



## PTFE lined, flexible hoses for the automotive industry

Excellent chemical resistance

Wide temperature range

Highly flexible

Kink resistant

High flow

Long life



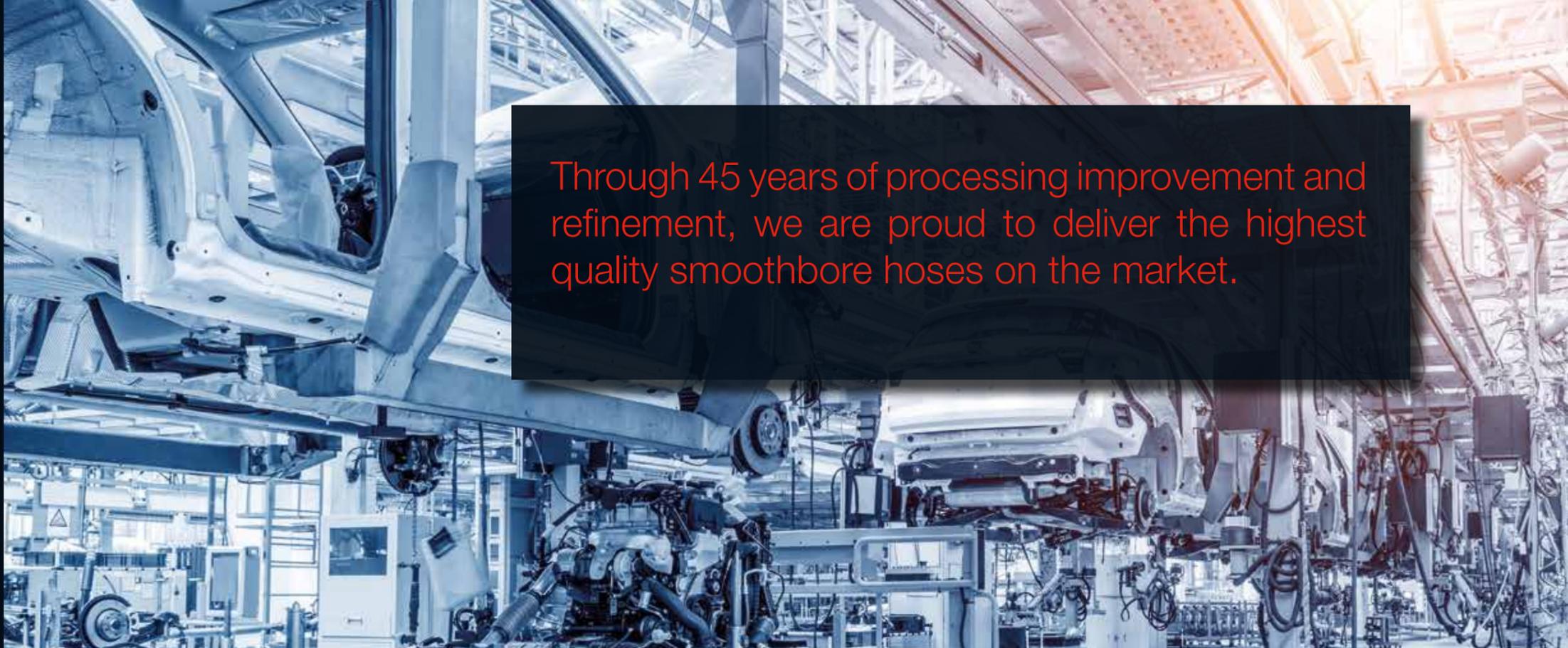


# THE WORLD'S LEADING MANUFACTURER OF PTFE LINED FLEXIBLE HOSE

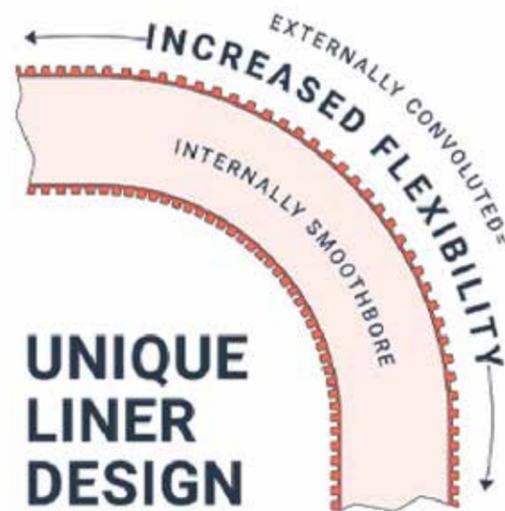
For more than 45 years, we have been producing the most technically advanced range of PTFE lined flexible hose products in the world.

From our headquarters in the UK, we design, develop and manufacture our hoses from raw materials to finished products. This comprehensive approach gives us an unrivalled ability to meet specific needs.

As part of Watson-Marlow Fluid Technology Solutions, our quality products are backed by a global network of specialist engineers. We partner with our customers who have standardised on our hose products as the most reliable choice for their fluid transfer applications.



Through 45 years of processing improvement and refinement, we are proud to deliver the highest quality smoothbore hoses on the market.



## ULTRA-LOW PERMEATION OPTIONS AVAILABLE

Aflex Hose products are created through a combination of expert engineering and material knowledge.

Lined with Polytetrafluoroethylene (PTFE), our hoses offer excellent chemical resistance and can withstand temperatures up to 260 °C. Their structure provides a smooth bore allowing for a fast, laminar flow. Thermally forming a spiral convolution on the external surface of the PTFE liner dramatically improves flexibility and permeation rate (Hyperline FX), whilst adding a 316SS helical wire, wound directly into the route of the convolution adds kink resistance (Hyperline KR). PTFE is proven to outperform rubber, silicone and alternative plastic hoses and tubes in similar applications. Hoses are constructed without the use of adhesives, eliminating the risk of contamination and delamination of layers.

- Highly flexible and kink resistant
- Available with either natural or anti-static patented PTFE liner
- Industry leading 24 month warranty
- No adhesives in hose manufacture, eliminates the risk of contamination
- Up to 32mm bore and hose lengths of up to 200 metres

**24**  
Month  
MANUFACTURER'S  
GUARANTEE

IATF 16949:2016  
ISO 9001:2015  
ISO 14001:2015  
ISO 45001:2018  
EN 9100:2018  
SAE J1737

**-0.9 Bar**  
USABLE AT  
VACUUM FOR  
All sizes

**PTFE**  
will outperform  
RUBBER  
SILICONE  
STAINLESS STEEL

# Hyperline KR

## Hyperline KR sets the standard for PTFE lined hose solutions for automotive applications.

- The ultimate flexible solution
- Internally smooth for fast laminar flow and system efficiency
- Externally convoluted for a high degree of flexibility
- Helically wound 316 stainless steel wire for added kink and usable at vacuum up to -0.9 bar
- Resistant to temperatures from -150 °C to 260 °C



### Hyperline KR construction

#### Design variations

Liner: AS or natural (ASTM D4895)

Braids: SS (304 or 316) / aramid (tracer options available)

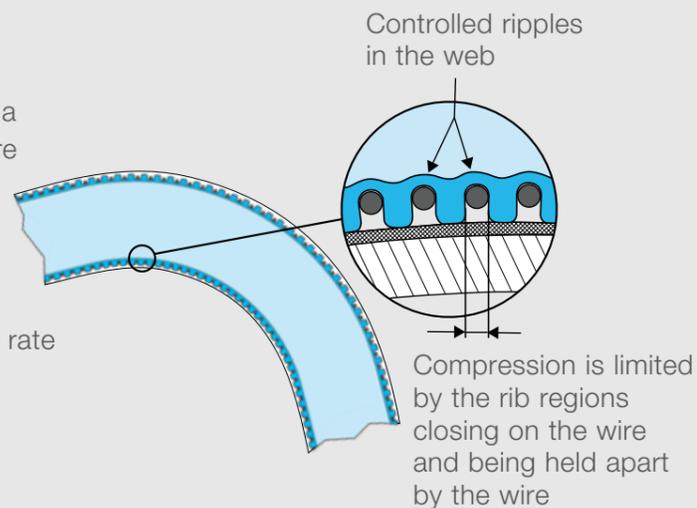
Covers: All options available (See braids and covers section)



### Aflex Hose unique PTFE liner

The patented design of the PTFE liner used in Hyperline KR allows the liner to expand around the outside and compress around the inside of a bend. This helps to retain a smooth circular bore throughout the hose, without distortion.

- Natural or anti-static options
- No entrapment zones
- Minimal turbulence allows for increased flow rate
- Excellent internal cleanability
- Longer service life



# Hyperline KR

| Hose bore size |           | Actual bore size |               | **Hose construction | Outside diameter of tube or braid |               | Minimum bend radius |    | Maximum working pressure |      | Burst pressure |      | Weight per unit length |       | *Part number       |
|----------------|-----------|------------------|---------------|---------------------|-----------------------------------|---------------|---------------------|----|--------------------------|------|----------------|------|------------------------|-------|--------------------|
| in             | dash size | in               | mm            |                     | in                                | mm            | in                  | mm | bar                      | psi  | bar            | psi  | kg/m                   | lb/ft |                    |
| 3/8            | 6         | 0.381 - 0.407    | 9.69 - 10.34  | TO                  | 0.475 - 0.511                     | 12.06 - 12.98 | 1 3/8               | 35 | 10                       | 145  | 30             | 435  | 0.06                   | 0.04  | 86-100-06          |
|                |           | 0.376 - 0.406    | 9.55 - 10.32  | SS                  | 0.502 - 0.542                     | 12.75 - 13.77 | 3/4                 | 19 | 140                      | 2030 | 420            | 6091 | 0.14                   | 0.09  | 86-100-06-01-01    |
|                |           | 0.376 - 0.406    | 9.55 - 10.32  | AM                  | 0.515 - 0.555                     | 13.08 - 14.10 | 3/4                 | 19 | 140                      | 2030 | 420            | 6091 | 0.10                   | 0.15  | 86-100-06-01-55-01 |
| 1/2            | 8         | 0.518 - 0.544    | 13.17 - 13.83 | TO                  | 0.624 - 0.674                     | 15.87 - 17.13 | 1 5/8               | 42 | 10                       | 145  | 30             | 435  | 0.15                   | 0.10  | 86-100-08          |
|                |           | 0.502 - 0.529    | 12.77 - 13.43 | SS                  | 0.672 - 0.714                     | 17.07 - 18.13 | 1 1/2               | 28 | 122                      | 1769 | 367            | 5322 | 0.29                   | 0.19  | 86-100-08-01-01    |
|                |           | 0.506 - 0.533    | 12.87 - 13.53 | AM                  | 0.668 - 0.718                     | 16.97 - 18.23 | 1 1/2               | 28 | 122                      | 1769 | 367            | 5322 | 0.18                   | 0.12  | 86-100-08-55-01    |
| 5/8            | 10        | 0.644 - 0.670    | 16.37 - 17.03 | TO                  | 0.766 - 0.816                     | 19.47 - 20.73 | 1 3/4               | 45 | 10                       | 145  | 30             | 435  | 0.17                   | 0.11  | 86-100-10          |
|                |           | 0.629 - 0.655    | 15.97 - 16.63 | SS                  | 0.826 - 0.867                     | 20.97 - 22.03 | 1 1/4               | 32 | 113                      | 1638 | 341            | 4945 | 0.35                   | 0.23  | 86-100-10-01-01    |
|                |           | 0.644 - 0.670    | 16.37 - 17.03 | AM                  | 0.826 - 0.875                     | 20.97 - 22.23 | 1 1/4               | 32 | 113                      | 1638 | 341            | 4945 | 0.26                   | 0.17  | 86-100-10-55-01    |
| 3/4            | 12        | 0.774 - 0.804    | 19.67 - 20.43 | TO                  | 0.904 - 0.958                     | 22.97 - 24.33 | 2 1/8               | 53 | 10                       | 145  | 30             | 435  | 0.20                   | 0.13  | 86-100-12          |
|                |           | 0.751 - 0.785    | 19.07 - 19.93 | SS                  | 0.956 - 1.005                     | 24.27 - 25.53 | 1 1/2               | 35 | 105                      | 1522 | 315            | 4568 | 0.40                   | 0.27  | 86-100-12-01-01    |
|                |           | 0.774 - 0.804    | 19.67 - 20.43 | AM                  | 0.963 - 1.017                     | 24.47 - 25.83 | 1 1/2               | 35 | 105                      | 1522 | 315            | 4568 | 0.31                   | 0.20  | 86-100-12-55-01    |
| 7/8            | 14        | 0.861 - 0.891    | 21.87 - 22.63 | TO                  | 1.006 - 1.060                     | 25.57 - 26.93 | 2 1/2               | 63 | 10                       | 145  | 30             | 435  | 0.34                   | 0.23  | 86-100-14          |
|                |           | 0.853 - 0.887    | 21.67 - 22.53 | SS                  | 1.066 - 1.115                     | 27.07 - 28.33 | 1 5/8               | 40 | 96                       | 1392 | 288            | 4177 | 0.60                   | 0.40  | 86-100-14-01-01    |
|                |           | 0.861 - 0.891    | 21.87 - 22.63 | AM                  | 1.066 - 1.119                     | 27.07 - 28.43 | 1 5/8               | 40 | 96                       | 1392 | 288            | 4177 | 0.41                   | 0.27  | 86-100-14-55-011   |
| 1              | 16        | 1.026 - 1.046    | 26.07 - 26.57 | TO                  | 1.187 - 1.241                     | 30.17 - 31.53 | 3                   | 77 | 10                       | 145  | 30             | 435  | 0.36                   | 0.24  | 86-100-16          |
|                |           | 1.003 - 1.036    | 25.47 - 26.33 | SS                  | 1.231 - 1.273                     | 31.27 - 32.33 | 2                   | 50 | 87                       | 1261 | 262            | 3799 | 0.63                   | 0.42  | 86-100-16-01-01    |
|                |           | 1.015 - 1.041    | 25.77 - 26.43 | AM                  | 1.247 - 1.300                     | 31.67 - 33.03 | 2                   | 50 | 87                       | 1261 | 262            | 3799 | 0.50                   | 0.33  | 86-100-16-55-01    |
| 1 1/4          | 20        | 1.282 - 1.312    | 32.57 - 33.33 | TO                  | 1.471 - 1.525                     | 37.37 - 38.73 | 3 7/8               | 98 | 10                       | 145  | 30             | 435  | 0.45                   | 0.30  | 86-100-20          |
|                |           | 1.270 - 1.304    | 32.27 - 33.13 | SS                  | 1.530 - 1.580                     | 38.87 - 40.13 | 2 7/8               | 70 | 78                       | 1131 | 236            | 3422 | 0.85                   | 0.57  | 86-100-20-01-01    |
|                |           | 1.267 - 1.300    | 32.17 - 33.02 | AM                  | 1.519 - 1.568                     | 38.57 - 39.83 | 2 7/8               | 70 | 78                       | 1131 | 236            | 3422 | 0.74                   | 0.50  | 86-100-20-01-55-01 |

\* For anti-static grade, add 10 to the 3-digit part number e.g. 86-100- becomes 86-110.

\*\*Hose construction - (TO) tube only, (SS) stainless steel, (AM) aramid.

The performance testing results stated in the above table have been carried out at ambient temperature, in a controlled laboratory environment, using water as the media. We recommend that the customer carries out stringent application performance testing on the hose, using the actual working conditions over a set period of time to validate the hose.

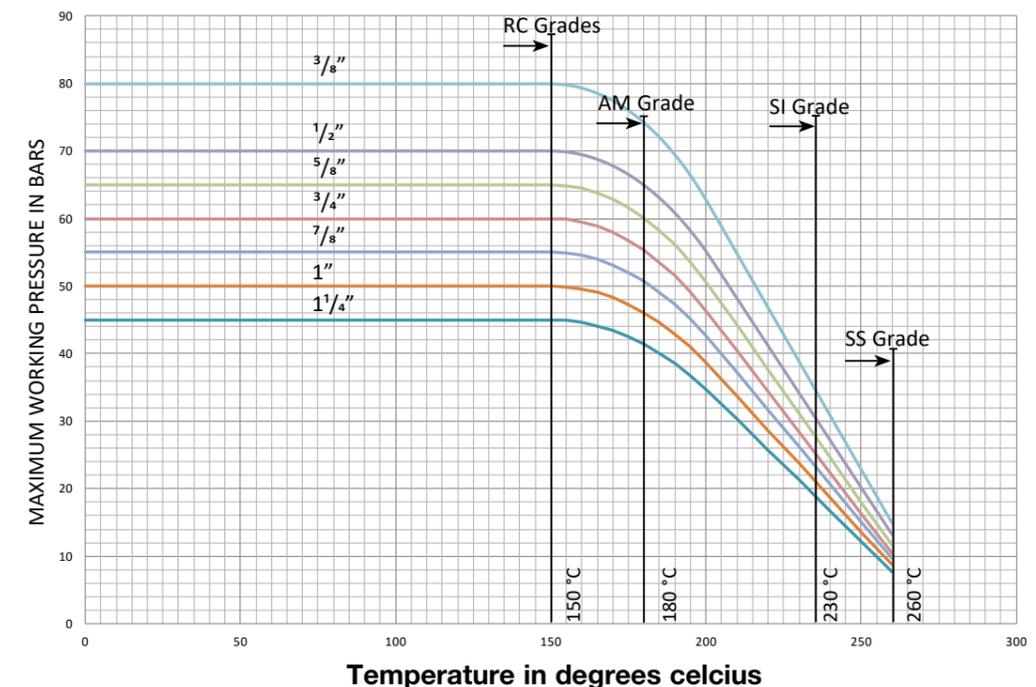
### Temperature vs pressure

Due to its extremely strong construction, Hyperline KR has outstanding resistance to temperature and pressure, much higher than that of conventional convoluted PTFE lined hose.

### Maximum working pressure (MWP) variation with temperature

Temperature and pressure limitations for the various sizes and specification variations of Hyperline KR is depicted on the graph.

### Temperature and maximum working pressure graph for Hyperline KR



# Hyperline FX

Hyperline FX hose consists of a smooth internal bore to eliminate turbulent flow and external convolutions to provide excellent flexibility.

- Excellent flow rates
- Non-stick internal surface
- Resistant to temperatures from -150 °C to 260 °C
- Usable at vacuum up to -0.9bar
- Thermally formed liner reduces diffusion rates



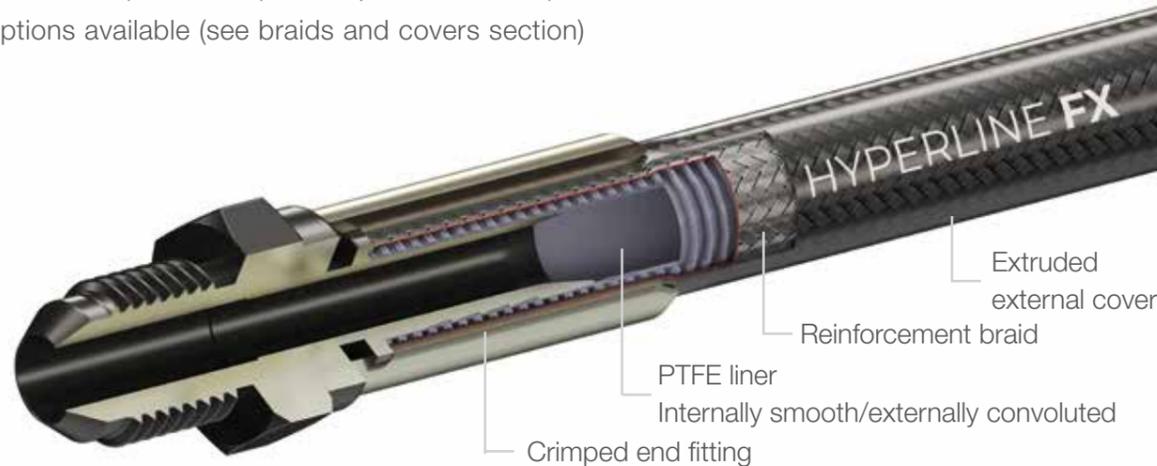
## Hyperline FX construction

### Design variations

Liner: AS or natural (ASTM D4895)

Braids: SS (304 or 316) / aramid (tracer options available) / PPS

Covers: All options available (see braids and covers section)



## The Hyperline range - PTFE lined hose engineered for efficiency

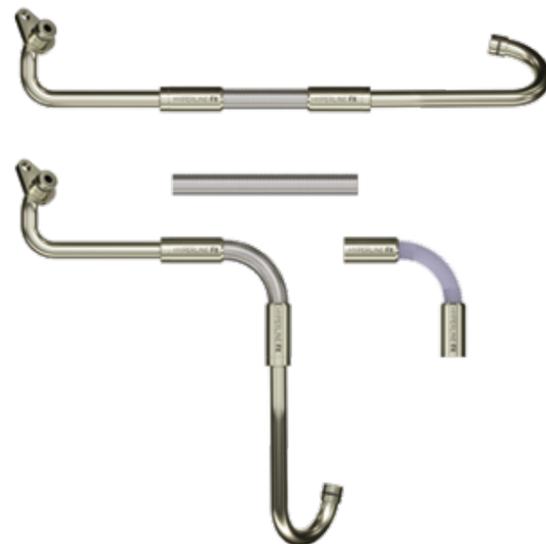
### Smooth bore for fluid system efficiency

All liners within the Hyperline range have a smooth internal bore. PTFE possesses low friction properties and creates the perfect conditions to maximise media flow rates and efficiency within a variety of systems.

### Unique liner design to maximise routing efficiency

With increased flexibility, much tighter minimum bend radius (MBR) and kink resistance, Hyperline KR and FX have allowed automotive design engineers to reduce their application footprint by routing pipework through the most efficient path without compromising on performance.

The length of flexible section (live length) can be shortened to achieve the same degree of flexibility, further reducing the overall cost of the assembly.



# Hyperline FX

| Hose bore size | dash size | Actual bore size |               | **Hose construction | Outside diameter of tube or braid |               | Minimum bend radius |     | Maximum working pressure |      | Burst pressure |      | Weight per unit length |       | *Part number       |
|----------------|-----------|------------------|---------------|---------------------|-----------------------------------|---------------|---------------------|-----|--------------------------|------|----------------|------|------------------------|-------|--------------------|
|                |           | in               | mm            |                     | in                                | mm            | in                  | mm  | bar                      | psi  | bar            | psi  | kg/m                   | lb/ft |                    |
| ¼              | 4         | 0.252 - 0.278    | 6.39 - 7.06   | TO                  | 0.326 - 0.368                     | 8.28 - 9.35   | 1 ½                 | 38  | 6                        | 87   | 18             | 261  | 0.041                  | 0.027 | 92-100-04          |
|                |           | 0.250 - 0.280    | 6.34 - 7.12   | SS                  | 0.355 - 0.395                     | 9.02 - 10.04  | ¾                   | 19  | 110                      | 1595 | 330            | 4786 | 0.092                  | 0.062 | 92-100-04-01-02    |
|                |           | 0.250 - 0.280    | 6.35 - 7.12   | AM                  | 0.360 - 0.400                     | 9.14 - 10.16  | 1 ½                 | 38  | 77                       | 1116 | 231            | 3350 | 0.056                  | 0.038 | 92-100-04-01-55-01 |
| ⅜              | 5         | 0.308 - 0.333    | 7.84 - 8.46   | TO                  | 0.382 - 0.424                     | 9.72 - 10.77  | 1 ½                 | 38  | 6                        | 87   | 18             | 261  | 0.056                  | 0.037 | 92-100-05          |
|                |           | 0.302 - 0.328    | 7.66 - 8.33   | SS                  | 0.424 - 0.458                     | 10.77 - 11.63 | ¾                   | 19  | 105                      | 1522 | 315            | 4569 | 0.126                  | 0.084 | 92-100-05-01-02    |
|                |           | 0.290 - 0.320    | 7.36 - 8.13   | AM                  | 0.440 - 0.480                     | 11.17 - 12.19 | 1 ½                 | 38  | 74                       | 1073 | 222            | 3220 | 0.075                  | 0.050 | 92-100-05-01-55-01 |
| ½              | 6         | 0.381 - 0.407    | 9.69 - 10.34  | TO                  | 0.475 - 0.511                     | 12.06 - 12.98 | 2                   | 50  | 6                        | 87   | 18             | 261  | 0.070                  | 0.047 | 92-100-06          |
|                |           | 0.376 - 0.406    | 9.54 - 10.32  | SS                  | 0.502 - 0.542                     | 12.75 - 13.64 | 1                   | 25  | 100                      | 1450 | 300            | 4351 | 0.160                  | 0.151 | 92-100-06-01-02    |
|                |           | 0.376 - 0.406    | 9.55 - 10.32  | AM                  | 0.515 - 0.555                     | 13.08 - 14.10 | 2                   | 50  | 70                       | 1015 | 210            | 3046 | 0.100                  | 0.094 | 92-100-06-01-55-01 |
| ¾              | 8         | 0.525 - 0.550    | 13.33 - 13.97 | TO                  | 0.620 - 0.668                     | 15.77 - 16.97 | 3                   | 76  | 6                        | 87   | 18             | 261  | 0.110                  | 0.074 | 92-100-08          |
|                |           | 0.515 - 0.545    | 13.07 - 13.85 | SS                  | 0.655 - 0.695                     | 16.64 - 17.66 | 1 ½                 | 38  | 75                       | 1087 | 225            | 3263 | 0.225                  | 0.151 | 92-100-08-01-02    |
|                |           | 0.515 - 0.545    | 13.08 - 13.85 | AM                  | 0.655 - 0.695                     | 16.64 - 17.66 | 3                   | 76  | 52                       | 754  | 156            | 2263 | 0.140                  | 0.094 | 92-100-08-01-55-01 |
| 1              | 10        | 0.639 - 0.665    | 16.25 - 16.89 | TO                  | 0.770 - 0.811                     | 19.55 - 20.60 | 4                   | 100 | 6                        | 87   | 18             | 261  | 0.161                  | 0.108 | 92-100-10          |
|                |           | 0.635 - 0.665    | 16.12 - 16.89 | SS                  | 0.810 - 0.850                     | 20.57 - 21.59 | 2                   | 50  | 62                       | 899  | 186            | 2698 | 0.336                  | 0.226 | 92-100-10-01-02    |
|                |           | 0.635 - 0.665    | 16.13 - 16.89 | AM                  | 0.815 - 0.855                     | 20.70 - 21.72 | 4                   | 100 | 44                       | 638  | 132            | 1915 | 0.204                  | 0.137 | 92-100-10-01-55-01 |
| 1 ¼            | 12        | 0.765 - 0.795    | 19.42 - 20.20 | TO                  | 0.895 - 0.941                     | 22.73 - 23.90 | 5                   | 126 | 6                        | 87   | 18             | 261  | 0.179                  | 0.120 | 92-100-12          |
|                |           | 0.760 - 0.790    | 19.30 - 20.07 | SS                  | 0.950 - 0.990                     | 24.13 - 25.15 | 2 ½                 | 63  | 52                       | 754  | 156            | 2263 | 0.383                  | 0.257 | 92-100-12-01-02    |
|                |           | 0.760 - 0.790    | 19.30 - 20.07 | AM                  | 0.946 - 0.986                     | 24.03 - 25.05 | 5                   | 126 | 36                       | 522  | 108            | 1566 | 0.236                  | 0.158 | 92-100-12-01-55-01 |
| 1 ½            | 16        | 1.015 - 1.045    | 25.77 - 26.55 | TO                  | 1.165 - 1.215                     | 29.58 - 30.86 | 6                   | 150 | 6                        | 87   | 18             | 261  | 0.268                  | 0.180 | 92-100-16          |
|                |           | 1.005 - 1.035    | 25.52 - 26.29 | SS                  | 1.227 - 1.269                     | 31.15 - 32.23 | 3                   | 75  | 50                       | 725  | 150            | 2176 | 0.540                  | 0.362 | 92-100-16-01-02    |
|                |           | 1.005 - 1.035    | 25.52 - 26.29 | AM                  | 1.233 - 1.273                     | 31.32 - 32.34 | 6                   | 150 | 35                       | 507  | 105            | 1523 | 0.354                  | 0.237 | 92-100-16-01-55-01 |

\*For anti-static grade, add 10 to the 3-digit part number e.g. 92-100- becomes 92-110.

\*\*Hose construction - (TO) tube only, (SS) stainless steel, (AM) aramid.

The performance testing results stated in the above table have been carried out at ambient temperature, in a controlled laboratory environment, using water as the media. We recommend that the customer carries out stringent application performance testing on the hose, using the actual working conditions over a set period of time to validate the hose.

### Temperatures and pressures

Hyperline FX, SS grades - The MWP listed above should be reduced by 1% for each 1 °C above 160 °C (1% for each 1.8 °F above 320 °F) up to a maximum of 260 °C (500 °F).

Hyperline FX, AM Grades - The MWP listed above should be reduced by 1% for each 1 °C above 130 °C (1% for each 1.8 °F above 266 °F) up to a maximum of 180 °C (356 °F).

MWP listed are calculated on the basis of a 3:1 safety factor relative to the burst pressure, so burst pressure = 3 x MWP. If MWP is required based on a 4:1 safety factor (e.g. EN 16643 requirement), multiply the listed value by 0.75.

### Vacuum resistance

Hyperline FX, SS grades are usable at vacuum up to -0.9bar up to 150 °C (300 °F).

### Excellent flow rates

Compared with conventional convoluted hose designs, Hyperline FX has excellent flow rates due to the smooth bore, which prevents the turbulent fluid flow which occurs in convoluted hose products.

### Reduced diffusion rates

Hyperline FX is much more resistant to diffusion of liquids or gases than other PTFE hose products, due to its highly compressed, non-porous PTFE matrix. Hyperline FX has been successfully tested to SAE J1737 for resistance to automotive fuel diffusion.

### Non-stick internal surface

Hyperline FX hose has a smooth bore, non-stick liner which is effectively self-cleaning, and which resists material build-up inside the hose which may cause bore constriction.

# Hyperline SB

Hyperline SB consists of a PTFE liner that has smooth internal and external surfaces.

- Smooth internal and external surfaces
- High pressure solutions
- High quality extrusion
- Exceptionally tight tolerances
- Ultra high pressure and low permeation liner options available upon request



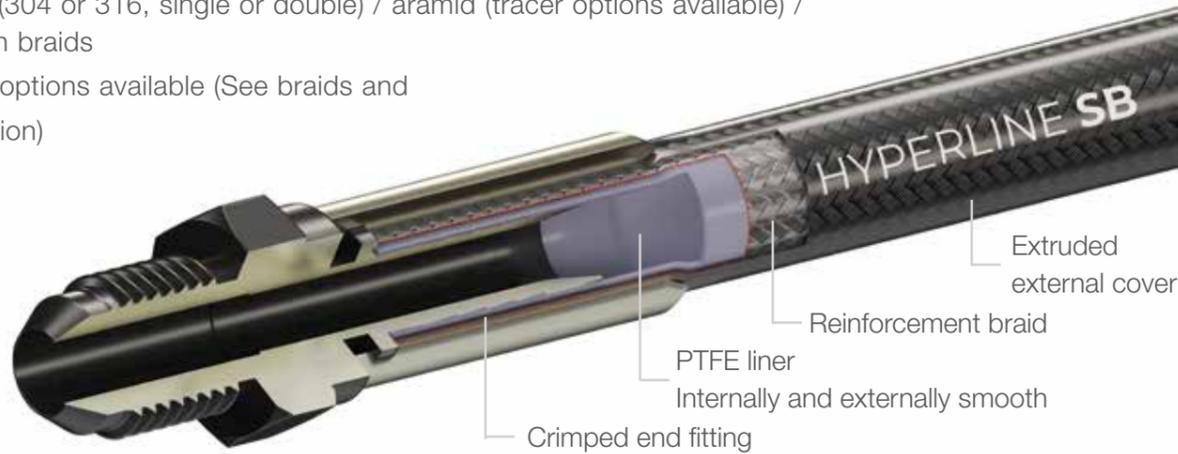
## Hyperline SB construction

### Design variations

Liner: AS or natural (ASTM D4895)

Braids: SS (304 or 316, single or double) / aramid (tracer options available) / combination braids

Covers: All options available (See braids and covers section)



## High pressure Smoothbore hose grades

There are many different applications for PTFE lined Smoothbore hose which are subjected to high pressures in service, and each application has its own individual set of requirements.

Aflex Hose is able to provide different specifications for high pressure hoses that are custom designed for particular applications or testing procedures where pressures exceed 100 Bar (1500 psi) for gases, or the listed maximum pressures for fluids.

**Aramid fibre braid** - A black Aramid fibre named “Technora”, which is a high technology fibre, with tensile, abrasion and temperature properties significantly better than the older Aramid products like Kevlar.

**Stainless steel braid** - Braided from AISI grade 304 stainless steel wire, bright hard drawn to a minimum 1700 N/mm<sup>2</sup> tensile strength. The braiding process is closely controlled to ensure even tensions and the correct braid angle, to give minimum expansion/contraction under pressure.

The custom design will include the size, wall thickness and quality of the PTFE tube and the precise design of the braid, all optimised for the particular application. Please consult Aflex Hose for further advice.

# Hyperline SB

| Hose bore size |               | Actual bore size |               | PTFE tube wall thickness |      | Outside diameter of the stainless steel braid |               | Minimum bend radius |     | Working pressure (MWP) |      | Weight per unit length |       | *Part number     |
|----------------|---------------|------------------|---------------|--------------------------|------|---|---------------|---------------------|-----|------------------------|------|------------------------|-------|------------------|
| in             | Dash size     | in               | mm            | in                       | mm   | in  | mm            | in                  | mm  | Bar                    | Psi  | kg/m                   | lb/ft |                  |
| 1/16 BB        | 2             | 0.068 - 0.091    | 1.75 - 2.31   | 0.04                     | 1.02 | 0.191 - 0.208                                 | 4.87 - 5.29   | 1/2                 | 13  | 450                    | 6500 | 0.045                  | 0.030 | 70-300-02-01-02  |
| 7/64           | 2.5           | 0.096 - 0.114    | 2.44 - 2.90   | 0.04                     | 1.02 | 0.209 - 0.229                                 | 5.31 - 5.82   | 3/8                 | 17  | 375                    | 5438 | 0.059                  | 0.040 | 70-310-025-01-02 |
| 1/8"           | 3 (MW 3 Ends) | 0.113 - 0.131    | 2.87 - 3.33   | 0.027                    | 0.68 | 0.203 - 0.226                                 | 5.17 - 5.73   | 3/4                 | 20  | 280                    | 4061 | 0.050                  | 0.033 | 70-331-03-01-02  |
| 1/8"           | 3 (HW 3 Ends) | 0.130 - 0.146    | 3.30 - 3.71   | 0.0375                   | 0.95 | 0.241 - 0.260                                 | 6.14 - 6.61   | 3/4                 | 20  | 290                    | 4206 | 0.060                  | 0.040 | 70-300-03-01s-02 |
| 1/8"           | 3 (HW 4 Ends) | 0.130 - 0.146    | 3.30 - 3.71   | 0.0375                   | 0.95 | 0.241 - 0.263                                 | 6.14 - 6.68   | 3/4                 | 20  | 350                    | 5076 | 0.070                  | 0.050 | 70-300-03-01-02  |
| 1/8"           | 3 (TW 3 Ends) | 0.130 - 0.146    | 3.30 - 3.71   | 0.026                    | 0.66 | 0.217 - 0.238                                 | 5.53 - 6.05   | 3/4                 | 20  | 290                    | 4206 | 0.050                  | 0.033 | 70-600-03-01s-02 |
| 3/16 BB        | 4             | 0.195 - 0.213    | 4.95 - 5.41   | 0.030                    | 0.76 | 0.300 - 0.324                                 | 7.62 - 8.23   | 1 3/4               | 45  | 290                    | 4206 | 0.078                  | 0.052 | 70-400-03-01-02  |
| 1/4 BB         | 5             | 0.260 - 0.280    | 6.60 - 7.11   | 0.030                    | 0.76 | 0.362 - 0.386                                 | 9.19 - 9.81   | 2 3/8               | 60  | 240                    | 3480 | 0.110                  | 0.074 | 70-400-04-01-02  |
| 5/16 BB        | 6             | 0.310 - 0.345    | 7.87 - 8.77   | 0.030                    | 0.76 | 0.410 - 0.445                                 | 10.41 - 11.31 | 2 3/4               | 70  | 220                    | 3190 | 0.136                  | 0.091 | 70-400-05-01-02  |
| 3/8 BB         | 7             | 0.380 - 0.401    | 9.67 - 10.19  | 0.030                    | 0.76 | 0.492 - 0.522                                 | 12.49 - 13.26 | 3                   | 80  | 190                    | 2755 | 0.166                  | 0.111 | 70-400-06-01-02  |
| -8 MW          | 8             | 0.400 - 0.440    | 10.16 - 11.18 | 0.030                    | 0.76 | 0.507 - 0.552                                 | 12.90 - 14.02 | 3                   | 80  | 190                    | 2755 | 0.180                  | 0.121 | 70-300-08-01-02  |
| 1/2 BB         | 10            | 0.515 - 0.545    | 13.07 - 13.84 | 0.030                    | 0.76 | 0.635 - 0.669                                 | 16.12 - 17.00 | 5                   | 130 | 150                    | 2175 | 0.210                  | 0.141 | 70-400-08-01-02  |
| 5/8 BB         | 12            | 0.640 - 0.670    | 16.25 - 17.01 | 0.033                    | 0.85 | 0.772 - 0.806                                 | 19.60 - 20.48 | 6 1/2               | 163 | 130                    | 1885 | 0.280                  | 0.188 | 70-400-10-01-02  |
| 3/4 BB         | .             | 0.765 - 0.785    | 19.42 - 19.94 | 0.040                    | 1.02 | 0.905 - 0.932                                 | 22.98 - 23.68 | 7                   | 180 | 110                    | 1595 | 0.327                  | 0.219 | 70-400-12-01-02  |
| 7/32           | 16            | 0.845 - 0.911    | 21.46 - 23.13 | 0.040                    | 1.02 | 1.001 - 1.063                                 | 25.65 - 27.00 | 9                   | 230 | 56                     | 812  | 0.388                  | 0.261 | 70-300-16-01-02  |
| 1 1/8          | 20            | 1.089 - 1.155    | 27.67 - 29.34 | 0.038                    | 0.97 | 1.251 - 1.305                                 | 31.77 - 33.15 | 16                  | 410 | 42                     | 609  | 0.522                  | 0.351 | 70-400-20-01-02  |

\* For anti-static grade, add 10 to the 3-digit part number e.g. 70-100- becomes 70-110.

The Hyperline SB range meets or exceeds the SAE 100 R14 standard. The performance testing results stated in the above table have been carried out at ambient temperature, in a controlled laboratory environment, using water as the media. We recommend that the customer carries out stringent application performance testing on the hose, using the actual working conditions over a set period of time to validate the hose.

## Temperature and pressures

- Temperature affects the maximum working pressure (MWP) as listed above, so for temperatures above 130 °C reduce the MWP by 0.75% for each 1 °C / 33 °F above 130 °C / 266 °F. Example: at 180 °C / 356 °F, reduce the MWP by (180 - 130) x 0.75 = 37.5%.

- Pressure ratings above 100 Bar (1500 psi) only apply for the transfer of non-penetrating fluids. If gases or penetrating fluids are used in the application, or used during pressure testing at pressures above 100 Bar, HPG grade hose is required.

MWP listed are calculated on the basis of a 3:1 safety factor relative to the burst pressure, so burst pressure = 3 x MWP. If MWP is required based on a 4:1 safety factor (e.g EN 16643 requirement), multiply the listed value by 0.75.

## HPG specification

For applications where gases are used in the hose at high pressures, or testing procedures above 100 bar (1500 psi) it is necessary to specify a HPG grade PTFE liner tube. HPG grade is also required when high pressures are applied to penetrating fluids.

HPG grade tubing is achieved by subjecting the PTFE tube to certain special processes, commonly known as “post sintering”, which increases the resistance of the material to penetration and porosity development by gases in service.

This specification requires that when compressed air or nitrogen is applied to a sample length at a pressure of 275 Bar (4000 psi) for one minute, then the pressure rapidly broken then re-applied for a total of 10 cycles, the sample must not show signs of excessive diffusion when finally gas tested under water.

Pure gases do not generate static charges, HPG liners are rarely required to be anti-static, but on such rare occasions, a special “inner layer” AS grade is used.

All sizes and types of Smoothbore hose PTFE tube liners can be supplied to HPG quality. However, we would always recommend that HPG hoses are supplied with a HW (Heavy Wall) for maximum performance.

# Hose braiding and covers

|                       |   |   |  |  |
|-----------------------|---|---|--|--|
| Tube only             |    | -150 °C to +260 °C  | <ul style="list-style-type: none"> <li>Suitable for low pressure applications</li> <li>Cost effective solution</li> <li>Ideal for weight critical application</li> <li>Outer covers can be extruded directly over tube for added protection</li> </ul>   |  |
|                       | Braids  |  | -73 °C to +260 °C  | <ul style="list-style-type: none"> <li>Various grades available including 304 and 316</li> <li>High tensile wires</li> <li>Suitable for high pressure and high temperature applications</li> <li>Available in double braid for ultra-high pressure applications</li> </ul> |
|                       |   |  | -40 °C to +180 °C  | <ul style="list-style-type: none"> <li>Lightweight</li> <li>High strength to weight ratio</li> <li>Exceptional abrasion resistance</li> <li>Different colours available for tracer options</li> </ul>  |
|                       |   |  | -40 °C to +204 °C  | <ul style="list-style-type: none"> <li>Ultra-lightweight</li> <li>High strength to weight ratio</li> <li>Suitable for high temperature applications</li> <li>Excellent chemical compatibility properties</li> </ul>  |
|                       |   |  | Dependent on braid type  | <ul style="list-style-type: none"> <li>All braids can be used in combination with one another to broaden design parameters. Further details upon request</li> </ul>  |
| Extruded outer covers |   | -10 °C to +60 °C  | <ul style="list-style-type: none"> <li>Cost effective outer cover for exposed brake lines</li> <li>Highly flexible</li> <li>Available in 28 different colours</li> <li>Can 'colour match' upon request</li> </ul>  |  |
|                       |  | -30 °C to +93 °C  | <ul style="list-style-type: none"> <li>Non-porous material, therefore zero chloride release</li> <li>Available as a strippable (PU-S) and direct crimp (PU-DC) cover</li> <li>Wide range of colours available including fluorescents</li> <li>High mechanical strength and excellent abrasion resistance qualities</li> <li>Good compatibility with most oils and automotive fluids</li> </ul> |  |
|                       |  | -40 °C to +120 °C   | <ul style="list-style-type: none"> <li>Very hard-wearing material for high levels of protection</li> <li>Excellent mechanical strength</li> <li>Resistant to almost all automotive fluids</li> <li>Direct crimp cover - no need to strip cover before crimping</li> <li>Wide temperature range</li> <li>Available in a wide range of colours</li> </ul>  |  |
|                       |  | -40 °C to +150 °C   | <ul style="list-style-type: none"> <li>Very hard-wearing material for high levels of protection</li> <li>Excellent mechanical strength</li> <li>Resistant to almost all automotive fluids</li> <li>Direct crimp cover - no need to strip cover before crimping</li> <li>Excellent temperature range</li> </ul>   |  |
|                       |  | -40 °C to +125 °C   | <ul style="list-style-type: none"> <li>Wide temperature range</li> <li>Excellent abrasion resistance</li> <li>Suitable for use in various internal/external chassis applications</li> <li>Excellent chemical compatibility with most automotive fluids</li> </ul>  |  |
|                       |  | -40 °C to +149 °C   | <ul style="list-style-type: none"> <li>Excellent temperature range</li> <li>Chemically compatible with most automotive fluids</li> <li>Exceptional abrasion qualities</li> <li>Highly flexible</li> </ul>  |  |
|                       |  | -73 °C to +230 °C   | <ul style="list-style-type: none"> <li>Exceptional temperature range</li> <li>Perfect cover for a range of under-bonnet and on-engine applications</li> <li>Ideal for motorsport applications where everything leans towards the extreme</li> </ul>  |  |

# Auto cut lengths

## 1 - Consultative design



We consider ourselves to be more than just a manufacturing company, placing an emphasis on all members of our team having an excellent level of engineering awareness. We have a wealth of application knowledge to complement our product expertise. Working with our automotive customers at the design phase of projects can help to reduce application footprints by routing pipework through the most efficient path without compromising on performance.

- Customer requirement
- Aflex design consultation
- Aflex solution proposal

## 2 - Cut



Aflex Hose has developed both annealed and E-weld automatic hose cutting machines which are able to cut stainless steel braided hose lengths within a tight length tolerance, without squashing or creating braid flare out. This system is applicable to (uncovered) stainless steel braided grades of the Hyperline range, in sizes up to -20 (SAE100R14) bore, with minimum cut lengths as short as 48mm.

- Customer specific hose lengths
- Annealed / E-Weld cut process
- High quality, tight tolerance cut

## 3 - Clean



Automated washing equipment is available for the cut lengths, which has the capability of achieving the required tolerance levels, whilst our validation equipment allows Aflex to verify the particle size, particle count and particle weight. Tolerance levels are typically 85 particles between 150 and 400 microns – with our facilities we typically find 0-5 particles of this size upon inspection.

- Effective cleaning process
- Removal of all processing fluids and particulates
- Batch specific cleanliness validation

## 4 - Inspect



In addition, Aflex has developed a fully automated inspection system which verifies the internal bores, braid outer diameter, flare diameter and hose length, ensuring only products that are 100% fit for purpose are sent to the customer. This inspection system is only applicable to regularly supplied large quantities of cut lengths and is limited to cut length which are less than 150mm (5.9 inches) in length.

- Customer specific tolerances
- Automatic defect segregation
- 100% dimensional compliance delivered

# Applications



## Fuel systems

A customer who manufactures high specification fuel pumps for supercars and for the motorsport industry was having issues using conventional annular corrugated nylon tube to convey various grades of fuel. The corrugations were needed for flexibility as the hose is routed in extremely compact packages, however, this creates problems when trying to expel all air from the system. The presence of air bubbles can cause the fuel to boil which leads to inefficiencies within the system. Nylon isn't perfectly compatible with most fuels so in time, it will start to degrade, turning brown and brittle, and will need to be replaced within three to five years.

Hyperline FX and KR used without reinforcing braids (tube only) are proven to be the perfect alternative; the smooth bore allows for all air to be expelled from the system, the external convolution provides the required flexibility (the added kink resistance of Hyperline KR is beneficial for extremely small packages) and the non-ageing nature of PTFE means the hose never has to be replaced, giving total piece of mind to the end user. As the convolutions are thermally formed, the liner becomes less permeable which makes it suitable to transfer fluids with high Hydrocarbon content.

For higher pressure systems, the addition of a PPS braid is recommended to increase the MWP of the hose as it is chemically compatible to all known fuels and doesn't dramatically increase the weight.



## Safety systems

A well-known car manufacturer has integrated a 'frontal collision inerting system' within their models. In the event of a collision, the engine is immediately filled with inert gas to prevent against engine fires and any subsequent explosion.

The inert gas is stored in a high-pressure gas canister and is connected to the engine using Aflex Smoothbore PTFE lined hose. Our hose was selected because of its high quality, dimensional consistency and exceptional volumetric expansion properties. The hose includes a TPE (Sarlink) external cover to give it additional protection.



## Turbo fluid transfer (Oil and Coolant)

A well-known automotive manufacturer was experiencing severe kinking issues during the installation of Smoothbore 5/16" turbocharger oil feed lines. Pipework had been designed around the limitations of the hose, but to install, the flexible section had to be bent past the specified minimum bend radius (MBR) resulting in 80% assemblies being rejected.

Aflex specified stainless steel braided 5/16" Hyperline FX with its impressive MBR of 19mm, in comparison with the current hose the customer was using that only had an MBR of 70mm. Hyperline FX's unique liner design provided the customer with the smooth bore they required, as well as the added flexibility to prevent kinking during installation.

By switching to Hyperline FX, the customer eliminated all kinking issues, improved productivity and reduced total cost of ownership.



## Flexible braking systems

Aflex has global recognition as the manufacturer of the best quality PTFE lined brake hose available on the market – the hose of choice for some of the most prestigious car, motorbike and ATV manufacturers along with some of the biggest aftermarket brake line providers.

Having spent 45 years perfecting the extrusion and braiding processes, we can say with confidence that our hose is the most dimensionally consistent product on the market.

By altering braid angles to suit our PTFE liner, we've managed to create the optimal solution which offers high flexibility, high pressure rating and low volumetric expansion.

A range of cover materials can be extruded over the hose making it extremely easy on the eye as well as to help protect it against the elements. We are experts in the extruding of compound plastic covers, such as Nylon PA11 or Arnitel, which allows for the ferrule/crimp shell to be crimped directly over the cover without skiving, therefore, dramatically reducing production times.



## Suspension systems

Similar to braking systems, Aflex Hose is renowned for manufacturing the best quality PTFE lined solution for suspension systems. Dimension consistency allows our customers to efficiently assemble a product they can be proud to supply to their customers.

In recent years we've seen an increasing demand for flexibility and kink resistance of the hose so it can be routed in the most efficient path. Therefore, Hyperline KR has been selected for various platforms. Using this liner with SS braid provides a high-pressure hose that can fit into the smallest spaces, and inclusion of an extruded rubber cover gives it the protection needed for the most versatile off-road vehicles.



## Electric vehicle applications

As a way of futureproofing the Automotive Division at Aflex Hose, we have placed a huge amount of focus on the development of products for the transfer of fluids in electric vehicles.

We have already seen a need for a PTFE lined hose to convey more aggressive oil-based battery coolants, commonly used in EV motorsports as they cool batteries much more efficiently. As technologies improve and filter down from motorsport into passenger vehicle platforms, it's becoming more apparent that PTFE lined hose is the most feasible, long-term solution.

Please speak to a member of our automotive team for more information.



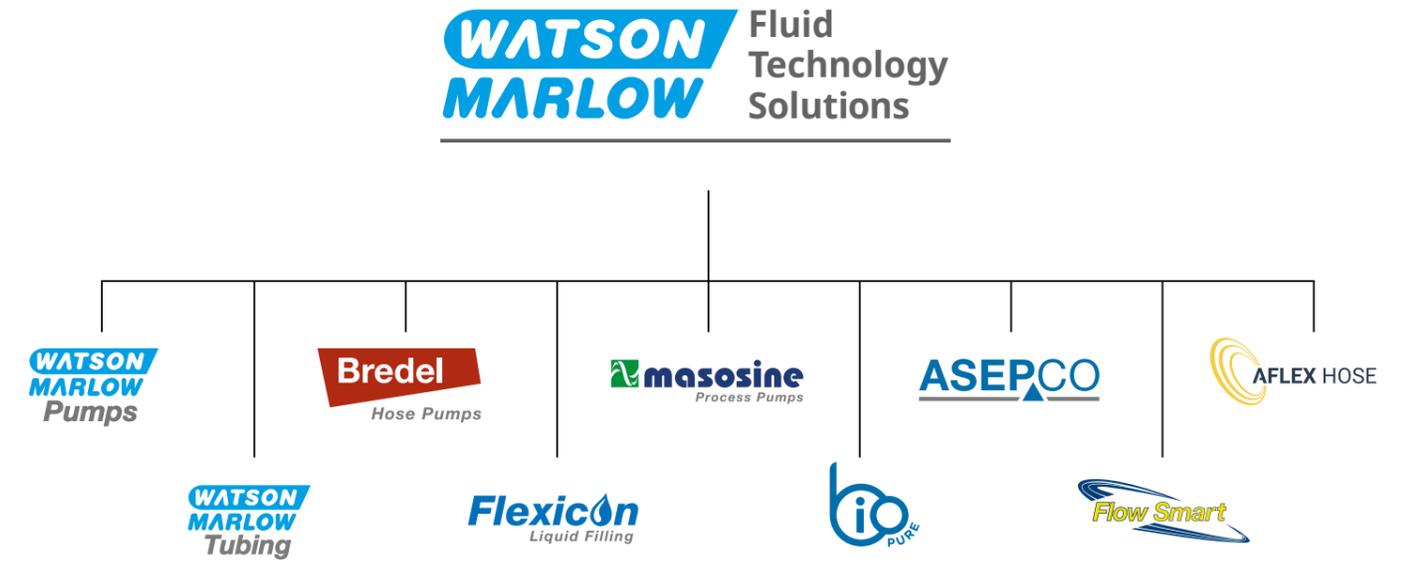
# Chemical compatibility

| Material Chemical compatibility<br><small>Make sure your Aflex automotive solution is perfect for the application and environment its used in</small> | Material |       |        |                                  |           |              |            |            |                             |         |        |          |      |     |       |
|---|----------|-------|--------|----------------------------------|-----------|--------------|------------|------------|-----------------------------|---------|--------|----------|------|-----|-------|
|   | PPS      | 304SS | Aramid | Polyurethane (Revarthane AGI140) | Nylon PA6 | Nylon PA6.12 | Nylon PA11 | Nylon PA12 | Ardinel (Nylon alternative) | Sarlink | Hytrek | Silicone | PTFE | PVC | 316SS |
| Antifreeze  | A        | A     | A      | B                                | A         | A            | A          | A          | A                           | A       | A      | A        | A    | A   | A     |
| Brake Fluid Dot3/4/5  | A        | A     | A      | -                                | A         | A            | A          | A          | -                           | A       | -      | C        | A    | -   | A     |
| Diesel Fuel   | A        | A     | A      | C                                | A         | -            | A          | A          | A                           | -       | A      | -        | A    | A   | A     |
| Ethanol (100%)  | A        | A     | A      | -                                | A         | A            | B          | A          | B                           | A       | A      | B        | A    | A   | A     |
| Ethylene Glycol   | A        | A     | A      | B                                | A         | A            | A          | A          | A                           | A       | A      | A        | A    | A   | A     |
| Gasoline (40% aromatic)   | A        | A     | -      | B                                | -         | -            | B          | -          | -                           | -       | B      | -        | A    | A   | A     |
| Gasoline Octane 65  | A        | A     | A      | B                                | A         | -            | A          | -          | -                           | -       | -      | -        | A    | C   | A     |
| Gasoline Octane 100   | A        | A     | -      | -                                | A         | -            | A          | A          | A                           | -       | A      | -        | A    | C   | A     |
| Jet Fuel (JP3, JP4, JP5)  | A        | A     | A      | -                                | A         | -            | C          | -          | -                           | -       | A      | B        | A    | A   | A     |
| Kerosene  | A        | A     | A      | A                                | A         | A            | A          | A          | B                           | -       | A      | -        | A    | A   | A     |
| Nitromethane  | A        | A     | -      | -                                | A         | A            | A          | A          | -                           | -       | A      | -        | A    | -   | A     |
| Petroleum   | A        | A     | A      | B                                | A         | A            | A          | A          | -                           | -       | A      | B        | A    | A   | A     |
| Power steering fluid  | A        | A     | -      | A                                | A         | -            | A          | B          | -                           | -       | A      | -        | A    | A   | A     |
| Shock fluid   | A        | A     | -      | A                                | A         | -            | A          | B          | -                           | -       | A      | -        | A    | A   | A     |
| Sulfuric acid <10%  | A        | -     | A      | -                                | -         | -            | B          | -          | A                           | A       | A      | -        | A    | A   | A     |
| Sulfuric acid 10%-75%   | A        | -     | B      | B                                | -         | -            | -          | -          | A                           | A       | A      | -        | A    | B   | A     |
| Sulfuric acid 75%-100%  | A        | -     | -      | -                                | -         | -            | -          | -          | -                           | A       | -      | -        | A    | A   | A     |
| Transmission fluid (ATF Type A)   | A        | A     | -      | A                                | -         | -            | B          | -          | -                           | -       | B      | B        | A    | -   | A     |
| Transmission fluid (OIL, MANUAL)  | A        | A     | -      | -                                | -         | -            | B          | -          | -                           | -       | -      | -        | A    | -   | -     |
| Windscreen washer fluid   | A        | A     | A      | A                                | B         | B            | B          | B          | -                           | A       | A      | A        | A    | A   | A     |

Compatibility table correct at time of publication. For most up to date compatibility information, see reference below:  
 Chemical Compatability Database [online] available at <https://www.wmfts.com/en/support/chemical-compatibility-guide/>

| Letter | Ratings  |
|--------|--|
| A      | Excellent  |
| B      | Good, minor effect, slight corrosion or discolouration                   |
| C      | Fair, moderate effect, softening, loss of strength or swelling may occur |
| D      | Severe effect  |
| N/A    | Not tested/no results known  |

# Group structure



## Watson-Marlow Fluid Technology Solutions global locations



a workforce of over  
**1,500 people**

a presence in over  
**40 countries**

an annual turnover of  
**300.9 million**

## AUTOMOTIVE SOLUTIONS



### Watson-Marlow Fluid Technology Solutions

Watson-Marlow Fluid Technology Solutions supports its customers locally through an extensive global network of direct sales operations and distributors

[wmfts.com/global](http://wmfts.com/global)

