VISIFLON
Convoluted PTFE Lined Flexible Hose

TEMPERATURE RESISTANT
CHEMICAL RESISTANT
VERY FLEXIBLE
PTFE - THE OPTIMUM CHOICE FOR HOSE LININGS

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.

- **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.
VISIFLON (HYPERLINE V) HOSE GRADES

Visiflon was previously named Hyperline V - either name applies, but Visiflon is now the conventional name applied.

Visiflon includes a helically convoluted PTFE liner tube, and the tube is fully convoluted inside and out. (This is different to Hyperline FX tube, which is only convoluted on the outer surface).

This convoluted liner design makes the hose very flexible and very kink resistant across the size range.

### STANDARD GRADES AVAILABLE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiflon GP, TO</td>
<td>Natural PTFE Tube Only, No Braid.</td>
</tr>
<tr>
<td>Visiflon GP, AS, TO</td>
<td>Antistatic Black PTFE Tube Only, No Braid.</td>
</tr>
<tr>
<td>Visiflon GP, SS</td>
<td>Natural PTFE Tube external AISI 304 Stainless Steel Wire Braid.</td>
</tr>
<tr>
<td>Visiflon GP, AS, SS</td>
<td>Antistatic Black PTFE Tube, external AISI 304 Stainless Steel Wire Braid.</td>
</tr>
<tr>
<td>*Visiflon GP, PB</td>
<td>Natural PTFE Tube, Orange Polypropylene Yarn Braid.</td>
</tr>
<tr>
<td>*Visiflon GP, AS, PB</td>
<td>Antistatic Black PTFE Tube, Orange Polypropylene Yarn Braid.</td>
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</tbody>
</table>

### GRADE DESCRIPTIONS

**Antistatic PTFE Linings (AS Grade)**
When electrically resistive fluids like solvents and fuels, or multiphase mixtures are passed through natural PTFE hose at high flow rates, a static charge build up occurs on the inner wall of the PTFE liner, which eventually discharges to the nearest earth creating a leak path through the liner.

Antistatic PTFE includes a small quantity of a special carbon black which ensures safe static charge dissipation, in accordance with International Standards.

**Stainless Steel Wire Braid (SS Grades)**
The braid protects the PTFE liner tube against internal pressure and mechanical abuse.

**Polypropylene Yarn Braid (PB Grades)**
The braid is lighter in weight than SS braid, and any ends broken in service will not cut an operator’s hands. Operating Temperatures & Pressures, however are limited.

*Note: PB Grades are usually only available to special order.*
**VISIFLON HOSE: SPECIFICATIONS & PROPERTIES**

**SPECIFICATIONS FOR VISIFLON HOSE GRADES**

Specifications listed below are for non-AS Grades. For AS Grades the specifications are all the same, except that "AS" is added to the Grade Reference, and the Part Number reads "-110-" in place of "-100-".

<table>
<thead>
<tr>
<th>Nominal Hose Size</th>
<th>*Actual Hose Bore Size</th>
<th>Hose Grade</th>
<th>Outside Diameter of Tube or Braid</th>
<th>Minimum Bend Radius</th>
<th>Maximum Working Pressure (MWP)</th>
<th>Weight per Unit Length</th>
<th>Hose Part Number</th>
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<tr>
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<td>in</td>
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</tbody>
</table>

*Visiflon Hose assemblies require that the convolutions at the ends of the hose are opened out to accept either Hydraulic or PTFE Tail end fittings (see page 7).

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

**PROPERTIES**

**Temperatures and Pressures**

*Visiflon TO Grades* - The MWP listed above applies up to a maximum temperature of 100°C (212°F).

*Visiflon SS Grades* - The MWP listed above should be reduced by 1% for each 1°C above 130°C up to a maximum of 230°C (1% for each 1.8°F above 266°F up to a maximum of 450°F).

*Visiflon PB Grades* - The MWP listed should be reduced by 5% for each 1°C above 80°C up to a maximum of 100°C (5% for each1.8°F above 176°F to 212°F).

**Vacuum Resistance**

Visiflon SS Grades are vacuum resistant to -0.9 bar up to 130°C (266°F).
Visiflon TO and PB Grades are vacuum resistant to -0.9 bar up to 80°C (176°F).

**Flow Rates**

The internal convolutions restrict flow rates due to turbulent flow, and may also cause a whistling noise when gases are passed through. For any applications where this may be a problem, the alternative Aflex Hose products Hyperline FX or Corroline\(+\) would provide a solution.
SUPPLY OPTIONS

Visiflon hose can either be supplied as made up and crimped hose assemblies, or as loose hose for customers to assemble themselves, using ferrules supplied by Aflex Hose, and either standard hydraulic end fittings or PTFE Tail end fittings.

Loose Hose

Visiflon hose can be supplied loose, in coils or on wooden reels if required, for Customers to assemble themselves.

For self-assembly, Customers must purchase not only the hose, but also the ferrules from Aflex Hose. If PTFE Tail design fittings are used, these must also be supplied by Aflex Hose, but hydraulic fittings are generally available.

Assembly must be carried out in accordance with the Instructions (page 7), and assemblers should be trained by Aflex Hose staff.

Assemblies

Aflex Hose can supply fully assembled Visiflon hose assemblies, with crimped ends.

A wide variety of End Fittings are available in Grade 316L Stainless Steel and Zinc Plated Mild Steel, including:

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

Note: stainless steel and carbon steel hydraulic tail end fittings and carbon steel PTFE tail end fittings do not always have a fine machined surface through the bore, and so are not suitable for certain specialised or hygienic applications which require a smooth bore. In such applications, stainless steel PTFE tail end fittings should be used.
ASSEMBLY INSTRUCTIONS

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

2. Assemble the correct ferrules (see list) on to the hose ends.

3. Open the hose bore, by screwing in then pulling out the correct Visiflon Opening Tool (Manual or Motorised). For hydraulic fittings, use the basic tool. For PTFE tail fittings, add the correct collar to the tool.

4. Insert the end fitting, then push the ferrule fully over the hose up to the end fitting.

5. Crimp the ferrule to the correct diameter as given in Aflex Document AS-42 for Hydraulic Inserts, or AS-VI-01 for PTFE Tail Inserts. These are available on an I-Bay system - apply to Aflex Hose for access codes. Check using a Vernier or Micrometer.

6. Pressure test the assembly with air or water to 1.5 x listed Maximum Working Pressure before use in application.

PART NUMBERS FOR VISIFLON HOSE FERRULES (GP OR GP, AS GRADE LINER)

<table>
<thead>
<tr>
<th>Visiflon Hose Size &amp; Grade</th>
<th>PTFE Tail</th>
<th>Hydraulic Tail</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Mild Steel</td>
<td>Stainless Steel</td>
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<tr>
<td></td>
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<td>01-120-06-06-02</td>
</tr>
<tr>
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<td>X</td>
<td>01-180-06-06-02</td>
</tr>
<tr>
<td>3/4&quot; GP, SS</td>
<td>01-120-08-08-04</td>
<td>01-120-08-08-02</td>
</tr>
<tr>
<td>1/2&quot; GP, PB</td>
<td>01-150-08-08-04</td>
<td>01-180-08-08-02</td>
</tr>
<tr>
<td>5/8&quot; GP, SS</td>
<td>X</td>
<td>01-180-10-10-02</td>
</tr>
<tr>
<td>3/4&quot; GP, SS</td>
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<td>1&quot; GP, PB</td>
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<td>1 1/4&quot; GP, PB</td>
<td>X</td>
<td>01-155-20-02-02</td>
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</table>

Note: X = This ferrule is not currently available.
PTFE Hose-Use with Alkali Metals, Halogens and Halogen containing Chemicals

PTFE hose liners react chemically with Fluorine, Chlorine Trifluoride and molten Alkali Metals. When PTFE lined hose is used to carry Chlorine or Bromine, either as gasses or fluids, they will diffuse into and through the PTFE liner wall thickness. Trace quantities will then combine with atmospheric moisture to corrode any braid/rubber outer coverings. Heavily halogenated chemicals, like Hydrogen Fluoride, Hydrogen Chloride, Phosgene (Carbonyl Chloride) Carbon Tetrachloride and other organic chemicals with a high halogen content can also be absorbed and transmitted through the PTFE liner tube.

Other “Penetrating” Fluids and Gases

Sulphur Trioxide, Methyl Methacrylate, Caprolactam and Glacial Acetic Acid are some other chemicals which can be absorbed and transmitted through the PTFE liner tube wall.

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 the fluid passing through the hose turns into a gas, then back into a fluid, then into a gas etc, in a cyclic sequence.

This is normally associated with changes in temperature and/or pressure. For complex reasons these conditions are extremely damaging to the hose liner, whatever material it is made from.

For example, hoses are sometimes used to pass steam, water, steam etc into rubber moulding presses, in order to heat the mould, then rapidly cool it before reheating in the next cycle. Hoses of all types fail rapidly in such an application and PTFE lined 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 in to 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.
**Visiflon Hose** and  
Quality Assurance, Certification and Approvals

**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).

**IATF16949:2016**
Aflex Hose Ltd manufactures PTFE flexible hose for the automotive industry in accordance with IATF16949 and is assessed and certified by The British Standards Institution (BSI).

**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.

**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.

**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.

**Automotive Fuel Hose - SAE J1737**
Tested and approved for automotive fuel hose use in accordance with SAE J1737.

**CE Marking (Europe only)**
Aflex has been assessed by 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 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.

**HOSE CONFIGURATION & LENGTH CALCULATIONS - FOR BEND RADIUS**
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

INCORRECT - Abrasion inside support

CORRECT - No abrasion over support

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 (342)
= 1/4 x 2 x 3.142 x 342 = 537mm

Length of top, Straight Section, including the top end fitting length
= 600 - 342 = 258mm

Length of bottom end fitting
= 58mm

Total length of Hose Assembly = 537 + 258 + 58 = 853mm

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 5.
 These terms and conditions of sale (these “Terms”) are the general terms of condition which govern the sale of the Goods ("Goods") by Aflex Hose to the Customer. Notwithstanding anything to the contrary, if a written contract signed by both parties is in existence covering the sale of the Goods covered hereby, the terms and conditions of that contract shall NOT prevail to the extent they are inconsistent with these Terms. The accompanying confirmation of sale (“Order Confirmation”) and these Terms comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. These Terms prevail over any of Customer’s general terms and conditions of purchase regardless of whether or when Customer has submitted its purchase order (“Order”) or such terms. Fulfillment of an Order does not constitute acceptance of any of Customer’s terms and conditions and does not serve to modify or amend these Terms. Materialed different or additional terms contained in an Order are rejected and not binding on Aflex Hose unless accepted in writing by Aflex Hose. Orders must be sent to Aflex Hose’s designated address and are valid only after receipt of an Order Confirmation by Aflex Hose.

Payment. The price, taxes, and charges as stated on the Order Confirmation and/or invoice shall be paid before shipment or according to Customer’s account credit limit and payment terms established with Aflex Hose. Payment terms are typically 100% Net 30 for standard products. Custom Goods orders may be subject to milestone payment terms, as defined by Aflex Hose at time of Order Confirmation. Unless otherwise agreed to in writing, delivery will be [F.O.B.] Aflex Hose’s facilities in Pipersville, Pennsylvania. Title and all risks of loss or damage pass to the Customer upon delivery to the Customer or third party carrier. Ship 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.

Returns. Returns are only authorized by express consent of Aflex Hose and in accordance with Aflex Hose’s return process and policy. Each return must be accompanied with a Return Material Authorization number and, to ensure the safety of Aflex Hose’s employees and to minimize environmental risks, Aflex Hose will require a Certificate of Decontamination or other documentation prior to authorizing the return.

Taxes and Assessments. Prices quoted exclude assessments, sales, use, value added or excise taxes, freight, duties, imports, and other charges which are the sole liability of Customer. If Customer asserts no sales tax is due, Customer shall furnish, a tax exemption certificate for the jurisdiction where the sale deemed is made, prior to Aflex Hose accepting the Order from Customer.

Delivery. Title, Shipment, and Risk or Loss. Date of delivery requested in the Order may be modified by the Acknowledgment or by occurrence of a Force Majeure event. Risk of loss passes on delivery Ex Works. Unless otherwise stated in writing by Customer: (i) Aflex Hose may select packing, shipment, routing and carrier; (ii) goods will be packaged according to industry standards and special packaging or designated carriers will be subject to additional charges; (iii) Customer shall inspect goods within 10 days of receipt; Any claim for quality or shortages must be made in writing within ten (10) days after Customer receives a shipment, and if not made, shall be deemed waived. If Customer wrongfully fails to accept a shipment after placing an order, Customer shall be deemed in default of these Terms and the goods may be held at Customer’s expense in a third party facility and disposed per applicable law without prejudice to Aflex Hose’s remedies. Customer shall bear all risk of and responsibility for damage or loss to the Goods after Aflex Hose delivers the Goods to the carrier at its point of shipment. Customer agrees to provide and maintain adequate insurance for the equipment supplied under the Order to fully protect Aflex Hose’s interest during the time between delivery and final payment. Loss or damage by fire or other causes during such period shall not relieve Customer from its obligations under the Order.

Security Interest. As collateral security for the payment of the purchase price of the Goods, Customer hereby grants Aflex Hose a lien on and security interest in and to all of the right, title and interest of Customer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest. Customer agrees Aflex Hose may record its interest on public records evidencing such interest of Aflex Hose. Customer shall, on request of Aflex Hose, execute any instrument required to perfect, maintain or enforce such security interest. Aflex Hose shall release such security interest upon payment of the purchase price in full by the Customer.

Postponement and Cancellation. No Order shall be cancelled by the Customer except with Aflex Hose’s prior consent in writing. In the event of Aflex Hose agreeing to the Customer cancelling all or any part of the Order, Aflex Hose may, without prejudice to any other rights against the Customer which it may have, require the Customer to pay a cancellation charge. Any cancellation charge which will correspond to the type of contract being cancelled and will be notified to the Customer within 7 days of its request for cancellation. Contracts for specialized or tailored Goods may be subject to a cancellation charge of 100% of the price of the Order after the Confirmation has been sent. Aflex Hose may terminate an Order with immediate effect upon written notice to Customer, if Customer: (i) fails to pay any amount when due under an Order and such failure continues for 7 days after Customer’s receipt of written notice of nonpayment; (ii) has not otherwise performed or complied with any of these Terms, in whole or in part; or (iii) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

Customer Responsibilities and Obligations. 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 shall include the terms and conditions of sale set forth herein, and in the Aflex Hose Products' specifications, 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 shall include the terms and conditions of sale set forth herein, and in the Aflex Hose Products' specifications.

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.
CONDITIONS OF SALE CONTINUED

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 thePTFE 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 15.

(16) The Customer accepts that Aflex Hose are not expert in the technical features which apply to Factored Products and their use in application. Aflex Hose will pass on to the Customer all the written information which they have regarding the Factored Product, but the Customer shall be responsible for ensuring that this and any other necessary Factored Product information is obtained and is reviewed which is sufficient to ensure that the Factored Product is fit for purpose in the intended usage application. If any application requirements apply which are not fully covered by the information which the Customer can obtain, then the Customer undertakes not to use or supply the Factored Product for, use in such a way. The Customer is absolutely liable for ensuring that the Factored Product will not be subjected to levels of usual or accidental physical abuse in service which would cause the Factored Product to fail. 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 16.

(17) 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.

(18) It is not possible to guarantee a minimum service life for any of the Aflex Hose Products or Factored Products which can be applicable for every type of application. The 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

(19) It is the responsibility of the Self Assembly Customer during his own testing of the finished Hose Assembly to ensure that 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 20 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 21.

(20) In the event of a Factored Product failure, the Customer shall advise Aflex Hose written notification within 48 hours of discovering the fault. The failed product shall not be tampered with or de-constructed in any way, but shall be decontaminated as required to render it fully safe and free from harmful substances and held awaiting advice concerning its disposition from Aflex Hose. Full details concerning the application, the time in use in the application and a full description of the type of failure shall be supplied to Aflex Hose, who shall pass this information on to the supplier or manufacturer of the Factored Product for advice concerning the appropriate course of action. The Customer will then be advised as to the disposition of the failed product.

(21) 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.

(22) In the event of an Aflex Hose product failure during the applicable warranty period set forth in Section 21, 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. Aflex Hose shall advise the Customer before supply full details in writing of the application condition(s) 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 shall then be advised as to the disposition of the failed product.

(23) 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. The Maximum Working Pressure (MWP) of the hose assembly is specified in the relevant Full Product Brochure. For hose products with a safety factor of 3.0 the hydrostatic pressure should be 1.5 times MWP. For hose product with a safety factor of 4.0 the hydrostatic pressure should be 2.0 times MWP. The safety factor is noted within the Full Product Brochure. Hydrostatic testing is conducted before supply for end use, to validate both the hose and the end fitting attachment.

(24) 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.

(25) 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 (13) and Section (14) above.
CONDITIONS OF SALE

(29) 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

(30) 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

(31) 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, cessation or restrictions, change in requirements, 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.

LIMITATIONS OF LIABILITY

(32) Aflex Hose Products and Factored 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 32 and hereby agrees that Aflex Hose shall not have any liability whatsoever in the event Customer uses Aflex Hose Products and Factored Products for aerospace, medical implantation or radioactive applications.

(33) Aflex Hose will not accept liability for any failures of the Aflex Hose Products and Factored Products which are caused by Customers failing to perform their Responsibilities as specified in these Conditions of Sale.

(34) NOTWITHSTANDING ANYTHING TO THE CONTRARY HEREIN, IN NO EVENT SHALL APLEX 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). IN ANY EVENT, NOTWITHSTANDING THE FOREGOING EXCLUSIONS, APLEX HOSE’S AGGREGATE TOTAL LIABILITY TO CUSTOMER UNDER AN ORDER SHALL NOT EXCEED THE ORDER PRICE. 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.

COMPLETION OF BULK HOSE ORDERS

(35) Due to the nature of the production of PTFE hose, Aflex Hose reserves the right to call an order complete in the following situations. If a product is a standard Aflex product (as listed in Aflex product brochures) a figure of +/- 10% of the original order quantity can be supplied. Goods supplied within these parameters would render the order complete.

OTHER

(36) Notice Provisions. Any written notice required to be provided to Aflex Hose shall be sent to the following address: Aflex Hose USA LLC 32 Appletree Lane, Piperville, Pennsylvania, PA 18094.
by Aflex Hose arising out of in connection with any breach of the Customer’s obligations contained in this Article. The Customer agrees to provide Aflex Hose with any information Aflex Hose reasonably requires concerning the destination and use of the Goods, to allow Aflex Hose to comply in full with any relevant export legislation.

(41) **Instructions and Health and Safety at Work**

(i) The Customer shall observe strictly the provisions of Aflex Hose’s instructions in writing regarding use and application of the Goods together with any revisions thereof and shall ensure that any person other than the Customer who acquires or has access to the Goods is furnished with and observes such instructions.

(ii) The Customer shall be solely responsible for and shall keep Aflex Hose indemnified against all Losses incurred by Aflex Hose in relation to any use of the Goods other than in strict accordance with Aflex Hose’s installation, operating, and maintenance instructions.

(42) **Governing law; Jurisdiction.** These Conditions of Sale and all rights, duties and obligations hereunder, including any and all other Customer agreements and orders shall be governed by Pennsylvania law without regard to its conflicts of laws principles. 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 state courts located in Bucks County, Pennsylvania or in the Federal District Court located in the Eastern District of Pennsylvania. 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 the Commonwealth of Pennsylvania, (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 42, including the right to trial by jury, and that it voluntarily and knowingly waives those rights.

(43) **Exclusion of CISG.** 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.
BIOFLEX ULTRA
CORROFLON
CORROLINE+
PHARMALINE N&X
SMOOTHBORE
HYPERLINE FX
VISIFLON

UK
Spring Bank Industrial Estate
Watson Mill Lane
Sowerby Bridge
Halifax
West Yorkshire, HX6 3BW
Tel:  +44 (0) 1422 317200
Fax:  +44 (0) 1422 836000

USA
32 Appletree Lane
Pipersville
Bucks County
Pa 18947
Tel:  215 - 766 - 1455
Fax:  215 - 766 - 1688

WWW.AFLEX-HOSE.COM