0</td>
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<td>50</td>
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<td>127.0</td>
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</table>
End Fitting Specifications

- BSPT Threads to British Standard Pipe Taper Thread design to BS21
  Alternatives: Parallel Threads, Metric Threads and Others.

Temperature and Pressure Ratings

- As for the relevant size of hose on Page 6.

End Fitting Materials

- Fittings in Grade 316L SS = EN 1.4404
- Ferrules, most in Grade 304 SS = EN 1.4301, some sizes in Grade 316L SS
- Available in other materials to special order

Surface Finish:
- All surface finishes are to ASME BPE-SF-O (No finish required).
- If a specified finish on a particular surface is required, please state on the enquiry and order.

Fixed Male NPT or BSPT

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>NPT or BSPT Thread Size</th>
<th>Fitting Length A</th>
<th>Fitting Inside Diameter I</th>
<th>Weight of Fitting</th>
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<td>in mm</td>
<td>in mm</td>
<td>in mm</td>
<td>Kg Lbs</td>
</tr>
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<td>2.40 61</td>
<td>0.37 9.40</td>
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Fixed Female NPT

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<th>Nominal Hose Size</th>
<th>NPT Thread Size</th>
<th>Fitting Length A</th>
<th>Fitting Inside Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in mm</td>
<td>in mm</td>
<td>in mm</td>
<td>in mm</td>
<td>Kg Lbs</td>
</tr>
<tr>
<td>1/2</td>
<td>13</td>
<td>1/2</td>
<td>2.40 61</td>
<td>0.37 9.40</td>
</tr>
<tr>
<td>3/4</td>
<td>20</td>
<td>3/4</td>
<td>2.52 64</td>
<td>0.62 15.75</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>1</td>
<td>3.23 82</td>
<td>0.85 21.50</td>
</tr>
<tr>
<td>1 1/2</td>
<td>40</td>
<td>1 1/2</td>
<td>3.62 92</td>
<td>1.25 31.75</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>2</td>
<td>4.13 105</td>
<td>1.76 44.60</td>
</tr>
</tbody>
</table>
Pharmaline N and X BSP 60° Cone Seat Female Unions and BSP Flat Seat Lug Nut Female Fittings

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

Temperature and Pressure Ratings
- As for the relevant size of hose on Page 6.

End Fitting Materials
- Spigots in Grade 316L SS
- Nuts in Grade 316L SS
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS

Surface Finish:
- All surface finishes are to ASME BPE-SF-O (No finish required).
- If a specified finish on a particular surface is required, please state on the enquiry and order.

Alternatives:
- Lug Nuts can be supplied in Gun Metal (Bronze) if required.

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

BSP 60° Cone Seat Female Union Fitting

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>NPT or BSPP Thread Size</th>
<th>Fitting Length A</th>
<th>Fitting Inside Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in mm</td>
<td>in mm</td>
<td>in in mm</td>
<td>in in mm</td>
<td>Kg Kg Lbs</td>
</tr>
<tr>
<td>1/2 13</td>
<td>1/2</td>
<td>1.46 37</td>
<td>0.37 9.40</td>
<td>0.09 0.21</td>
</tr>
<tr>
<td>3/4 20</td>
<td>3/4</td>
<td>1.89 48</td>
<td>0.62 15.75</td>
<td>0.20 0.44</td>
</tr>
<tr>
<td>1 25</td>
<td>1</td>
<td>2.17 55</td>
<td>0.85 21.50</td>
<td>0.33 0.72</td>
</tr>
<tr>
<td>11/4 32</td>
<td>11/4</td>
<td>2.48 63</td>
<td>1.03 26.21</td>
<td>0.49 1.07</td>
</tr>
<tr>
<td>11/2 40</td>
<td>11/2</td>
<td>2.87 73</td>
<td>1.25 31.75</td>
<td>0.79 1.73</td>
</tr>
<tr>
<td>2 50</td>
<td>2</td>
<td>2.91 74</td>
<td>1.76 44.60</td>
<td>1.07 2.36</td>
</tr>
<tr>
<td>21/2 65</td>
<td>21/2</td>
<td>3.15 80</td>
<td>2.25 57.15</td>
<td>1.37 3.02</td>
</tr>
<tr>
<td>3 80</td>
<td>3</td>
<td>3.21 81.5</td>
<td>2.63 66.7</td>
<td>2.10 4.62</td>
</tr>
</tbody>
</table>

BSP Flat Face Lug Nut Female Fitting

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>BSPP Thread Size</th>
<th>Fitting Length A</th>
<th>Fitting Bore Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in mm</td>
<td>in mm</td>
<td>in in mm</td>
<td>in in mm</td>
<td>Kg Kg Lbs</td>
</tr>
<tr>
<td>1 25</td>
<td>1</td>
<td>2.67 68</td>
<td>0.85 21.50</td>
<td>0.23 0.51</td>
</tr>
<tr>
<td>11/2 40</td>
<td>11/2</td>
<td>3.94 100</td>
<td>1.25 31.75</td>
<td>0.55 1.21</td>
</tr>
<tr>
<td>2 50</td>
<td>2</td>
<td>4.33 110</td>
<td>1.75 44.60</td>
<td>0.77 1.69</td>
</tr>
</tbody>
</table>
Pharmaline N and X 37° JIC Female Fittings and NPT Male & Female Unions

37° JIC Female Fitting

End Fitting Specifications
- SAE J514 37˚ Flare JIC Female Fitting
- 37° JIC Male-to-NPT Male/Female Adaptors
- NPT Threads to ANSI/AMSE B1.20.1

Temperature and Pressure Ratings
- As for the relevant size of Hose, on page 6.

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

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>37° JIC Thread Size</th>
<th>Fitting Length A</th>
<th>Hex Size H</th>
<th>Fitting Inner Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
<td>in</td>
<td>in</td>
<td>mm</td>
<td>Kg</td>
</tr>
<tr>
<td>1/2</td>
<td>13</td>
<td>13/4 - 16</td>
<td>1.57</td>
<td>0.88</td>
<td>0.37</td>
</tr>
<tr>
<td>3/4</td>
<td>20</td>
<td>11/16 - 12</td>
<td>1.89</td>
<td>1.25</td>
<td>0.62</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>1 3/4 - 12</td>
<td>2.28</td>
<td>1.50</td>
<td>0.85</td>
</tr>
<tr>
<td>11/2</td>
<td>40</td>
<td>17/8 - 12</td>
<td>2.72</td>
<td>2.25</td>
<td>1.25</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>2 1/2 - 12</td>
<td>3.27</td>
<td>2.88</td>
<td>1.76</td>
</tr>
</tbody>
</table>

JIC to NPT Male Union (including a JIC Male to NPT Male Adaptor)

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>Male Union Length A1</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
<td>Kg</td>
</tr>
<tr>
<td>1/2</td>
<td>13</td>
<td>0.17</td>
</tr>
<tr>
<td>3/4</td>
<td>20</td>
<td>0.34</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>0.64</td>
</tr>
</tbody>
</table>

JIC to NPT Female Union (including a JIC Male to NPT Female Adaptor)

<table>
<thead>
<tr>
<th>Female Union Length A2</th>
<th>Fitting Inner Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
<td>Kg</td>
</tr>
<tr>
<td>3.07</td>
<td>78</td>
<td>0.17</td>
</tr>
<tr>
<td>3.78</td>
<td>96</td>
<td>0.34</td>
</tr>
<tr>
<td>4.17</td>
<td>106</td>
<td>0.64</td>
</tr>
</tbody>
</table>

End Fitting Materials
- Spigots in Grade 316L SS
- Nuts in 316L SS
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS

Alternatives:
- Available in other materials to special order

Surface Finish:
- All surface finishes are to ASME BPE-SF-O (No finish required).
- If a specified finish on a particular surface is required, please state on the enquiry and order.
Non-Lined Tube Adapter (Grooved Standpipe) Fitting

**End Fitting Specifications**
- Compatible with existing Industrial Standard Tube Fitting Components.

**Temperature &Pressure Ratings**
- As for the relevant size of hose on Page 6.

**End Fitting Materials**
- Fitting in grade 316L SS
- Ferrule (for hose attachment) in Grade 304 or 316L SS

**Alternatives:**
- can be supplied with matching Female nuts & Ferrules (clamping Ferrules) to suit.

**Surface Finish :**
- All surface finishes are to ASME BPE-SF-O (No finish required).
- If a specified finish on a particular surface is required, please state on the enquiry and order.

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>Fitting Length A</th>
<th>Diameter D</th>
<th>Fitting Inside Diameter I</th>
<th>Weight of Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
<td>in</td>
<td>mm</td>
<td>in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mm</td>
<td>mm</td>
<td>Kgs</td>
</tr>
<tr>
<td>3/4</td>
<td>20</td>
<td>2.48</td>
<td>63</td>
<td>3/4</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>2.87</td>
<td>73</td>
<td>1</td>
</tr>
</tbody>
</table>
Pharmaline N and X Dip Pipes, Straight or 90° Elbow

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 N 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
- Ferrules, most in Grade 304 SS, some sizes in Grade 316L SS

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

Maximum Working Pressures
Dip Pipes are normally only tested to 6 Bar Pressure, and are not suitable for use at pressures higher than 3 Bar. They are usable at negative pressure up to -0.9bar vacuum.
If higher pressure ratings are required, consult Aflex Hose.

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

<table>
<thead>
<tr>
<th>Nominal Hose Bore Size</th>
<th>Approximate Dip Pipe Dimensions</th>
<th>Outside Diameter D</th>
<th>Inside Diameter I</th>
</tr>
</thead>
<tbody>
<tr>
<td>in mm</td>
<td>in mm</td>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>3/4 20</td>
<td>0.87 22</td>
<td>0.51 13</td>
<td></td>
</tr>
<tr>
<td>1 25</td>
<td>1.14 29</td>
<td>0.83 21</td>
<td></td>
</tr>
<tr>
<td>1 1/2 40</td>
<td>1.54 39</td>
<td>1.00 27</td>
<td></td>
</tr>
<tr>
<td>2 50</td>
<td>2.17 55</td>
<td>1.58 40</td>
<td></td>
</tr>
</tbody>
</table>

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
**Pharmaline N and X Standard Labelling, Streamline Tagging and Colour Coding Systems**

**Standard Labelling**
All Pharmaline N and X hose assemblies are labelled with the following information:

- Manufacturer’s Name
  (Aflex Hose Ltd)
- Hose Type, Size and Grade
- EN16643 and Year of Standard Publication
- EN16643 Electrical Property Grade
- Max. Working Pressure and Test Pressure
- Working Temperature Range*
- Unique Serial Number
- Month & Year of Manufacture
- Aflex Hose Telephone Number
- CE Mark (if applicable)

*Note any restrictions on working pressure resulting from elevated temperatures.

This information is normally laser-etched on to a ferrule.

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

**Streamline Tagging**

A label and/or Colour Code is placed around the silicone cover of the hose and then encapsulated by a transparent silicone that is formed into a thin streamlined cover.

Note: 1/4" size, Colour Code only, no text.

**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.
Pharmaline N and X Hose: Special Usage Conditions

- **Cleaning & Sterilising Systems - CIP, SIP and Autoclave**
  CIP & SIP – PTFE liner tubes are chemically resistant to all CIP, SIP and Autoclave conditions. A primary consideration is whether the cleaning and purging cycle is likely to develop an electrostatic charge on the internal surface of the liner, in which case AS (Anti-Static) grade hose is required.
  AS grade hose and Electrostatic charge generating systems are fully described in the hose liner section.
  CIP systems using high electrical resistivity solvents like Toluene will require AS grade hose.
  Another electrostatic generation problem arises when wet steam is passed through, or when the cleaning fluids or WFI are purged out of the line using nitrogen, compressed air or another gas, because droplets of liquid or water in the gas then generate a multi-phase condition until they are cleared out, which will generate a static charge, and so will require AS grade hose.

- **Autoclave**
  Pharmaline N hose is able to withstand at least 300 x 30 minute autoclave cycles at relatively high autoclave temperatures (up to 135°C, 275°F).
  Please note that in robust applications the Silicone cover may become more susceptible to tearing after extended autoclave cycles. Consult Aflex Hose for more specific information.

- **PTFE Hose-Use with Alkali Metals, Halogens and certain Halogens containing Chemicals**
  PTFE hose liners react chemically with Fluorine, Chlorine Trifluoride and molten Alkali Metals and so no hose grades are suitable for use with these chemicals.
  When PTFE lined hose is used to carry Chlorine or Bromine, either as gasses or fluids, trace quantities can diffuse into and through the PTFE liner wall thickness. These will then combine with atmospheric moisture to corrode the SS braid or rubber cover outside the liner tube. It has been found that Corroflon SP, HB or KYB hose is best suited for these applications - Please consult the Corroflon brochure.
  Depending upon the internal pressures and temperatures, some other gasses and fluids with a high halogen content may also be transmitted in trace quantities through the wall of the PTFE tube, including Hydrogen Fluoride, Hydrogen Chloride, Carbonyl Chloride (Phosgene), Carbon Tetrachloride and others. Please consult with Aflex Hose for a suitable hose grade recommendation.

- **Other “Penetrating” Fluids and Gases**
  Sulphur Trioxide, Methyl Methacrylate, Caprolactam and Glacial Acetic Acid are some other chemicals which do not react chemically with the PTFE, but which can be absorbed and transmitted in trace quantities through the PTFE liner tube wall - please consult Aflex Hose for the optimum solution with these chemicals.
  Generally, however, as a hydrophobic (non-wetting) material, PTFE is very resistant to the absorption of chemicals. In some cases, PTFE has superior resistance to diffusion, for example to the diffusion of automotive fuels, in comparison with all other plastics and rubbers.

- **Gas/Fluid Cycling**
  There are some applications where fluids then gasses are passed through the hose, in a cyclic sequence.
  This is normally associated with changes in temperature and/or pressure. For complex reasons these conditions are extremely damaging to the hose liner, whatever material it is made from.
  For example, hoses are sometimes used to pass steam, water, steam etc into rubber moulding presses, in order to heat the mould, then rapidly cool it before reheating in the next cycle. Hoses of all types fail rapidly in such an application and PTFE lined hoses are no exception.
  Please contact Aflex Hose for further information if these conditions apply.

- **Connecting Assemblies for Use in Applications**
  The lengths of hose assemblies and their configuration in use when connected into the application must always be in accordance with the Hose Configuration information at the end of this product literature.
  When being connected for use in applications, the end fittings on hose assemblies must be connected to correct mating parts in the correct way, using the correct tools, spanners, clamps, nuts and bolts etc. The connections must be sufficiently tightened to ensure that the joint is leak free but not be over tightened as this can damage the sealing surfaces.
  In applications involving the transfer through the hose of expensive or dangerous fluids or gases, the hoses and connections must be pressure tested in situ before being put into service. This should be done with some harmless media to 1.5 times the maximum working pressure of the hose assembly, as stated in the product literature.
  If in doubt please contact Aflex Hose for advice.

- **Special Applications**
  Aflex Hose PTFE lined hose products are not rated as suitable for use in the following, special applications:
  - All Radioactive Applications involving high energy radiation, including Gamma radiation (degrades PTFE)
  - All Medical Implantation Applications.
  For Aerospace Applications, please contact Aflex for the appropriate hose choice.
Quality Assurance, Certification and Approvals, and Hose Testing

BS EN ISO 9001:2015
Aflex products are all manufactured in accordance with BS EN ISO 9001 Quality Management Systems independently assessed and registered by The British Standards Institution (BSI).

EN 16643:2016
Pharmaline N and X hose meets the requirements of EN 16643 (SC), which include the electrical and electrostatic requirements of hose assemblies.

ISO 45001:2018
Aflex Hose Ltd have been successfully assessed to the requirements of ISO 45001, by the British Standards Institution (BSI). By gaining this accreditation Aflex Hose Ltd are demonstrating our commitment to the health and safety of our employees by consistently identifying and controlling risks to health and safety, reducing the potential for accidents, complying to relevant legislation and improving overall awareness throughout the business.

ISO 14001:2015
Aflex Hose Ltd have been successfully assessed to the requirements of ISO 14001, by the British Standards Institution (BSI). By gaining this accreditation Aflex Hose Ltd are demonstrating our commitment to reducing our impact on the environment.

USP Class VI and ISO 10993-5, 6, 10 and 11 guidelines
The Natural and Antistatic PTFE Hose Liners and the Platinum Cured Silicone Rubber Covers have been independently tested in accordance with USP protocols and are found to conform to the requirements of USP Class VI Chapter <88>.
Natural and Antistatic PTFE Hose Liners now also meet the more stringent USP Class VI and ISO 10993-6,10 and 11 guidelines at 121°C (250°F) with a “no reaction” classification.
Natural and Antistatic PTFE Hose Liners and Platinum Cured Silicone Rubber Covers have also been tested in accordance with USP protocols and are found to conform to the requirements of USP Class VI <87>, the L929 MEM Elution Test and are considered non-cytotoxic.
Natural and Antistatic PTFE Hose Liners have now been further tested and have passed the more stringent USP Class VI and ISO 10993-5 guidelines at 121°C (250°F).

USP <661> Physicochemical Test for Plastics
Natural and Antistatic (Carbon filled) Pharmaline N and X Externally Convoluted Smoothbore PTFE hose has been tested in accordance with USP Physicochemical Test for Plastics and found to meet the criteria of the following reference: USP34, NF 29, 2011. Monograph <661> Containers, Physicochemical Test-Plastics.

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 62-02
Pharmaline N and X hose assemblies accredited to 3-A Sanitary Standards are identified within the product brochure. The Aflex Hose 3-A certificate is available to view on our website in the ‘certifications’ section.

BPSA leachables and extractables testing
Aflex Hose Natural and Antistatic PTFE Hose Liner Tube has been independently tested in accordance with BPSA recommendations, and found to be satisfactory.
Copies of the Test Report are available for specific assessments to be made.

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

CE Marking (Europe only)
Aflex has been assessed by The British Standards Institution (BSI) and found to comply with the Pressure Equipment Directive 2014/68/EU 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 2014/34/EU (Potentially Explosive Atmospheres)
Available for hose 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 Testing
Each assembly is pressure tested to 1.5 times maximum working pressure before despatch, and pressure test certificates can be supplied.

Fire Resistance to BS5173 Section 103.13 Part 6.2 and 6.3
Pharmaline N and X hose assemblies are ‘Fire Resistant’. If DSI-300 is added at both ends, the assemblies are upgraded to ‘Fireproof’.

Food Contact
Manufactured in compliance with Regulation (EC) No 1935/2004 - on materials and articles intended to come in to contact with food, Commission regulation (EU) No 10/2011 - relating to plastic materials and articles intended to come into contact with food and Regulation (EC) No 2023/2006 - on good manufacturing practise for materials and articles intended to come in to contact with food.
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

90° Elbow
End Fittings
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.

**INCORRECT** - Abrasion against hose

**CORRECT** - No hose abrasion

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:

**CORRECT** - Flexing movement takes place in 2 dimensions

**INCORRECT** - Flexing movement takes place in 3 dimensions so torque is applied
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.

Note: The bend radius is measured to the inside edge of the hose, For the minimum bend radius refer to page 6.
Conditions of Sale

DEFINITIONS

“Business Days” shall mean a day (other than Saturday or Sunday or public holiday) when the banks in London are open for business.

“Conditions” shall mean these terms and conditions for the sale of Goods or the supply of Services or both made by the Seller and the Customer.

“Contract” shall mean a binding contract for the sale of Goods and/or Services or both made by the Seller and the Customer.

“Customer” shall mean the individual or entity that is purchasing Goods and/or Services hereunder.

“Factored Products” shall mean products which are supplied by Seller, but are not manufactured by Seller, and are purchased by Seller from another supplier or manufacturer.

“Full Product Brochure” shall mean the brochure for each of Sellers specific Product available at http://www.aflex-hose.com/products-and-markets/.

“Goods” shall mean either the Products and/or the Factored Products.

“Losses” shall mean a) any direct and/or indirect, special or consequential loss or damage; b) loss of data or other equipment or property; or c) economic loss or damage; or d) incurring of liability for loss of damage of any nature whatsoever suffered by third parties (including in each case incidental and punitive damage); or e) any loss of actual; or anticipated profit, interest, revenue, anticipated savings or business disruption or goodwill.

“Products” shall mean those products which are manufactured by Seller and are described on the Seller’s website.

“Seller” shall mean Aflex Hose Limited.

“Services” means the services (if any) agreed to be supplied by the Seller to the Customer as detailed in the Order acknowledgment.

1. GENERAL

(a) These Conditions shall govern all Contracts between Seller and the Customer to the exclusion of all other terms and conditions including any terms or conditions which the Customer may purport to impose, apply or introduce under any document, communication, order or similar.

(b) A Customer shall place its order for the Goods or Services (or both) by completing the Seller’s standard purchase order form (the “Purchase Order”). Each Purchase Order shall be deemed to be an offer by the Customer to buy the Goods or Services (or both) of the Seller that are identified in the Purchase Order subject to these Conditions exclusively. The Purchase Order shall only be deemed to be accepted when the Seller issues to the Customer an order acknowledgment form which indicates acceptance of the Customer’s offer on these Conditions (“Order Acknowledgment”). A Contract between the Seller and the Customer shall come into existence at the time and on the date when the Seller delivers the relevant Goods and/or Services (or both) to the Customer.

(c) Delivery will be at Customers cost from Seller’s facilities Brighouse, West Yorkshire, England.

(d) Title in the Goods shall remain at all times with Seller until full payment in clear funds has been received.

(e) Risk of loss or damage in the Goods shall pass to the Customer upon delivery to the Customer or third party carrier.

(f) Delivery dates specified by Seller are only Seller’s best estimates and Seller’s only responsibility will be to use reasonable commercial efforts to meet all specified delivery dates. Unless otherwise agreed in writing, time is not of the essence.

2. CUSTOMER RESPONSIBILITIES AND OBLIGATIONS

(a) It is the Customer’s strict responsibility and sole liability to review all of the usage conditions and usage limitations given for the Seller’s Products. The usage conditions and usage limitations are as referred to in these Conditions and as further specified in the relevant Full Product Brochure. It will be the Customer’s sole responsibility to consult with and to familiarise itself with the latest, up to date Product information and Full Product Brochure at the time of ordering, which are only available and downloadable from the Sellers website at http://www.aflex-hose.com/products-and-markets/ or on request, in writing from Seller. The Customer hereby represents and warrants that it has read and understood the applicable Full Product Brochure and the usage conditions and the usage limitations set forth therein, and has ensured their compliance with the [intended use end] application conditions.

(b) If the Customer subsequently sells or assigns any Products to any other person or entity, the Customer shall ensure that the final end user of the Products is supplied with these Conditions of Sale, the applicable Full Product Brochures, the Seller’s 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 Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations. The Customer agrees and acknowledges that Seller shall have no responsibility or liability whatsoever for any claims arising in whole or in part out of the Customer selling or assigning the Products to a third party that does not use the Products in accordance with Sellers usage requirements and limitations.
all Hose Assemblies which are “ETH” (Electrical Trace Heated) Grade or are Factored Products are only warranted for 12 months. The sole liability of Seller and the Customer’s sole remedy for breach of warranty is as set out in clauses 5. a) and/or 5. b) below as applicable.

(f) SAVE AS PROVIDED FOR IN CLAUSE 4 c) (IF APPLICABLE) and/or 4 e) ANY “CONCESSION NOT TO TEST” IS OBTAINED FROM THE CUSTOMER, AND A LABEL IS ATTACHED TO HOSE ASSEMBLIES WHICH THE CUSTOMER SUPPLIES, AND IN SOME CASES IT IS NOT

7. UNTESTED HOSE ASSEMBLIES

Seller’s liability is limited to its Products which are assembled by approved SAC (e). The SAC agrees and acknowledges that it alone shall determine and approve the design suitability of the hose assembly for its intended use before supply and that, except as set forth in 6. B), shall indemnify and hold Seller fully harmless against all loss and damage, whether direct or indirect arising from Design Suitability for a SAC. This includes proceeding in accordance with 2. a) and 2. d) above.

(e) Seller’s liability is limited to its Products which are assembled by approved SAC if all the hose and fitting components were supplied by Seller or approved for use by Seller in writing, and they were assembled and tested in accordance with Seller’s current Manufacturing and Testing Instructions, available to approved SAC in an I-Bay on the Seller website.

7. UNTESTED HOSE ASSEMBLIES

Seller is sometimes requested by Customers to attach non-standard end fittings to hose assemblies which the Customer supplies, and in some cases it is not possible to do so to the Seller’s satisfaction. The term “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 Seller shall have no liability whatsoever if the Customer does not comply with the warning that requires pressure testing before use, and agrees to fully indemnify and hold Seller fully harmless from any liability arising from this situation.

8. FORCE MAJEURE

Seller 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 labour disputes, accidents to Seller’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, or restrictions, orders, or other conditions imposed by or under any applicable law or regulations thereof, including a force majeure event occurring in respect to one of Seller’s suppliers; or (b) any other cause beyond Seller’s control.

9. LIMITATIONS OF LIABILITY & EXCLUDED APPLICATIONS

(a) Seller’s Products and/or Factored Products have not been designed nor tested for use in aerospace, medical implantation or radioactive fields (“Excluded Applications”), and as such their use is therefore strictly prohibited. Customer agrees and acknowledges that it is aware of the limitations set forth in this clause 9. a), and hereby acknowledges and agrees that Seller shall have no liability whatsoever in the event Customer decides to unilaterally violate such prohibition by using Seller Products and/or Factored Products for such Excluded Applications. Customer hereby further agrees to indemnify Seller, its representatives and agents, and all representatives for any and all Claims and Losses arising out of Customer’s use of the Seller’s Products and/or Factored Products in such Excluded Applications.

(b) Seller will not accept liability for any failures of the Seller Products and/or Factored Products which are caused by Customer’s failure to perform and/or discharge their Responsibilities fully as specified in these Conditions.

(c) SAVE FOR: (i) DEATH OR PERSONAL INJURY CAUSED BY AN ACT OR OMISSION TO ACT OF SELLER; (II) FOR AN ACT OF FRAUD/ FRAUDULENT STATEMENT AND TO THE MAXIMUM EXTENT PERMITTED BY LAW AND NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY, OR PUNITIVE DAMAGES OR LOSSES, 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 ARISERS 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.

10. COMPLETION OF BULK HOSE ORDERS

Due to the nature of the production of PTFE hose, Seller reserves the right to call an order complete in the following situations. If a product is a standard Seller product ordered in Seller’s standard (inches) a figure of +/- 10% of the original order quantity can be supplied. If the product is a non-standard product and outside the Seller’s standard product range the figure of +/- 10% of the original order quantity can be supplied. Goods supplied within these parameters would render the order complete.

11. NOTICE PROVISIONS

Any written notice required to be provided to Seller shall be sent to the following address: Seller Limited, Spring Bank Industrial Estate, Watson Mill Lane, Soverby Bridge, Halifax, West Yorkshire, HX6 3BW.

12. EXCLUSION OF CONTRACTS FOR THE INTERNATIONAL SALE OF GOODS

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.

13. GOVERNING LAW, JURISDICTION

(a) 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.

(b) 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 before 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 object by any party to personal jurisdiction or the laying of venue or proceeding 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 process, service of process, or any other process of any kind whatsoever in any other jurisdiction, (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 13. B), requires the right to a jury trial, and that it voluntarily and knowingly waives those rights.
BIOFLEX ULTRA
CORROFLON
CORROLINE+
PHARMALINE N&X
SMOOTHBORE
HYPERLINE FX
VISIFLON