

General information about PTFE hoses

For over sixty years Polytetrafluoroethylene (PTFE, brand names: Tarflen, Teflon, Fluon) has been known and recognized for its unique properties. It is widely used in all branches of industry, including production of flexible hoses of various construction and application.

PTFE unique properties:

- Excellent chemical resistance. It does not dissolve or swell in any of known solvents. It is resistant to highly aggressive acids and bases. Only very few, very rare substances (fluorine, boiling alkali metals, oxygen bifluoride, chlorine trifluoride) can affect PTFE.
- Wide range of thermal resistance. PTFE remains flexible even at the temperature of liquid helium (-269°C). Crystalline melting point of PTFE is +327°C, and at +415°C decomposition of PTFE takes place. Working temperature for hoses made of PTFE usually ranges from -70°C up to +260°C depending on the hose design (pressure and mechanical parameters of PTFE start to decrease when the temperature rises above +130°C).
- Resistance to ageing and weather conditions. PTFE is hydrophobic, entirely resistant to ozone, oxygen, light and UV radiation. Samples exposed for several dozen of years to diverse climate conditions have not shown any changes to PTFE properties.
- PTFE has a very low coefficient of friction (from 0.02 to 0.2) and a low value of surface energy. Therefore hoses made of PTFE have self-cleaning properties (substances do not stick to hose walls) so the transfer is very hygienic.
- Good electrical properties, high resistivity.
- Self-extinguishing properties.
- Moderate resistance to abrasion.

Other materials similar to PTFE

Hoses can be manufactured not only from PTFE but also from PTFE copolymers. They usually feature high chemical and thermal resistance but other properties are slightly different in comparison to PTFE (better mechanical resistance, better processing qualities):

- FEP (teflon FEP, DuPont),
- PFA, MFA (teflon PFA, DuPont),
- ETFE (Tefzel, DuPont),
- ECTFE (Halar).

Production and construction of PTFE hoses

Because of high viscosity even at temperatures close to thermal decomposition (+415°C), PTFE hoses are manufactured by extruding the compound of lubricant (paraffin oil) and PTFE powder.

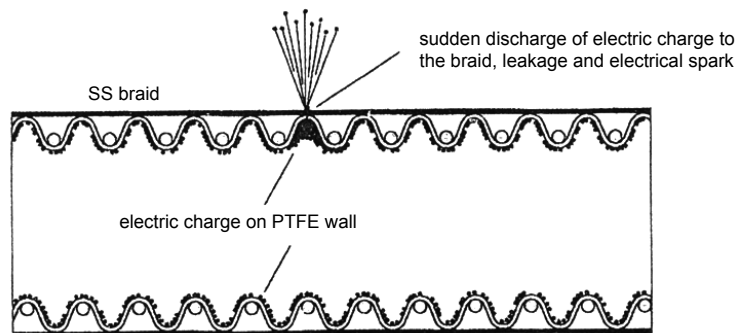
Types of PTFE hose construction:

- Smooth and corrugated hoses with no braid. Used for low pressure applications. Translucent, PTFE wall allows the visual control of the flow.
- Smooth hoses with a single or double external braid made of stainless steel. Widely used for almost all media: chemicals, gases, steam, oils, lubricants, fuel, paint, adhesives, foodstuffs in all branches of industry. The combination of relatively high working pressure of the hoses (up to around 400 bar) and PTFE unique properties result in a universal and irreplaceable solution for recent industrial technology.
- Corrugated hoses with external braids made of stainless steel or different materials. Sometimes reinforced with a steel wire helix between PTFE and the external braid. Manufactured in various construction options with lower working pressure but higher flexibility than smooth bore hoses.
- Smooth bore hoses with an extruded PTFE liner with a textile braid, steel wire helix reinforcement and an external layer made of rubber. All layers are vulcanized and permanently integrated with the PTFE internal layer - as in a standard rubber hose. Used mainly in chemical industry.

Static electricity - antistatic PTFE

As virgin PTFE is non-conductive and features high surface electrical resistivity ($R = 10^{17} \Omega$), potential hazards connected with static electricity should always be carefully considered. If a transferred substance is a bad electrical conductor and has electrifying properties, an electrostatic charge builds up on the inside of PTFE layer. The higher the flow rate, the faster the buildup of charge. The charge may build up faster than it is discharged through PTFE to the other parts of the installation and to the ground. When voltage reaches the sufficient level a sudden discharge of electric charges occurs. It may progress as follows:

- discharge to the stainless steel braid causes a micro hole or a plasma arc (at high temperature) that may lead to a leakage and ignition of flammable substances,
- an electrical spark occurs on the hose surface that has enough energy to ignite a flammable substance,
- discharge to external parts or people who are handling the hose.



To avoid the problem of static electricity an antistatic version of PTFE (with addition of graphite) is used. This version enables lowering the resistance between the internal layer of the hose wall and the grounded steel fitting below $10^8 \Omega$ and discharging the electric charges.

Antistatic version of PTFE hoses:

- standard version (tube made of antistatic PTFE) - electric charges are discharged to the braid and fittings,
- only internal layer of the tube is antistatic - electric charges are discharged along the internal layer to the hose ends.

Electrical continuity within installation

Electrical continuity within installation is a notion completely different from antistatic properties of a hose. Electrical continuity is ensured if a direct electrical connection with the use of a conductor (copper wire, braid) is provided between fittings. Resistance measured between hose fittings should not exceed 10Ω .

Media that require antistatic PTFE

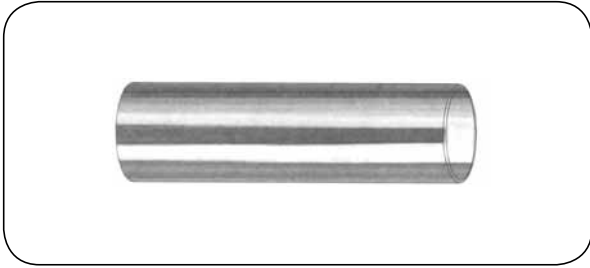
Substances such as: organic solvents (acetone, toluene, xylene), alcohol, fuel (automotive, aviation, heating oil), solids (powder, dust), steam and many more require antistatic PTFE hoses. Substances that do not require antistatic PTFE: non-organic products (salts, acids, alkalis), some alcohols, glycol, water, dry and pure gases, dry and pure steam.

Antistatic PTFE for foodstuffs

Because many substances conveyed in food industry require antistatic PTFE, a special version of antistatic PTFE certified for foodstuffs is used.

Application of different versions of PTFE should be always confirmed with Sales or Technical Department of TUBES INTERNATIONAL®.

INDUSTRIAL HOSES - PTFE

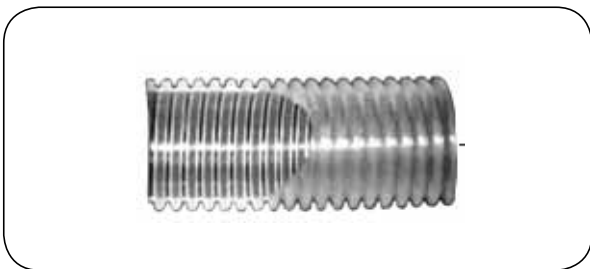


SMTO

Material: PTFE
Working temp.: From -60°C up to +260°C
 Pressure correction factor:
 0.8 from +40°C
 0.6 from +100°C
 0.2 from +150°C
 0.1 from +200°C

Lightweight, translucent, smooth bore hose made of PTFE highly resistant to chemicals. Designed for low-pressure installations transferring chemicals, paint, oil, air, water and water-based fluids. Not suitable for pneumatic push-in fittings.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	bursting pressure [bar]	bending radius [mm]	weight [kg/m]
ZC-SMTO-01X03	1	3	1	56	168	15	0.014
ZC-SMTO-02X04	2	4	1	27	81	20	0.022
ZC-SMTO-03X04	3	4	0.5	10	30	25	0.013
ZC-SMTO-03X05	3	5	1	22	66	25	0.029
ZC-SMTO-03X06	3	6	1.5	30	90	25	0.049
ZC-SMTO-04X06	4	6	1	18	54	30	0.037
ZC-SMTO-05X08	5	8	1.5	20	60	35	0.071
ZC-SMTO-06X08	6	8	1	14	42	40	0.051
ZC-SMTO-07X10	7	10	1.5	16	48	50	0.093
ZC-SMTO-08X10	8	10	1	12	36	60	0.066
ZC-SMTO-09X12	9	12	1.5	13	39	70	0.113
ZC-SMTO-10X12	10	12	1	10	30	90	0.080
ZC-SMTO-12X14	12	14	1	8	24	110	0.095
ZC-SMTO-12,5X15	12.5	15	1.25	9	27	130	0.120
ZC-SMTO-13X15	13	15	1	8	24	180	0.102
ZC-SMTO-14X16	14	16	1	7	21	250	0.109
ZC-SMTO-15X18	15	18	1.5	8	24	320	0.167
ZC-SMTO-20X22	20	22	1	3	9	700	0.152



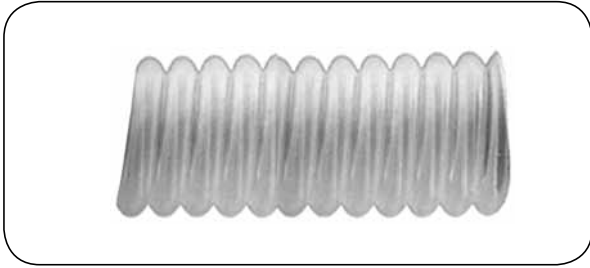
FXTO

Material: PTFE
Working temp.: From -70°C up to +260°C (working pressure depends on temperature)

Lightweight, translucent hose with smooth inside and corrugated outside PTFE. The construction combines properties of smooth hoses (ease of cleaning, uninterrupted flow) and high flexibility that is specific to corrugated hoses. An antistatic version is also available.

code	I.D. [mm]	O.D. [mm]	working pressure [bar]	weight [kg/m]
AF-FXTO-06	6.8	9	4	0.041
AF-FXTO-08	7.9	10	4	0.056
AF-FXTO-10	10	12.5	4	0.070
AF-FXTO-13	13.6	16.2	4	0.110
AF-FXTO-16	16.7	20	3	0.161
AF-FXTO-19	19.8	23.2	3	0.179
AF-FXTO-25	26.3	30.3	2	0.268

INDUSTRIAL HOSES - PTFE

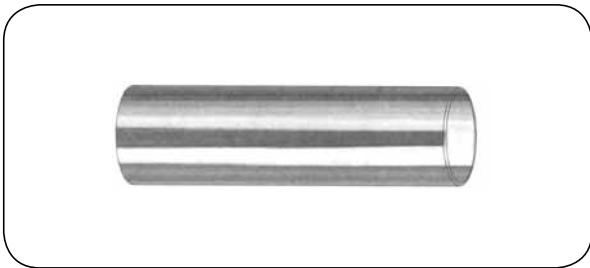


VISIFLON TO

Material: Helically corrugated PTFE
Working temp.: From -70°C up to +100°C

Lightweight, translucent hose made of helically corrugated PTFE. Extremely flexible. Resistant to full vacuum up to +80°C. An antistatic version is also available.

code	DN [inch]	flow diameter [mm]	O.D. [mm]	working pressure [bar]	bending radius [mm]	weight [kg/m]
AF-VFTO-10	3/8	6.3	10.7	4	25	0.06
AF-VFTO-13	1/2	9.5	14.1	4	38	0.08
AF-VFTO-16	5/8	12.7	19.8	4	50	0.13
AF-VFTO-19	3/4	16	21.2	3	75	0.17
AF-VFTO-25	1	22	29	3	89	0.24
AF-VFTO-32	1.1/4	28	34.2	2	100	0.34
AF-VFTO-38	1.1/2	35	45	2	150	0.42
AF-VFTO-50	2	47	59	2	200	0.63



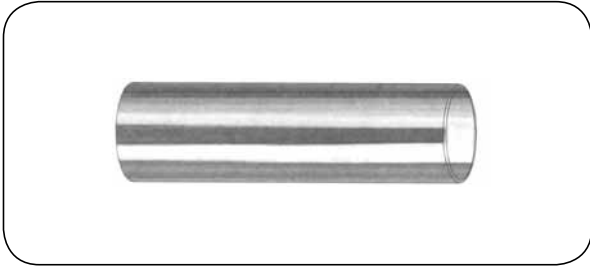
CHEMFLUOR PTFE

Material: PTFE
Working temp.: From -268°C up to +260°C

Lightweight, translucent hose with a smooth, non-porous surface. Excellent chemical resistance. It is not suitable for push-in fittings. Widely used in all branches of industry. Shore hardness (D) 58°, density 2.18. Safety factor 4:1. Hoses with inside diameter 2 ÷ 6 mm are available with 0.5 mm thick wall.

code	I.D. [mm]	tolerance [+/- mm]	wall thickness [mm]	tolerance [+/- mm]	working press. 20°C [bar]	bending radius [mm]	weight [g/m]
VE-CHEMPTFE-02X04	2	0.15	1	0.15	13.4	16	20.60
VE-CHEMPTFE-03X05	3	0.15	1	0.15	10.6	25	27.50
VE-CHEMPTFE-04X06	4	0.15	1	0.15	8.6	36	34.40
VE-CHEMPTFE-05X07	5	0.2	1	0.15	7.2	49	41.30
VE-CHEMPTFE-06X08	6	0.2	1	0.15	6.2	64	48.10
VE-CHEMPTFE-08X10	8	0.3	1	0.15	5	100	61.90
VE-CHEMPTFE-10X12	10	0.3	1	0.15	4.5	144	75.60
VE-CHEMPTFE-12X14	12	0.3	1	0.15	3.7	196	89.40
VE-CHEMPTFE-14X16	14	0.3	1	0.15	3.2	256	103.10
VE-CHEMPTFE-16X18	16	0.35	1	0.15	2.8	324	116.90
VE-CHEMPTFE-18X20	18	0.35	1	0.15	2.5	400	130.70

INDUSTRIAL HOSES - PTFE

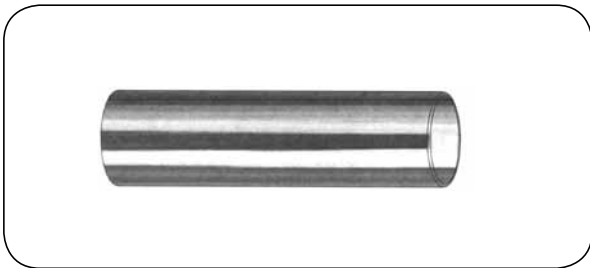


CHEMFLUOR FEP

Material: FEP
Working temp.: From -73°C up to +204°C

Lightweight, translucent hose made of fluorinated ethylene propylene with excellent chemical resistance. It is not suitable for push-in fittings. Widely used in all branches of industry, labs, etc. Shore hardness (D) 55°, density 2.17. The hose compliant with FDA requirements can be supplied on request. Safety factor 3:1.

code	I.D. [mm]	tolerance [± mm]	wall thickness [mm]	tolerance [± mm]	working press. 20°C [bar]	bending radius [mm]	standard length [m]
VE-CHEMFEP-02X04	2	0.1	1	0.1	27	16	50
VE-CHEMFEP-04X06	4	0.1	1	0.1	18	36	50
VE-CHEMFEP-06X08	6	0.1	1	0.1	14	64	50
VE-CHEMFEP-08X10	8	0.1	1	0.1	11	100	50
VE-CHEMFEP-10X12	10	0.1	1	0.1	9	144	50
VE-CHEMFEP-12X14	12	0.1	1	0.1	8	196	50



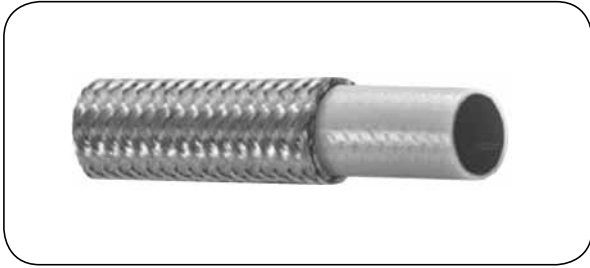
CHEMFLUOR PFA

Material: PFA
Working temp.: From -196°C up to +260°C
Hardness: 60 - 65° Shore (A)
Density: 2.17 g/cm³

Lightweight, translucent hose with a smooth, non-porous surface. Resistant to cracks caused by excessive stress. Excellent resistance to UV radiation. The hose compliant with FDA and USP Class VI standards (approval for use in pharmaceutical industry) can be supplied on request. Used in biomedical and pharmaceutical industry. Good insulating properties - suitable for electric cable insulation. Because of high plasticity, PFA is particularly recommended for industrial robots and installations that are prone to vibration.

code	I.D. [mm]	tolerance [± mm]	wall thickness [mm]	tolerance [± mm]	working press. 20°C [bar]	bending radius [mm]	standard length [m]
VE-CHEMPFA-02X03	2	0.1	0.5	0.1	18	18	50
VE-CHEMPFA-02X04	2	0.1	1	0.1	27	16	50
VE-CHEMPFA-03X06	3	0.1	1.5	0.1	27	24	50
VE-CHEMPFA-04X06	4	0.1	1	0.1	18	36	50
VE-CHEMPFA-06X08	6	0.1	1	0.1	13.5	64	50
VE-CHEMPFA-08X10	8	0.1	1	0.1	10.8	100	50
VE-CHEMPFA-09X12	9	0.1	1.5	0.1	13.5	96	50
VE-CHEMPFA-10X12	10	0.2	1	0.2	9	144	50

INDUSTRIAL HOSES - PTFE

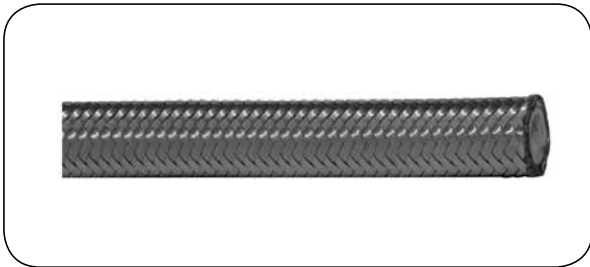


CHEMFLUOR TH

Internal layer: Black, conductive PTFE
Reinforcement: AISI 304 stainless steel braid
Working temp.: From -50°C up to +200°C

Flexible, PTFE hose designed for high pressure hydraulic, pneumatic and gas installations. The internal layer, made of conductive PTFE, prevents the build-up of electrostatic charges. Available as complete hose assemblies with fittings according to customer specification.

code	I.D. [mm]	O.D. [mm]	working press. 20°C [bar]	bursting press. 20°C/200°C [bar]	bending radius [mm]	maximum length [m]
VE-1704TH000	5.6	9.5	345	1100/820	38	12
VE-1706TH000	7.8	12	345	1100/820	64	10.5
VE-1708TH000	10.2	15.2	345	1100/820	73	10.5
VE-1710TH000	12.6	18	345	1100/820	83	10.5
VE-1712TH000	15.7	24.6	345	1100/820	102	10.5
VE-1716TH000	22	31.8	345	1100/820	127	10.5



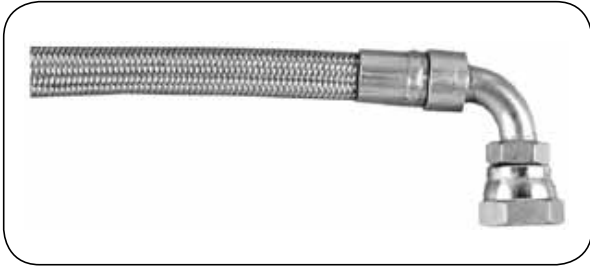
PRESSURE FLEX

Material: PTFE
Reinforcement: Double aramid braid,
 AISI 304 steel braid
Working temp.: From -60°C up to +260°C

Flexible, PTFE hose designed for high pressure hydraulic and gas installations. Lightweight, with a very small bending radius and small external diameter. Meets the requirements of SAE 100 R14 standard. For temperature above +150°C, working pressure depends on temperature - contact Sales or Technical Department of TUBES INTERNATIONAL®.

code	DN [inch]	I.D. [mm]	O.D. [mm]	working pressure [bar]	bursting pressure [bar]	bending radius [mm]
KA-PFLEX-06	1/4	6.2	12.3	485	1940	38
KA-PFLEX-08	5/16	8.1	14.2	450	1800	47
KA-PFLEX-10	3/8	9.5	16	430	1750	64
KA-PFLEX-12	1/2	12.2	19	425	1700	74
KA-PFLEX-15	5/8	15.1	22	360	1450	90
KA-PFLEX-20	3/4	20	27.5	275	1100	180
KA-PFLEX-23	1	23	31.8	250	1000	200

INDUSTRIAL HOSES - PTFE



SMOOTHBORE

Material: PTFE
Reinforcement: Single or double AISI 304 stainless steel braid
Working temp.: From -70°C up to +260°C (working pressure depends on temperature)

Characteristics: The internal layer made of seamless extruded, premium grade of PTFE that ensures minimum porosity, maximum flexibility and high resistance to vibration. The braid made of heat treated, AISI 304 stainless steel wire (tensile strength: 1700 MPa). There are several SMOOTHBORE versions available: standard or heavy wall, with a single or double braid (see tables below). Heavy wall is recommended for heavy-duty applications, gases (up to 150 bar) and applications with cyclic, rapid temperature changes. Double braid version is designed for high working pressure and applications where kink resistance is required as the hose undergoes constant bending.

For temperatures above +130°C reduce the maximum working pressure given in the tables by 0.75% for each 1°C of temperature rise above +130°C.

**Example: at +170°C temperature, maximum working pressure for AF-SWSB-08 hose is:
 260 bar - (170°C - 130°C) x 0.75 = 260 bar - 30% = 182 bar.**

Safety factor (working pressure/ bursting pressure) is 1:3.

Applications: Due to the unique properties of PTFE (wide temperature range, excellent chemical resistance, non-stick surface), widely used to transfer chemicals, foodstuffs, fuels, oils, paints, solvents, adhesives, detergents, inks, steam, etc.

SWSB (standard wall, single braid)

code*	I.D.			O.D.		bending radius [mm]	working pressure [bar]	weight [kg/m]
	nominal [inch]	minimum [mm]	maximum [mm]	minimum [mm]	maximum [mm]			
AF-SWSB-06	1/4	6	6.5	8.3	8.7	60	280	0.09
AF-SWSB-08	5/16	7.5	8	9.8	10.5	70	260	0.11
AF-SWSB-10	3/8	9.1	9.6	11.5	12	80	220	0.12
AF-SWSB-13	1/2	11.9	12.8	14.5	15.4	110	155	0.21
AF-SWSB-16	5/8	15	16	17.8	18.9	150	120	0.26
AF-SWSB-19	3/4	18	19.2	21	22.3	200	100	0.32
AF-SWSB-25	1	24	25.4	27.6	28.7	300	80	0.43

* code example of an antistatic version: AF-SWSB-06AS

HWSB (heavy wall, single braid)

code*	I.D.			O.D.		bending radius [mm]	working pressure [bar]	weight [kg/m]
	nominal [inch]	minimum [mm]	maximum [mm]	minimum [mm]	maximum [mm]			
AF-HWSB-03	1/8	3	3.2	6	6.2	20	350	0.07
AF-HWSB-05	3/16	4.5	4.8	7.5	7.8	29	320	0.09
AF-HWSB-06	1/4	6	6.5	9	9.5	30	250	0.11
AF-HWSB-08	5/16	7.5	8	10.5	11.3	40	240	0.14
AF-HWSB-10	3/8	9.1	9.6	12.2	12.8	55	200	0.15
AF-HWSB-13	1/2	11.9	12.8	15.1	16.1	85	150	0.24
AF-HWSB-16	5/8	15	16	18.5	19.7	110	120	0.29
AF-HWSB-19	3/4	18	19.2	21.4	22.7	145	100	0.34
AF-HWSB-25	1	24	25.4	28.1	29.5	260	80	0.47

* code example of an antistatic version: AF-HWSB-06AS

INDUSTRIAL HOSES - PTFE

SWDB (standard wall, double braid)

code*	I.D.			O.D.		bending radius [mm]	working pressure [bar]	weight [kg/m]
	nominal [inch]	minimum [mm]	maximum [mm]	minimum [mm]	maximum [mm]			
AF-SWDB-03	1/8	3	3.2	6.8	6.9	20	380	0.10
AF-SWDB-05	3/16	4.6	4.75	8.6	8.8	30	350	0.14
AF-SWDB-06	1/4	6	6.5	9.9	10.2	40	310	0.16
AF-SWDB-08	5/16	7.5	8	11.3	11.8	50	300	0.19
AF-SWDB-10	3/8	9.1	9.6	13.2	13.5	60	250	0.21
AF-SWDB-13	1/2	11.9	12.8	16	16.8	90	200	0.34
AF-SWDB-16	5/8	15	16	19.5	20.4	130	150	0.42
AF-SWDB-19	3/4	18	19.2	22.6	23.6	170	120	0.50
AF-SWDB-25	1	24	25.4	29	30.2	270	90	0.70

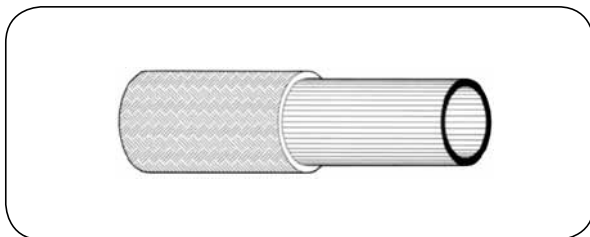
* code example of an antistatic version: AF-SWDB-06AS

HWDB (heavy wall, double braid)

code*	I.D.			O.D.		bending radius [mm]	working pressure [bar]	weight [kg/m]
	nominal [inch]	minimum [mm]	maximum [mm]	minimum [mm]	maximum [mm]			
AF-HWDB-03	1/8	3	3.2	7	7.1	18	370	0.11
AF-HWDB-05	3/16	4.5	4.8	8.8	9	25	340	0.14
AF-HWDB-06	1/4	6	6.5	10.6	10.9	26	300	0.18
AF-HWDB-08	5/16	7.5	8	12.1	12.6	35	290	0.21
AF-HWDB-10	3/8	9.1	9.6	13.9	14.3	50	240	0.24
AF-HWDB-13	1/2	11.9	12.8	16.5	17.3	75	190	0.37
AF-HWDB-16	5/8	15	16	20.3	21.2	100	150	0.45
AF-HWDB-19	3/4	18	19.2	23.3	24.3	135	120	0.53
AF-HWDB-25	1	24	25.4	30.2	31.2	250	90	0.73
AF-HWDB-32	1.1/4	30.4	32	36.3	37.5	400	80	0.95
AF-HWDB-38	1.1/2	36.2	38	42.8	44.7	800	65	1.17
AF-HWDB-51	2	48.8	50.8	55.4	57.4	1200	40	1.61

* code example of an antistatic version: AF-HWDB-06AS

SMOOTHBORE hose versions



AS - antistatic

Special additives reduce inherent, high resistance of PTFE meeting the requirements of ISO 8031 Annex A. The electrical resistance between an end fitting and an internal hose layer should not exceed $10^8 \Omega$. One of the end fittings must be grounded.

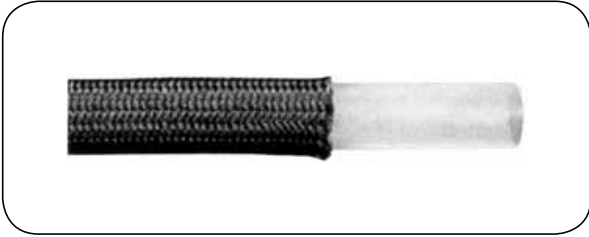


HPG - high pressure gases

Hose designed for gases with the pressure above 140 bar. Hose wall is made of specially processed PTFE. See „INDUSTRIAL HOSES - technical gas”

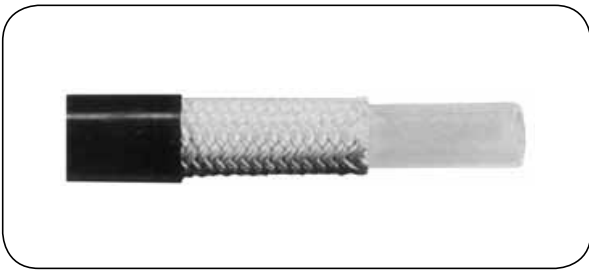
INDUSTRIAL HOSES - PTFE

SMOOTHBORE hose versions



Other braid materials

SMOOTHBORE hoses can be supplied with braids (standard or additional) made of AISI 316 stainless steel, Monel, Kevlar, Nomex, polyester or fibreglass.



Additional hose covers

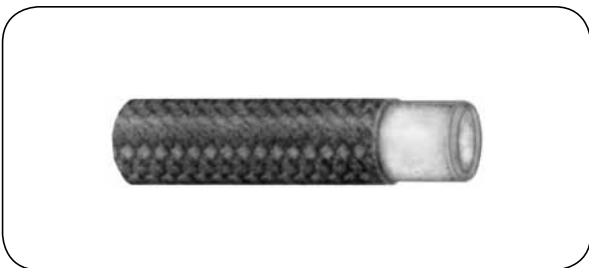
For braid protection or for the ease of cleaning, hoses can be supplied with additional external covers made of Hytrel, PVC, polyolefin, polyamide or various kinds of rubber. The covers can be labelled with a brand name, working pressure, etc.



SMOOTHBORE hose fittings

Standard SMOOTHBORE hose fittings: BSP (straight) female thread (cone 60°) or BSPT male thread, made of zinc-plated steel or AISI 316. Other fittings such as metric, JIC, NPT, flanges, pipe ends, DIN 11851, SMS, TRICLOVER, and many more can be used as well.

TUBES INTERNATIONAL® produces a hose assembly according to customer specifications (length, diameter, type of fittings) on request.



AX 1603

Material: PTFE

External layer: Steel wire / textile braid

Lightweight, flexible hose designed for steam. Used in ironing machines, rinsers, coffee machines, etc.

code	I.D. [inch]	O.D. [inch]	wall thickness [mm]	bending radius [mm]	working pressure [bar]	bursting pressure [bar]
AX-1603	3/16	5/16	0.76	63.50	287	862

INDUSTRIAL HOSES - PTFE



HYPERLINE SB (HYDRAFLON)

Material: PTFE
Reinforcement: Single or double AISI 304 stainless steel braid
Working temp.: From -70°C up to +260°C (working pressure depends on temperature)

Characteristics: The internal layer made of seamless extruded, premium grade PTFE that ensures minimum porosity, maximum flexibility and high resistance to vibration. The braid made of heat treated AISI 304 stainless steel wire (tensile strength: 1700 MPa). HYPERLINE hose is a version of SMOOTHBORE hose, however its wall is medium thick and inside diameter suitable for standard hydraulic fittings. Supplied with a single braid as a standard (double braid on special request).

For temperatures above +130°C reduce the maximum working pressure given in the tables by 0.75% for each 1°C of temperature rise above +130°C.

Example: at +170°C temperature, maximum working pressure for AF-HDSB-05 hose is:
 $320 \text{ bar} - (170^\circ\text{C} - 130^\circ\text{C}) \times 0.75 = 320 \text{ bar} - 30\% = 224 \text{ bar}.$

Safety factor (working pressure/ bursting pressure) is 1:3.

Applications: Due to the unique properties of PTFE (wide temperature range, excellent chemical resistance, non-stick surface), widely used to transfer chemicals, foodstuffs, fuels, oils, paints, solvents, adhesives, detergents, inks, steam, etc.

HYPERLINE SB (medium wall, single braid)

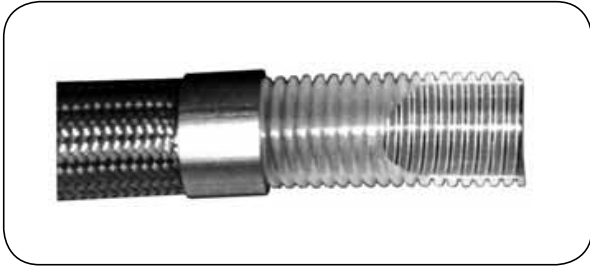
code*	I.D.		O.D. [mm]	working pressure [bar]	bending radius [mm]	weight [kg/m]
	[inch]	[mm]				
AF-HDSB-03	1/8	3.5	6.45	350	20	0.07
AF-HDSB-05	3/16	5	7.65	320	45	0.08
AF-HDSB-06	1/4	6.7	9.3	240	60	0.11
AF-HDSB-08	5/16	8.5	11.1	220	70	0.14
AF-HDSB-10	3/8	10	12.75	190	80	0.17
AF-HDSB-13	1/2	13.6	16.35	150	130	0.21
AF-HDSB-16	5/8	16.6	19.5	130	163	0.28
AF-HDSB-19	3/4	19.8	22.5	110	180	0.33
AF-HDSB-25	1	26.4	30.1	80	230	0.52

* code example of an antistatic version: AF-HDSB-06AS

Standard fittings for HYPERLINE SB: Z type fittings (see: HIGH PRESSURE).

TUBES INTERNATIONAL® produces hose assemblies according to customer specification (length, diameter, fitting type) on request.

INDUSTRIAL HOSES - PTFE



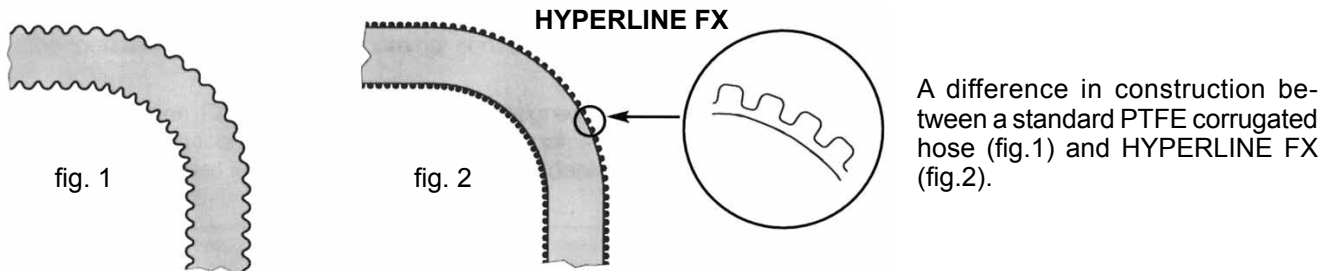
HYPERLINE FX

Material: Smooth inside, corrugated outside PTFE
Reinforcement: Single AISI 304 braid (SS version) or Kevlar braid (KB version)
Working temp.: From -70°C up to +260°C - KB version up to +180°C (working pressure depends on temperature)

Characteristics: HYPERLINE FX is made of PTFE which is smooth on the inside but corrugated one on the outside. The construction combines properties of smooth hoses (ease of cleaning, uninterrupted flow) and high flexibility that is specific to corrugated hoses. HYPERLINE FX SS is resistant to full vacuum up to +130°C.

For temperatures above +160°C for FXSS and +130°C for FXKB reduce the maximum working pressure given in the tables by 1% for each 1°C of temperature rise. Example: at +170°C temperature, maximum working pressure for AF-FXSS-10 hose is:
 $80 \text{ bar} - (170^\circ\text{C} - 160^\circ\text{C}) \times 1 = 80 \text{ bar} - 10\% = 72 \text{ bar}.$

Applications: HYPERLINE FX is recommended for all industrial applications demanding high flow rates, resistance to chemicals, temperature and permeation. Widely used in automotive industry (fuel installations, oil lines), refrigeration, steam and gas lines. Not suitable when PTFE lined fittings are required (BIOFLEX hose is then recommended).



On special request, HYPERLINE is available with a braid made of different materials, e.g. polypropylene. HYPERLINE can be also supplied in 304 steel braid and additional cover made of EPDM rubber, silicone rubber, PVC, nylon or other material.

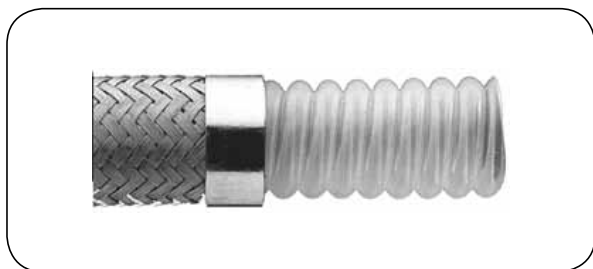
code (SS version)	code (KB version)	I.D. [mm]	O.D. (SS version) [mm]	O.D. (KB version) [mm]	working pressure SS/KB [bar]	bending radius SS/KB [mm]
AF-FXSS-06	AF-FXKB-06	6.8	9.6	9.6	88/62	19/38
AF-FXSS-08	AF-FXKB-08	7.9	10.6	10.6	84/59	19/38
AF-FXSS-10	AF-FXKB-10	10	13.5	13.5	80/56	25/50
AF-FXSS-13	AF-FXKB-13	13.6	17.5	17.5	60/42	38/76
AF-FXSS-16	AF-FXKB-16	16.7	21.4	21.4	50/35	50/100
AF-FXSS-19	AF-FXKB-19	19.8	24.2	24.2	42/29	63/126
AF-FXSS-25	AF-FXKB-25	26.4	31.7	31.7	40/28	75/150

note: for an antistatic version add "AS" at the end of the code

Z type fittings (see chapter HIGH PRESSURE) are used as a standard for HYDRALINE FX hose.

TUBES INTERNATIONAL® supplies hose assemblies according to customer specification (length, diameter, fitting type) on request.

INDUSTRIAL HOSES - PTFE



HYPERLINE V (VISIFLON)

Material:	Helically corrugated PTFE
Reinforcement:	AISI 304 braid (SS version) Polypropylene braid (PB version) No braid (TO version)
Working temp.:	From -70°C up to +230°C (SS version) From -30°C up to +100°C (PB version) From -70°C up to +100°C (TO version)

Characteristics: The internal layer is made of corrugated, premium grade PTFE which ensures excellent flexibility and resistance to vibrations. A braid in SS version is made of AISI 304 annealed stainless steel wire. PB version with a braid made of orange polypropylene fibre is lightweight and highly resistant to chemicals. The maximum working pressure is 50% of the maximum working pressure of SS version. TO version has no braid, is very lightweight and enables visual control of the medium flow. The maximum working pressure is 2 bar. All versions are available as antistatic (AS), resistance $R < 10^8 \Omega$ according to ISO 8031 Annex A. HYPERLINE V SS is resistant to full vacuum up to +130°C temperature (TO and PB up to +80°C).

For temperatures above +130°C reduce the maximum working pressure given in the tables by 1% for each 1°C of temperature rise. For PB version by 5% for each 1°C above +80°C. Example: at +170°C temperature, maximum working pressure for AF-VFSS-10 is:
 $60 \text{ bar} - (170^\circ\text{C} - 130^\circ\text{C}) \times 1 = 60 \text{ bar} - 40\% = 36 \text{ bar}$

Safety factor (working pressure/ bursting pressure) is 1:4.

Applications: Due to the unique properties of PTFE (wide temperature range, excellent chemical resistance, non-stick surface), widely used to transfer chemicals, foodstuffs, fuels, oils, paints, solvents, adhesives, detergents, inks, steam, etc.

HYPERLINE V (AISI 304 steel braid)

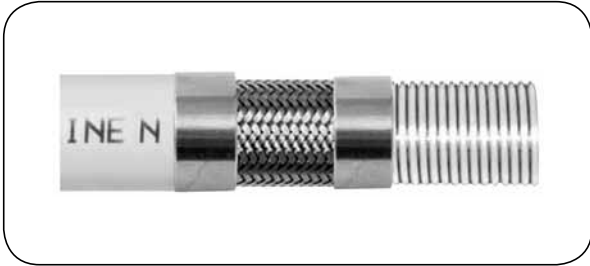
code*	DN [inch]	DN [mm]	O.D. [mm]	working pressure [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
AF-VFSS-10	3/8	6.3	11.95	60	19	0.13	40
AF-VFSS-13	1/2	9.5	15.25	47	25	0.20	40
AF-VFSS-16	5/8	12.7	21.2	40	38	0.25	30
AF-VFSS-19	3/4	16	22.7	32	50	0.34	30
AF-VFSS-25	1	22.2	30.6	26	63	0.47	25
AF-VFSS-32	1.1/4	28.2	36	25	75	0.63	20
AF-VFSS-38	1.1/2	35	47	20	115	0.90	10
AF-VFSS-50	2	47	61	15	130	1.25	10

* code example of an antistatic version: AF-VFSS-10AS, code example of PB version: AF-VFPB-10

Standard HYPERLINE V hose fittings: BSP female fittings with cone 60° and BSPT male fittings, made of zinc-plated steel, AISI 316 steel or polypropylene. Other fittings can also be used e.g. metric, JIC, NPT, flange, pipe, DIN 11851, SMS, TRICLOVER in straight, 45° or 90° option.

TUBES INTERNATIONAL® produces hose assemblies according to customer specification (length, diameter, fitting type) on request.

INDUSTRIAL HOSES - PTFE



PHARMALINE N

- Material:** Smooth inside, corrugated outside PTFE
- Reinforcement:** AISI 316 stainless steel braid
(from 1/2" additional AISI 316 steel helix)
- External layer:** White silicone
- Working temp.:** From -73°C up to +204°C (working pressure depends on temperature)

Characteristics: PHARMALINE hose is made of smooth inside and corrugated outside PTFE. The construction combines properties of smooth hoses (ease of cleaning, uninterrupted flow) and high flexibility that is specific to corrugated hoses. It is a lighter version of BIOFLEX hose, designed for traditional fitting-hose connection (crimping by a ferrule) as well as for RELINK reusable fittings. Hoses in all diameters are resistant to full vacuum up to 140°C. A standard PHARMALINE N hose in GP version has the internal layer made of PTFE in accordance with FDA No. 21 CFR 177.1550 standard. An antistatic version (AS) is also available - compliant with FDA No. 21 CFR 178.3297 standard. Both GP and GP AS hoses have been tested and they both conform to the requirements of USP Class VI. The material of the external layer- platinum cured white silicone rubber is compliant with USP Class VI and with FDA CFR-177-2600 standards. PHARMALINE N hose can be optionally manufactured in accordance with ATEX directive and adequately labelled according 94/9/EC Directive.

For temperatures above +130°C reduce the maximum working pressure given in the tables by 1% for each 1°C of temperature rise above +130°C. Example: at +170°C temperature, maximum working pressure for AF-PHGP-10 is:

$$100 \text{ bar} - (170^\circ\text{C} - 130^\circ\text{C}) \times 1 = 100 \text{ bar} - 40\% = 60 \text{ bar}$$

Safety factor (working pressure/ bursting pressure) is 1:4.

Applications: PHARMALINE N hose is designed for transfer applications in high purity conditions both inside and outside the hose. It is widely used in pharmaceutical, biotech, chemical and food industry. Excellent for other industrial applications, particularly those where hot medium is transferred, posing potential burn hazard due to accidental, direct contact with the hose. For example hot oil or steam transfer. Unlike silicone hoses, PHARMALINEN can undergo countless steam sterilization without the risk of degradation of the hose and/or adverse changes in its material.

PHARMALINE N - standard GP version

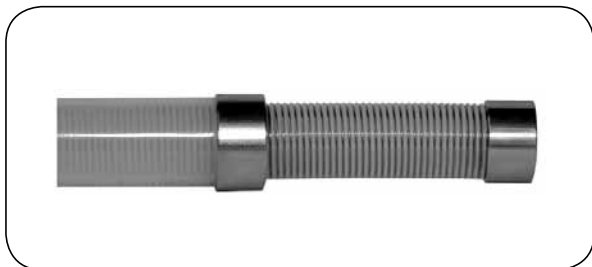
code	DN [mm]	I.D. [mm]	O.D. [mm]	working pressure [bar]	bursting pressure [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
AF-PHGP-N-06	6.4	6.8	11.6	80	320	19	0.17	30
AF-PHGP-N-10	9.5	9.5	15.5	70	280	25	0.22	30
AF-PHGP-N-13	12.7	13.5	21.4	60	240	38	0.37	30
AF-PHGP-N-16	16	16.5	25.2	50	200	50	0.52	30
AF-PHGP-N-19	19	19.8	28.5	45	180	63	0.65	30
AF-PHGP-N-25	25.4	26.1	37	40	160	100	0.88	30
AF-PHGP-N-32	32	32.5	44.6	35	140	130	1.30	30
AF-PHGP-N-38	38	38.8	51.7	30	120	170	1.70	30
AF-PHGP-N-50	50	51.5	65.6	28	112	210	2.36	30

note: for an antistatic version add "AS" at the end of the code

PHARMALINE N PTFE hoses are used with AF-PHX series fittings (e.g. AF-PHXTC - TRICLOVER fittings) and AF-BFXT3 series crimp ferrules. PHARMALINE N hoses can be also used with AF-T series fittings (for more - check „Fittings for PHARMALINE N and PHARMALINE X“).

TUBES INTERNATIONAL® produces hose assemblies according to customer specification (length, diameter, fitting type) on request.

INDUSTRIAL HOSES - PTFE



PHARMALINE X

Material: Smooth inside, corrugated outside PTFE
Reinforcement: From 1/2" AISI 316 steel wire helix
External layer: Transparent silicone
Working temp.: From -73°C up to +204°C (working pressure depends on temperature)

Characteristics: PHARMALINE X hose is made of smooth inside and corrugated outside PTFE. The construction combines the properties of smooth hoses (ease of cleaning, uninterrupted flow) and high flexibility that is specific to corrugated hoses. It is a lighter version of PHARMALINE N hose, designed for traditional fitting-hose connection. Hoses in all diameters are resistant to full vacuum up to +140°C. A standard PHARMALINE X hose, GP version has the internal layer made of PTFE according to the requirements of FDA 21 CFR 177.1550 standard. An antistatic version, marked AS, is also available, made in accordance with FDA 21 CFR 178.3297 standard. Both GP and GP AS hoses were tested and they both conform to the requirements of USP Class VI. The material of the external layer- platinum cured white silicone rubber is compliant with USP Class VI. PHARMALINE X hose can be optionally manufactured in accordance with ATEX directive and adequately labeled - Directive 94/9/EC.

For temperatures above +130°C reduce the maximum working pressure given in the tables by 1% for each 1°C of temperature rise above +130°C.

**Example: at +170°C temperature, maximum working pressure for AF-PHGP-X-10 is:
 6 bar - (170°C - 130°C) x 1 = 6 bar - 40% = 3.6 bar**

Safety factor (working pressure/ bursting pressure) is 1:4.

Applications: PHARMALINE X hose is designed for transfer applications in high purity conditions both inside and outside the hose. It is widely used in pharmaceutical, biotech, chemical and food industry. As an alternative to silicone hoses it allows for visual control of a medium in the hose, but it is significantly more resistant to numerous chemicals and temperature. Unlike silicone hoses, PHARMALINE X can undergo countless steam sterilization without the risk of degradation of the hose and/or adverse changes in its material.

code	DN [mm]	I.D. [mm]	O.D. [mm]	working pressure [bar]	bursting pressure [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
AF-PHGP-X-06	6.4	6.8	11.6	7.5	30	30	0.09	30
AF-PHGP-X-10	9.5	9.5	15.5	6	24	38	0.14	30
AF-PHGP-X-13	12.7	13.5	21.4	5.8	23	60	0.32	30
AF-PHGP-X-16	16	16.5	25.2	5	20	64	0.29	30
AF-PHGP-X-19	19	19.8	28.5	5	20	75	0.55	30
AF-PHGP-X-25	25.4	26.1	37	4	16	110	0.81	30
AF-PHGP-X-32	32	32.5	44.6	3	12	120	0.75	30
AF-PHGP-X-38	38	38.8	51.7	2	8	180	1.11	30
AF-PHGP-X-50	50	51.5	65.6	2	8	300	1.91	30

note: for an antistatic version add "AS" at the end of the code

PHARMALINE X PTFE hoses are used with AF-PHX series fittings (e.g. AF-PHXTC - TRICLOVER fittings) and AF-BFXT3 series crimp ferrules. PHARMALINE X hoses can be also used with AF-T series fittings (for more - check „Fittings for PHARMALINE N and PHARMALINE X”).

TUBES INTERNATIONAL® produces hose assemblies according to customer specification (length, diameter, fitting type) on request.

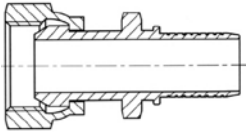
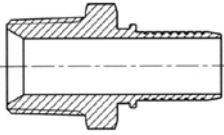
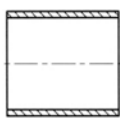
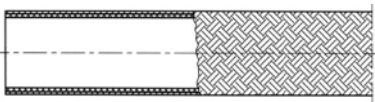
INDUSTRIAL HOSES - PTFE

Fittings and ferrules for SMOOTHBORE and HYPERLINE V

SMOOTHBORE and HYPERLINE V (VISIFLON) hoses are used with fittings and ferrules from AF-T series. Diameters and tails of the fittings are adjusted to these hoses. The ferrules (tube shaped) are crimped using special crimping dies. The end part of HYPERLINE V hose in which a fitting will be inserted, must be de-convoluted by using a special tool and only then crimped.

AF-TBW110, AF-TBZ130 fittings are made of zinc-plated carbon steel or AISI 316 stainless steel; AF-T1, T2 and T3 ferrules are made of zinc-plated carbon steel or AISI 304 (303) stainless steel.

Other fittings e.g. metric, 45°, 90° or made of different materials (polypropylene or PTFE) are available on request.

AF-TBW110	AF-TBZ130	AF-T1 AF-T2 AF-T3	AF-SWSB AF-SWDB	AF-HWSB AF-HWDB	AF-VFSS AF-VFPB
					
code - BSP female, 60° cone		code - BSPT male		thread size [inch]	hose I.D. [inch]
(carbon steel)	(AISI 316)	(carbon steel)	(AISI 316)		
AF-TBW110-02-02	AF-TBW110-02-02-SS	AF-TBZ130-02-02	AF-TBZ130-02-02-SS	1/8	1/8
AF-TBW110-04-04	AF-TBW110-04-04-SS	AF-TBZ130-04-04	AF-TBZ130-04-04-SS	1/4	1/4
AF-TBW110-06-06	AF-TBW110-06-06-SS	AF-TBZ130-06-06	AF-TBZ130-06-06-SS	3/8	3/8
AF-TBW110-08-08	AF-TBW110-08-08-SS	AF-TBZ130-08-08	AF-TBZ130-08-08-SS	1/2	1/2
AF-TBW110-12-12	AF-TBW110-12-12-SS	AF-TBZ130-12-12	AF-TBZ130-12-12-SS	3/4	3/4
AF-TBW110-16-16	AF-TBW110-16-16-SS	AF-TBZ130-16-16	AF-TBZ130-16-16-SS	1	1
AF-TBW110-20-20	AF-TBW110-20-20-SS	AF-TBZ130-20-20	AF-TBZ130-20-20-SS	1.1/4	1.1/4
AF-TBW110-24-24	AF-TBW110-24-24-SS	AF-TBZ130-24-24	AF-TBZ130-24-24-SS	1.1/2	1.1/2
AF-TBW110-32-32	AF-TBW110-32-32-SS	AF-TBZ130-32-32	AF-TBZ130-32-32-SS	2	2

code (carbon steel)	code (AISI 304/303)	hose I.D. [inch]	hose type
AF-T1-02	AF-T1-02-SS	1/8	HWSB
AF-T1-03	AF-T1-03-SS	3/16	HWSB, (HWDB 1/8")
AF-T1-04	AF-T1-04-SS	1/4	SWSB, HWSB
AF-T2-04	AF-T2-04-SS	1/4	SWDB, (HWSB-5/16")
AF-T1-05	AF-T1-05-SS	5/16	SWSB, (HWDB-3/16")
AF-T1-06	AF-T1-06-SS	3/8	SWSB, HWSB, VFSS, (HWDB-1/4", SWDB-5/16")
AF-T2-06	AF-T2-06-SS	3/8	SWDB, VFPB, (HWDB-5/16")
AF-T1-08	AF-T1-08-SS	1/2	SWSB, HWSB, VFSS, (HWDB-3/8")
AF-T2-08	AF-T2-08-SS	1/2	SWDB, HWDB, VFPB
AF-T1-10	AF-T1-10-SS	5/8	SWSB, HWSB, VFSS
AF-T2-10	AF-T2-10-SS	5/8	SWDB, HWDB, VFPB
AF-T1-12	AF-T1-12-SS	3/4	SWSB, HWSB
AF-T2-12	AF-T2-12-SS	3/4	SWDB, VFSS
AF-T3-12	AF-T3-12-SS	3/4	HWDB, VFPB
AF-T1-16	AF-T1-16-SS	1	SWSB
AF-T2-16	AF-T2-16-SS	1	HWSB, SWDB, VFSS
AF-T3-16	AF-T3-16-SS	1	HWDB, VFPB
AF-T2-20	AF-T2-20-SS	1.1/4	HWDB, VFSS
AF-T3-20	AF-T3-20-SS	1.1/4	VFPB
AF-T2-24	AF-T2-24-SS	1.1/2	HWDB, VFSS
AF-T3-24	AF-T3-24-SS	1.1/2	VFPB
AF-T2-32	AF-T2-32-SS	2	HWDB, VFSS
AF-T3-32	AF-T3-32-SS	2	VFPB

INDUSTRIAL HOSES - PTFE

Fittings and ferrules for HYPERLINE SB, FX, V

HYPERLINE SB, HYPERLINE FX and HYPERLINE V hoses require standard hydraulic fittings TI-Z type (e.g. TI-ZBW110-08-08), see „HIGH PRESSURE” chapter, and ferrules from series AF-TH and AF-THU. The ferrules are crimped with standard crimping dies. The corrugated part of HYPERLINE V hose in which a fitting will be inserted, must be de-convoluted using a special tool and only then crimped.

code (carbon steel)	code (carbon steel)	code (AISI 304/303)	code (AISI 304/303)	hose I.D. [inch]	hose type
AF-THU-03	AF-TH-03	AF-THU-03-SS	AF-TH-03-SS	3/16	HDSB
AF-THU-04	AF-TH-04	AF-THU-04-SS	AF-TH-04-SS	1/4	HDSB, FXSS, FXKB
AF-THU-05	AF-TH-05	AF-THU-05-SS	AF-TH-05-SS	5/16	HDSB
AF-THU-06	AF-TH-06	AF-THU-06-SS	AF-TH-06-SS	3/8	HDSB, FXSS, FXKB, VFSS
AF-THU-08	AF-TH-08	AF-THU-08-SS	AF-TH-08-SS	1/2	HDSB, FXSS, FXKB, VFSS
AF-THU-10	AF-TH-10	AF-THU-10-SS	AF-TH-10-SS	5/8	HDSB, FXSS, FXKB, VFSS
AF-THU-12	AF-TH-12	AF-THU-12-SS	AF-TH-12-SS	3/4	HDSB, FXSS*, FXKB*, VFSS
AF-THU-16	AF-TH-16	AF-THU-16-SS	AF-TH-16-SS	1	HDSB, FXSS, FXKB, VFSS
-	AF-TH-20	-	AF-TH-20-SS	1.1/4	VFSS
-	AF-TH-24	-	AF-TH-24-SS	1.1/2	VFSS
-	AF-TH-32	-	AF-TH-32-SS	2	VFSS

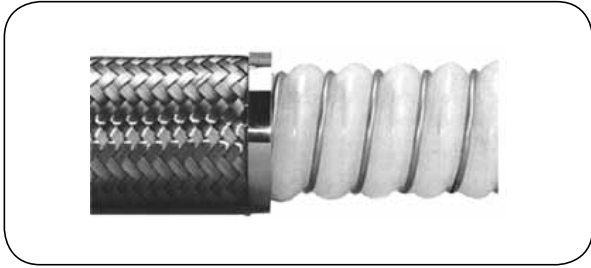
* - only AF-THU ferrules

Fittings for PHARMALINE N and PHARMALINE X

PHARMALINE N and PHARMALINE X PTFE hoses are used with fittings from AF-PHX series (e.g. AF-PHXTC - TRICLOVER fittings) and crimp ferrules from AF-BFXT3 series (the same as for BIOFLEX and CORROLINE PLUS hoses). The tail of AF-PHX fittings is hygienic which means that the tail is slightly tapered at the very end of the fitting and internally polished up to $Ra = 0.4 \mu m$. AF-PHX hygienic fittings are also available with other types of connectors. PHARMALINE N and X hoses can be also used with fittings from AF-T series. Basic TRICLOVER fittings are given in the table below (for more - check „Stainless steel hygienic couplings”).

code (AISI 316)	flange diameter A [mm]	outlet diameter d [mm]	ferrule (AISI 304/303)	hose I.D. [inch]
AF-PHXTC-025-05-006	25	4.57	AF-BFXT3-006	1/4
AF-PHXTC-025-08-010	25	8	AF-BFXT3-010	3/8
AF-PHXTC-025-15-013	25	15.75	AF-BFXT3-015	1/2
AF-PHXTC-034-16-016	34	16	AF-BFXT3-016	5/8
AF-PHXTC-050-22-019	50.5	22.1	AF-BFXT3-020	3/4
AF-PHXTC-050-26-025	50.5	26	AF-BFXT3-025	1
AF-PHXTC-050-38-038	50.5	38	AF-BFXT3-040	1.1/2
AF-PHXTC-064-50-050	64	50	AF-BFXT3-050	2

INDUSTRIAL HOSES - PTFE

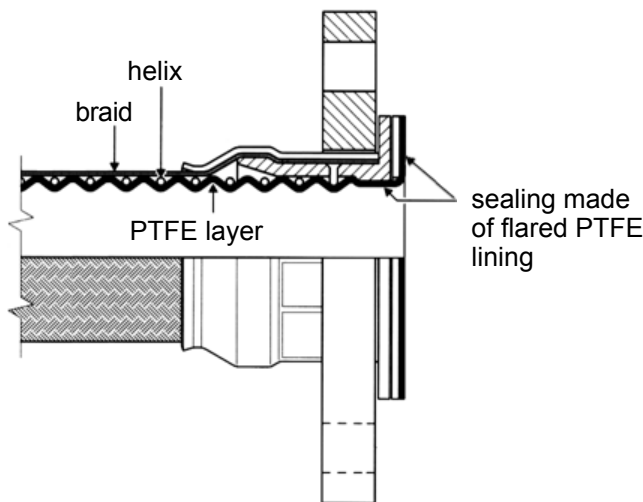


CORROFLON

Material: Helically corrugated PTFE
Reinforcement: AISI 304 stainless steel wire helix
 AISI 304 braid (SS version)
 Polypropylene braid (PB version)
Working temp.: From -70°C up to +260°C (SS version)
 From -30°C up to +100°C (PB version)
 (working pressure depends on temperature)

Characteristics: CORROFLON hose is made of helically corrugated PTFE reinforced with AISI 304 stainless steel wire helix and stainless steel braid (SS version). The construction ensures resistance to vacuum and kinking. A thick wall reduces permeation to minimum. A gentle, shallow corrugation gives an uninterrupted flow, increases cleanability and encourages self-cleaning. All versions are supplied as complete hose assemblies with standard or PTFE lined (flared) fittings.

Applications: Due to the unique properties of PTFE (wide temperature range, excellent chemical resistance, non-stick surface), widely used to transfer chemicals, foodstuffs, fuels, oils, paints, solvents, adhesives, detergents, inks, steam, etc.



CORROFLON - SS version - AISI 304 stainless steel braid

DN [inch]	DN [mm]	flow diameter [mm]	O.D. [mm]	working pressure [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
1/2	15	11.2	17.5	41	38	0.33	28
3/4	20	15.7	23.1	35	51	0.45	30
1	25	21.5	31.7	31	70	0.70	40
1.1/4	32	27.5	38.4	27	82	0.82	30
1.1/2	40	32	44.6	23	100	1.50	25
2	50	43	59	20	140	2.10	18
2.1/2	65	54	73	16	178	2.58	13
3	80	64	86	14	230	3.29	10
4	100	98	117	10	300	5.05	5
6	150	130	170	5	600	6.70	4

INDUSTRIAL HOSES - PTFE

CORROFLON - PB version - polypropylene braid

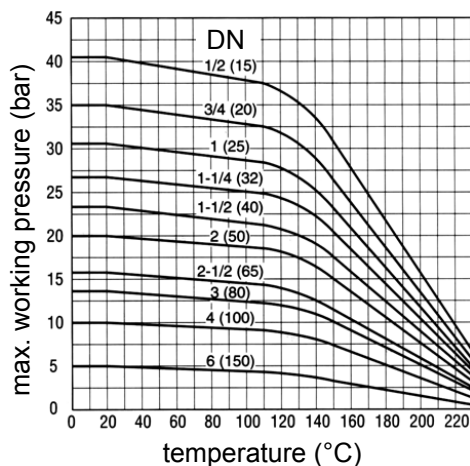
DN [inch]	DN [mm]	flow diameter [mm]	O.D. [mm]	working pressure [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
1/2	15	11.2	19.1	31	38	0.26	28
3/4	20	15.7	26	26	51	0.36	30
1	25	21.5	34	23	70	0.56	40
1 1/4	32	27.5	43.6	20	80	0.66	30
1 1/2	40	32	48.6	17	100	1.20	25
2	50	43	62	15	140	1.68	18
2 1/2	65	54	77	12	178	2.06	13
3	80	64	90	10	230	2.63	10
4	100	98	120	8	300	3.98	5



PB - polypropylene braid

A hose in polypropylene braid is more lightweight (around 20% compared to GPSS version) and more resistant to abrasion.

Recommended for applications involving frequent operation and relocation. Excellent for frequent manual handling of the hose in particular. The working temperature ranges from -30°C up to +100°C.



Relation between working pressure and temperature

The graph shows the relation between the maximum working pressure and temperature for nominal diameters of CORROFLON GPSS hose. At temperatures lower than 0°C and down to -70°C, the maximum working pressures applies as the nominal pressure of the hose.

For PB version, in the temperature range from -30°C up to +80°C as per graph. From +80°C up to +100°C reduce the pressure by 50%. RC, FP, SI versions as per graph (within the temperature range of the particular version).

Vacuum resistance

Hoses in SS version are resistant to full vacuum up to +130°C. Vacuum resistance must be reduced by 1% for every 1°C above +130°C. The resistance of other versions is limited by their maximum working temperature.



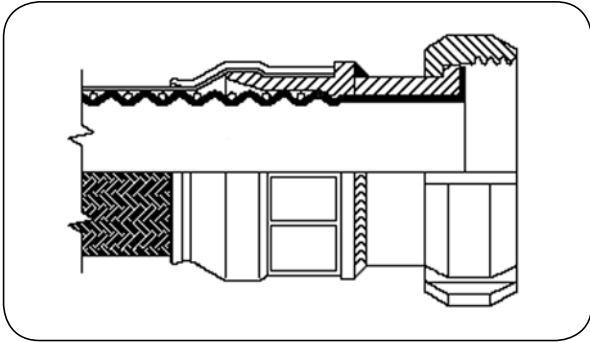
AS - antistatic internal layer

Special additives reduce inherent, high resistance of PTFE. The electrical resistance between an end fitting and a wetted internal layer should not exceed $10^8 \Omega$. One of the end fittings must be grounded. The additives in the material of the hose do not have any impact on its sanitary properties. Compliant with FDA standards.

INDUSTRIAL HOSES - PTFE

Complete CORROFLON hose assemblies

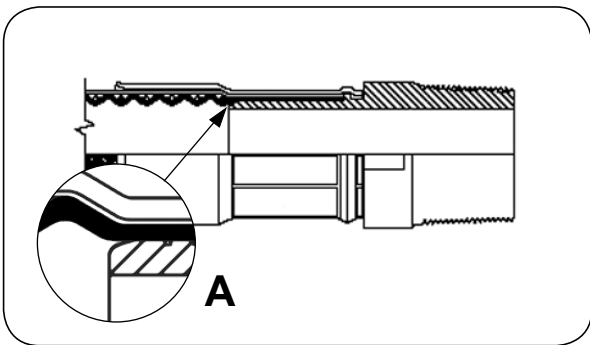
TUBES INTERNATIONAL® produces CORROFLON hose assemblies with fittings in two versions: PTFE lined fittings (PTFE layer is extended through the fitting and flared out as the sealing face) and standard fittings (non-lined fittings).



PTFE lined fittings

The internal layer of PTFE hose is extended through the fitting and flared out as the sealing face. This construction prevents any contact of the transferred medium with the material of the fitting. Advantages:

- for aggressive media - the separation of transferred fluid from the fitting.
- for food and pharmaceutical substances - the lack of crevices (A) - places in which material particles may be entrapped. It allows to ensure clean and sterile system.



Non-lined fittings

CORROFLON hose can be equipped with standard fittings used for PTFE hoses with thread and seal types as for hydraulic fittings. Then this PTFE hose assembly is similar to HYPERLINE V hose assemblies but its operation life is much longer, resistance to bending, mechanical impact and vacuum is higher, permeability is reduced. Available with TRICLOVER, non-flared fittings as well.

CORROFLON hose assembly length limitations

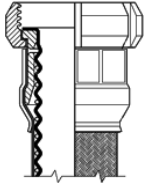
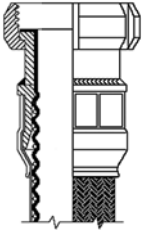
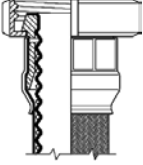

DN		minimum length		maximum length
[inch]	[mm]	straight [mm]	bent 90° [mm]	[m]
1/2	15	75	60	28
3/4	20	75	81	30
1	25	75	110	40
1.1/4	32	75	129	30
1.1/2	40	75	158	25
2	50	75	220	18
2.1/2	65	100	280	13
3	80	100	362	10
4	100	350	472	5
6	150	300	943	4

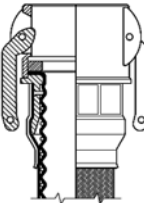
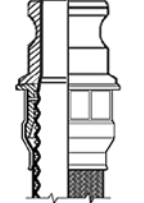
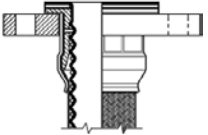
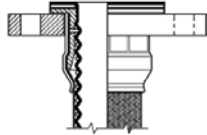
Values given in the table above do not include the length of the fittings (fitting + ferrule), apply to versions in stainless steel or plastic braid, without rubber cover. The values should be increased by 50% for rubber covered hoses. The length of a complete hose assembly is taken as the length from the sealing face of the fitting at one end of the assembly to the same at the other end. Length tolerance: from 0% to 10% - for lengths above 1 meter and 0% to 5% - for lengths up to 1 meter.

The maximum working pressure of a hose assembly is determined by the lower from two values: hose working pressure and fitting working pressure.

INDUSTRIAL HOSES - PTFE

Standard flared fittings for CORROFLON hoses

fitting type	SMS	SMS HP	DIN 11851 female	DIN 11851 male
				
working pressure [bar]	10 (static)	10 (pulsating)	to 1.1/4" - 40, above - 25	
code	AF-CFXSMS...N AF-CFXSMS...W	AF-CFXSMSHP...	AF-CFXDIN...N AF-CFXDIN...W	AF-CFXDIN...Z
hose DN	thread	thread	thread	thread
1"	25	Rd 40x1/6"	Rd 40x1/6"	Rd 52x1/6"
1.1/4"	32	-	-	Rd 58x1/6"
1.1/2"	40	Rd 60x1/6"	Rd 60x1/6"	Rd 65x1/6"
2"	50	Rd 70x1/6"	Rd 70x1/6"	Rd 78x1/6"
2.1/2"	65	Rd 85x1/6"	Rd 85x1/6"	Rd 95x1/6"
3"	80	Rd 98x1/6"	Rd 98x1/6"	Rd 110x1/4"

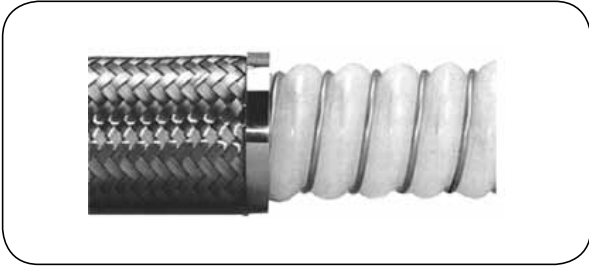
fitting type	CAMLOCK C type	CAMLOCK A type	swivel flange DIN PN10/16	swivel flange ASA 150
				
working pressure [bar]	16 (DN 3"-14)	16 (DN 3"-14)	16 (DN 3"-14)	16 (DN 3"-14)
code	AF-CFXCAM...G	AF-CFXCAM...W	AF-CFXSFL...W AF-CFXSFL...K AF-CFXSFL...U	AF-CFXSFLA...W AF-CFXSFLA...K AF-CFXSFLA...U
hose DN	size	size	size	size
1/2"	15	-	DN 15	DN 15
3/4"	20	3/4"	DN 20	DN 20
1"	25	1"	DN 25	DN 25
1.1/4"	32	1.1/4"	DN 32	DN 32
1.1/2"	40	1.1/2"	DN 40	DN 40
2"	50	2"	DN 50	DN 50
2.1/2"	65	2.1/2"	DN 65	DN 65
3"	80	3"	DN 80	DN 80

Fittings are made of AISI 316 stainless steel as a standard (ferrules and flanges with PTFE lined option AISI 304).

Available on request: hose assemblies with flared TRICLOVER fittings, hose assemblies with fittings specified by the customer, 4" and 6" hose assemblies. Please contact Technical Department of TUBES INTERNATIONAL® for advice.

INDUSTRIAL HOSES - PTFE

CORROFLON hose versions

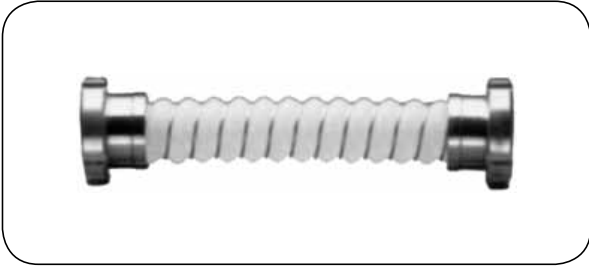


EC - electrical continuity between fittings

Resistance between end fittings for hoses up to 5 meter:

- SS version $<10 \Omega$
- PB and KYB versions $<20 \Omega$

If electrical continuity is required, EC version should be ordered.



TO - tube only (no braid)

Economical solution for low pressure applications without a risk of mechanical damage. Made of translucent PTFE that enables visual control of the flow. The working pressure is reduced by 85%, weight by 35% compared to SS version.



KYB - KYNAR braid

Braid made of Polyvinylidene Fluoride Monofilament (KYNAR). Excellent chemical resistance. The working temperature ranges from -40°C up to $+120^{\circ}\text{C}$ (inside); up to $+100^{\circ}\text{C}$ (outside the hose).

The working pressure is reduced by 60%, weight by 30% compared to GP SS version.



HB - HASTELLOY braid

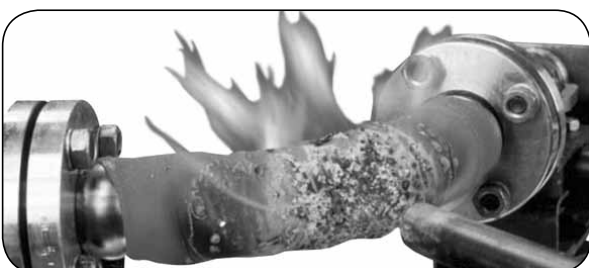
HASTELLOY braid is more resistant to chemicals than SS version. Suitable for applications conveying chlorine or fluoride, and wherever the hose is exposed to intense chemical corrosion.

The working pressure is reduced by 50% compared to SS version.



RC - rubber cover

Designed for heavy duty application (e.g. reloading applications). It is SS version with the layer of antistatic EPDM rubber (neoprene/Hypalon also available) vulcanized directly onto the steel braid. The working temperature ranges from -40°C up to $+140^{\circ}\text{C}$ (inside); up to $+120^{\circ}\text{C}$ for EPDM (outside of the hose).



FP - fireproof

Fire resistant version of RC hose designed to resist flame and maintain continuous flow in the event of fire. Manufactured according to BS 5173. The working temperature ranges from -40°C up to $+140^{\circ}\text{C}$ (inside); up to $+1200^{\circ}\text{C}$ (outside of the hose). An antistatic version is also available.

INDUSTRIAL HOSES - PTFE

CORROFLON hose versions



SP - special profile

As a result of construction with corrugations closer together, SP version has better parameters than the standard one. Kink and crush resistance is improved, the working pressure is increased by 25% but the weight is increased by 30%, actual bore diameter is reduced by 3 mm, bending radius is reduced by 25%. The maximum continuous length is reduced by 50%. An antistatic version is also available.



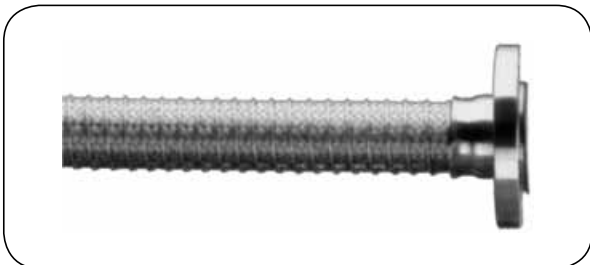
SI - additional silicone rubber cover

Used in applications where cleanliness is essential (pharmaceutical, food industry). Remaining parameters are the same as for SS version. Available in diameters up to 3". The working temperature ranges from -40°C up to +180°C (inside); up to +160°C (outside the hose).



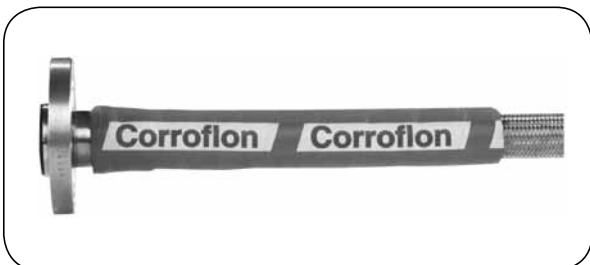
SR - scuff rings

Rubber rings are placed every half meter along the hose (diameters from 1" to 3") to protect against abrasion and damage. Resistant to temperature up to +140°C.



PC - protection coil

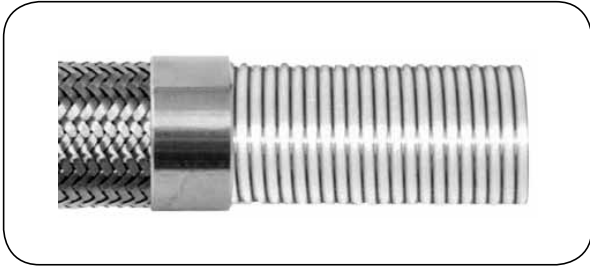
For applications where the hose requires protection against abrasion but other covers are not acceptable (e.g. due to high temperature). Technical parameters are the same as for SS version.



RC 300 - rubber cover for fittings

A layer of EPDM rubber is vulcanized directly on the ferrule to protect a handling person from direct contact with a very hot or very cold hose assembly. Also protects against excessive flexing of the hose at the fitting. Length 300 mm.

INDUSTRIAL HOSES - PTFE



BIOFLEX ULTRA

Material: Smooth inside, corrugated outside PTFE
Reinforcement: AISI 304 steel braid (SS version)
Working temp.: From -70°C up to +260°C (SS version) (working pressure depends on temperature)

Characteristics: BIOFLEX ULTRA hose is made of smooth inside and corrugated outside PTFE, reinforced with an external AISI 304 stainless steel braid (SS version). The construction combines properties of smooth hoses (ease of cleaning, uninterrupted flow) and high flexibility that is specific to corrugated hoses. When compared to classic PTFE corrugated hoses, BIOFLEX ULTRA features better resistance to cyclic bending, smaller permeability and the maximum flow rates. Numerous versions are available as complete hose assemblies with PTFE-lined fittings.

Applications: Due to the unique properties of PTFE and state-of-the-art construction, BIOFLEX ULTRA hose is frequently employed in installations transferring: chemicals, food and pharmaceutical substances, fuels, oils, solvents, detergents, adhesives, paints, inks, steam, etc.

BIOFLEX ULTRA- standard version GPSS

DN [inch]	DN [mm]	flow diameter [mm]	O.D. [mm]	working pressure* [bar]	bending radius [mm]	weight [kg/m]	maximum length [m]
3/8	10	9.5	12.8	80	19	0.14	18
1/2	15	12.7	16.6	70	38	0.29	18
5/8	16	16	20.6	65	45	0.35	18
3/4	20	19	24.5	60	50	0.40	18
7/8	22	22	28.2	55	60	0.52	18
1	25	25.4	32.3	50	70	0.63	18
1.1/4	32	32	39.5	45	100	0.85	18
1.3/8	35	34.9	43.1	40	120	1.00	16
1.1/2	40	38	47	40	140	1.10	17
1.7/8	48	47.6	57.1	35	190	1.38	13
2	50	50.8	61	30	200	1.90	10

* maximum working pressure depends on the temperature and the maximum working pressure of fittings assembled on a hose (contact the Technical Department of TUBES INTERNATIONAL®).

BIOFLEX ULTRA hose versions



AS - antistatic internal layer

Special additives reduce inherent, high resistance of PTFE. Compliant with ISO 8031 Annex A. The electrical resistance between an end fitting and a wetted internal layer should not exceed $10^8 \Omega$. One of the end fittings must be grounded. Compliant with FDA standards.

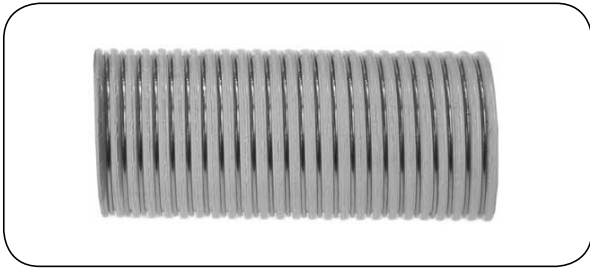


EC - electrical continuity between end fittings

Resistance between end fittings:
 - SS version $<10 \Omega$
 - PB version $<20 \Omega$
 If electrical continuity is required, EC version should be ordered.

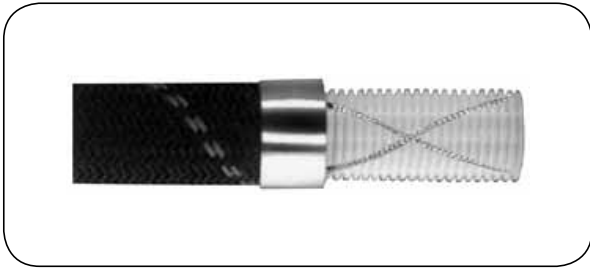
INDUSTRIAL HOSES - PTFE

BIOFLEX ULTRA hose versions



TO - tube only (no braid)

A lightweight hose without braid (available in GP and AS versions) used at low pressure.



PB - polypropylene braid

A hose in polypropylene braid is more lightweight and more resistant to abrasion. Recommended for applications involving frequent operation and relocation. The working pressure is reduced by 50% (up to +80°C) compared to GPSS version. The hose features two Monel wires to ensure electrical continuity between end fittings. The working temperature ranges from -30°C up to +100°C.



RC - rubber cover

A hose in smooth, blue, EPDM rubber is more resistant to abrasion, chemicals and easier to clean. The cover compliant with USP Class VI. The working temperature: -40°C up to +140°C.



RC FP - fireproof rubber cover

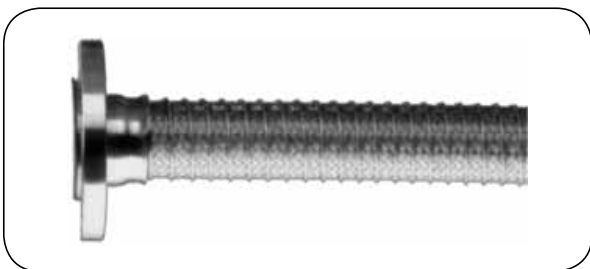
Developed for heavy duty conditions (e.g. reloading systems). It is GP SS version with a layer of black antistatic EPDM rubber vulcanized onto the stainless steel braid. RC FP version conforms to the fire resistance requirements of BS5173 standard.

The working temperature ranges from -40°C up to +140°C.



SI - silicone cover

A cover made of platinum cured silicone allows visual control of the braid. A very smooth surface of the cover facilitates cleaning. The cover compliant with USP Class VI. The working temperature ranges from -73°C up to +204°C.



PC - protection coil

SR - scuff rings

Description as for CORROFLON.

INDUSTRIAL HOSES - PTFE

BIOFLEX ULTRA hose fittings



SMS

A fitting with a female thread compliant with Swedish SMS specification. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.



RJT

A fitting with a female thread compliant with British BS4825 standard. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.



DIN 11851

A fitting with a female thread according to German DIN 11851 standard. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.



DIN 11851

A fitting with a male thread according to German DIN 11851 standard. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.



CAMLOCK

CAMLOCK coupling compliant with MIL-C-27487 standard. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.



TRICLOVER

A fitting compliant with BS 4825, ISO 2852 or DIN 32676. PTFE liner ensures clean and uninterrupted flow. All parts made of acid-resistant steel.

INDUSTRIAL HOSES - PTFE

BIOFLEX ULTRA hose fittings



Standard flanges

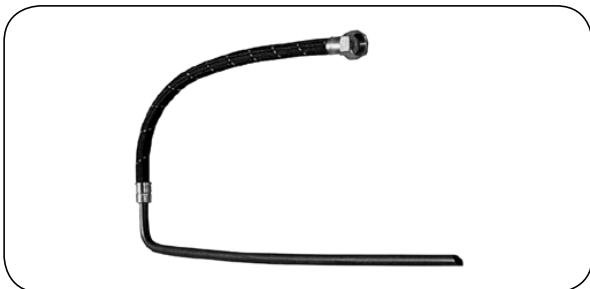
Swivel flanges compliant with ASA 150 and DIN PN16. PTFE liner ensures clean and uninterrupted flow. Flange material: AISI 304 stainless steel. Spigot material: AISI 316L stainless steel.

ASA 150 flanges (ANSI B 16.5 class 150)

flange size		O.D. [mm]	number of bolts	bore diameter [mm]	raised face diameter [mm]
[inch]	[mm]				
1/2	15	89	4	16	32
3/4	20	98	4	16	43
1	25	108	4	16	50
1.1/2	40	127	4	16	73
2	50	152	4	19	92
3	80	190	4	19	152
4	100	228	8	19	190
6	150	279	8	22	241

DIN PN16 flanges (BS 4504)

flange size		O.D. [mm]	number of bolts	bore diameter [mm]	raised face diameter [mm]
[inch]	[mm]				
1/2	15	95	4	14	32
3/4	20	105	4	14	43
1	25	115	4	14	63
1.1/2	40	150	4	18	88
2	50	165	4	18	102
3	80	200	8	18	160
4	100	220	8	18	180
6	150	285	8	22	240



DIP PIPES - tube fittings

Rigid tube fittings, straight or 90° elbow, designed for suction of fluids (or filling up) from tanks, containers, drums, etc. Made of antistatic (AS) PTFE as a standard. Available in AISI 316 stainless steel, virgin PTFE or other materials. The working pressure ranges from full vacuum to 3 bar.



INDUSTRIAL HOSES - PTFE



BIOFLON

- Material:** Smooth PTFE tube
Reinforcement: AISI 304 steel braid, Steel wire helix (AISI 304)
External layer: Blue EPDM rubber (RC version) or transparent silicone (SI version)
Working temp.: From -40°C up to +140°C (RC version) From -73°C up to +204°C (SI version) (working press. depends on temp.)

Characteristics: BIOFLON hose includes a smooth PTFE tube. It is reinforced with AISI 304 steel wire braid and AISI 304 steel wire helix which is wound onto the braid and vulcanized into the rubber cover. This construction allowed to satisfy market demand for smooth bore PTFE hoses in 2.1/2" and 3" diameter. When compared to its competitive counterparts, the construction of BIOFLON is surely prevailing as there is no glue used which might contaminate the medium in case of hose failure. Moreover, the use of virgin PTFE guarantees excellent chemical resistance (in comparison to rubber hoses with FEP, PFA MFA, XLPE, UHMWPE liners). The flexibility of BIOFLON hose is considerably limited. It is stiffer than rubber hoses - the minimum bending radius is twice as large. Vacuum resistance depends on the temperature and bending radius. If a hose undergoes constant bending and is frequently disassembled, it is recommended to use CORROLINE or 2" BIOFLEX with larger end fittings, 2.1/2" or 3" nominal diameter, or use 2.1/2" or 3" CORROFLON. All BIOFLON versions are always supplied as complete hose assemblies with fittings, PTFE lined (flared) fittings as well.

Applications: Transfer of chemicals, food and pharmaceutical substances, fuels, oils, paints, solvents, adhesives, detergents, inks, steam, etc. - wherever excellent chemical resistance of PTFE and smooth internal layer are of primary importance but flexibility is not that vital.

BIOFLON - standard version RC

DN [inch]	DN [mm]	flow diameter [mm]	O.D. [mm]	working pressure [bar]	bending radius [mm]	maximum length [m]
2.1/2	65	60	78	20	800	10
3	80	73	96.5	16	1000	10

BIOFLON hose versions



RC SI - silicone cover

A hose designed to operate at higher temperatures than hoses in EPDM rubber cover. The working temperature ranges from -73°C up to +204°C.



AS - antistatic internal layer

Special additives reduce inherent, high resistance of PTFE. Compliant with EN ISO 8031:2009. The electrical resistance between an end fitting and a wetted internal layer should range from $10^3 \Omega$ up to $10^7 \Omega$. One of the end fittings must be grounded. Compliant with FDA standards.

INDUSTRIAL HOSES - PTFE

BIOFLON hose fittings



Flange fittings

Swivel flanges compliant with ASA 150 and DIN PN16. A version with PTFE liner ensures clean and uninterrupted flow.

Flange material: AISI 304 stainless steel.
Spigot material: AISI 316L stainless steel.

ASA 150 flange (ANSI B 16.5, 150 class)

flange size		O.D. [mm]	number of holes	bore diameter [mm]	flared diameter * [mm]
[inch]	[mm]				
2 1/2	65	178	4	19	105
3	80	191	4	19	127

DIN PN16 flanges (EN 1092-1)

flange size		O.D. [mm]	number of holes	bore diameter [mm]	flared diameter * [mm]
[inch]	[mm]				
2 1/2	65	185	4	18	122
3	80	200	4	18	127

* - flared diameter is the diameter of a sealing face made of the flared PTFE liner. Due to technological limitations the actual diameter of some sizes may be smaller than the raised face diameter specified by the standard.

Other types of fittings

BIOFLON can be used with a variety of other fittings either standard or made according to customer specifications, e.g.:

- non-flared, straight or 90° elbow TRICLOVER fittings,
- imperial or metric fittings with standard sealing,
- tube fittings.



Some of the types of fittings listed above are available with PTFE liner (flared). Please contact Technical Department of TUBES INTERNATIONAL® for technical details and availability.