Petroleum hoses – general information

Petroleum products, petrochemical products

Petroleum products are substances derived from **crude oil** in oil refineries by applying a distillation process i.e. separation of fractions with different boiling points and by processing, modification and purification (cracking, reforming, etc.). The products obtained from these processes include **fuels** (petrol, kerosene, heating oil and diesel oil), mineral **oils**, **lubricants**, **asphalt** (fuel refinery) and **raw materials** for further processing (synthesis) in the chemical industry (petrochemical refinery) e.g. olefins: ethylene, propylene, butadiene and aromatic hydrocarbons: benzene, toluene, xylene (so-called BTX). Many of these substances can also be derived from other raw materials: fossil (natural gas, coal) or renewable (e.g. corn, sugarcane).

Petroleum hoses, fuel hoses

The term **petroleum hoses**, as used in this chapter, primarily includes hoses for liquid fuels, oils, lubricants and asphalt, as well as hoses for crude oil. These are:

- **multipurpose hoses for fuel and oil**, used mainly in fuel and oil systems of vehicles and technical equipment, low-pressure hydraulic systems, various industrial applications;
- **distribution and refuelling hoses for fuel and oil**, designed for refuelling vehicles and aircraft, for distribution of fuels and oils e.g. heating oil;
- **loading/unloading hoses for fuel and oil,** crude oil and other petroleum products in road and rail transport, fuel terminals - used on tank trucks, inland and marine fuel terminals, ships and oil rigs.
- **liquid asphalt hoses** - specialist hoses for transferring, loading and unloading liquid hot bituminous substances;
- **drilling hoses**, used in onshore and offshore drilling equipment for crude oil, high sulphur oil, drilling fluid, drill cuttings, and blow-out-preventers (BOP).

Fuel hoses are used both as ready-made, complete flexible hose assemblies with fittings, designed for a specific medium, installation site and operating parameters, and as hose sections, attached to the connections or pipe stubs in a system.

Hoses suitable for petroleum substances are also in other chapters of the INDUSTRIAL HOSES section. They include:

Chemical hoses – hoses for liquid chemicals and their mixtures, for highly reactive or hazardous substances, including petroleum substances, e.g. hot aromatic hydrocarbons, solvents. The hoses made of Viton (FKM / FPM), polyethylene (UPE), fluoropolymers (PTFE, FEP, MFA) are broadly used for most petroleum substances.

Composite hoses – hoses formed of several layers of fabric and film of various thermoplastic materials wound between helically coiled outer and inner wires. The composition of fabric and film materials allows for achieving the appropriate resistance to fuels and chemicals. The hoses are very lightweight and extremely flexible. They are widely used for loading and unloading fuels and petrochemicals.

PTFE hoses – hoses made of smooth or corrugated PTFE tube, with stainless steel or polymer fibre braid, often with additional smooth elastomer coating. With the unique properties of PTFE, they are completely chemically resistant to almost all substances, medium to high pressures and relatively high temperatures. Used for fuels, oils, solvents and other petrochemicals.

Metal pressure hoses – corrugated flexible hoses made of thin stainless steel sheet metal, in stainless steel braid, with welded fittings. For versatile applications including fuels, oils and petroleum substances. Resistant to high temperature, medium to high pressure.

TYGON® and VERSILON™ tubing – a group of hoses made of improved PVC, various elastomers and polymers. These are small diameter extruded hoses, braided, with no reinforcement, manufactured from top quality materials. They include peristaltic pump hoses, chemical hoses and special fuel hoses with low hydrocarbon permeability rates.

For high-pressure hoses for hydraulic oil, lubricants, fuels, see HIGH PRESSURE HYDRAULICS (HIGH PRESSURE) section. A range of low-pressure, non-reinforced polymeric hoses resistant to fuel and oil is also in PNEUMATICS section.

Petroleum hoses – general information

Selecting a hose for petroleum products and selecting other elements of a complete hose assembly.

Petroleum hoses belong to a group of chemical hoses, therefore the selection should be made according to the same rules as described in the chapter "Chemical Hoses". The initial selection of the hose for petroleum substances can be based on its intended use specified in the catalogue description, the material of the inner layer and its chemical resistance given in the Tubes International chemical resistance chart at the end of the catalogue:

					↓								
→	ENVIRONMENT (MEDIUM)	EPDM	EPM	NR	NBR	CR	SBR	FPM	UPE	PTFE	PVC	PU	PA
	Benzene	X	X	X	X	X	X	A/B	C/X	A	X	X	A
	Benzyl benzoate	C	B	X	X	X	X	A	-	A	-	-	-
	Butyl benzoate	C	B	C	X	X	B	A	-	A	-	-	-
	Ethyl benzoate	B	A	A	X	X	A	A	-	A	-	-	-
→	Petrol	X	X	X	**A**	C	X	A	A	A	B	B	A
	…												

Materials are classified by resistance as follows:

A - high resistance, suitable for continuous operation
B - medium resistance, limited scope of continuous operation
C - low resistance, limited scope of operation

X - no resistance
- - no data

The characteristics of the materials in the tables apply at + 20ºC. At higher temperatures, the chemical resistance will generally decrease. Especially at temperatures of + 50ºC and above, it can change drastically. Moreover, rubber compounds, e.g. NBR contain different additives that have a different degree of cross-linking, depending on the manufacturer. Compositions (blends) of different elastomers, e.g. SBR with NBR, are also used. The fact that petroleum substances are usually complex mixtures of many types of hydrocarbons or contain additives must also be considered:

1. In the example in the table above, one selects the hose for the medium: **petrol**, temperature up to + 40ºC, pressure up to 6 bar. Based on the data in the table, one can say that all hoses made of NBR should have good resistance to petrol. However, according to the descriptions of the hoses, the application is often limited by the content of aromatic hydrocarbons (up to 30% or up to 50%). Petrol may contain more than 30% of aromatic hydrocarbons. NBR is not resistant to 100% aromatic hydrocarbons, e.g. **benzene** (shown in the example above). Therefore, for petrol, it is better to choose a hose with the resistance to aromatic content of up to 50% or with a clear indication in the description that it is suitable for petrol.
2. Petrol used as motor fuel may contain various additives, e.g. alcohols or ethers, which improve the combustion properties of the fuel or are ecological in nature. A small amount of additives (e.g. E5 petrol popular in Europe contains up to 5% of ethyl alcohol) should not significantly affect the resistance of the hose material, while in the case of biofuels (more than 5% of additives) this effect should be taken into consideration.
3. In the case of **diesel oil** and **biodiesel,** it is important to evaluate the content of fatty acid ester additives (e.g. FAME) in diesel oil - fuel for compression ignition engines.

Therefore the selection according to the table and the general term **'petrol'** is always only an initial step. It is necessary to follow the exact composition of a substance, e.g. according to the datasheet, confirmation by the manufacturer or Tubes International, the nature of an application (is the hose used only for pouring petrol or is it permanently exposed to petrol?).

Tubes International always recommends getting a written confirmation for the correct selection of a hose and/or complete hose assembly for the medium and for operating conditions specified by the user.

Also, and as in all cases, it is important to check: working pressure and working temperature, resistance of an outer layer, static electricity and medium permeation hazard, selected fittings and sealing resistance, installation of a complete hose assembly.

Petroleum hose construction materials

Basic properties of NBR rubber	
resistant to:	poor resistance:
• mineral, diesel, heating oils and lubricants • hydraulic oil • petrol • vegetable and animal fats • diluted acids and bases	• aromatic hydrocarbons (e.g. benzene, toluene) • solvents (e.g. trichloroethylene) • esters, ethers, ketones • concentrated acids and lye • ozone, UV, weather conditions, fire

Nitrile rubber (NBR) is a material commonly used in making the inner layer of petroleum product hoses. NBR is a copolymer of acrylonitrile (ACN) and butadiene. The percentage of acrylonitrile content (average 17% ÷ 50%) determines the properties of NBR: the more ACN, the higher resistance to oil and solvents and to increased temperature, but in turn, lower flexibility and resistance to low temperatures. The chemical resistance of hoses with NBR inner layer may therefore differ.

Fluorocarbon rubber (FKM, FPM, Viton) is one of the most chemically resistant elastomer materials, with excellent resistance to fuels and aromatic hydrocarbons, even at elevated temperatures. It is however one of the most expensive materials.

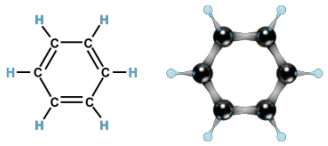
Chloroprene rubber (CR, neoprene) shows slightly lower resistance to oils, fuels and hydrocarbons than NBR, while it is resistant to ozone, UV radiation, ageing and weathering. Its flame resistance is excellent. It is very often used for the outer layers of good quality petroleum hoses.

Polyurethane (PU) has good resistance to oils and fuels, poor resistance to aromatic hydrocarbons, limited operating temperature range.

Polyvinyl chloride (PVC) – is used in hoses in its softened form containing plasticizers. Here, the main problem is the migration (leaching) of plasticizers, which causes hardening of the material, cracking, limited service life, and risk of contamination of the medium. Limited working temperature range.

Petroleum hoses – general information

Resistance to aromatic hydrocarbons



benzene C_6H_6

Aromatic hydrocarbons - hydrocarbons with a characteristic ring structure, the simplest representative of which is **benzene**, often with a distinctive odour (thus, their common name - **aromatics**). Examples of other aromatic hydrocarbons: **toluene, xylene**. Produced mainly from petroleum, they are important raw materials for the chemical industry. Also used as solvents. Generally flammable, explosive, highly toxic, carcinogenic. They are the components of motor fuels, though their content in petrol is being reduced. **Polycyclic aromatic hydrocarbons** (PAH) – e.g. **naphthalene, anthracene, benzopyrene,** used as raw materials in the chemical industry, are also formed during incomplete combustion of hydrocarbons (burning fuels, smoking cigarettes, frying food) and are very harmful (carcinogenic, mutagenic).

When selecting a hose for petroleum products, it is important to take into consideration the resistance of the hose to aromatic hydrocarbons. For typical NBR fuel hoses, it is normally limited to 30% of aromatic hydrocarbons. Such hoses can be used for oil and petrol with an aromatic content of less than 30%. If the aromatic content in petrol or other petrochemical mixtures is likely to be higher, the operation of the hose is more intensive and the application is very responsible, then NBR hoses approved for fuel with 50% aromatic content should be used. When the content of aromatic hydrocarbons is higher than 50%, the chemical hoses come into play and Viton (FKM, FPM) hose may be the best solution.

Resistance to fuel additives and biofuels

E5 E10 E85 B7 B10

Biofuels – a general name for fuels produced from biomass. They can be **solid** (wood, straw, sawdust pellets, etc.), **liquid** (e.g. alcohol produced from grain, diesel oil - biodiesel made from soya, rapeseed, etc.), **gaseous** (biogas from manure, wood gas).

Biopetrol – fuel for spark ignition engines: **ethyl alcohol (ethanol)** as an additive to petrol or as a basic fuel ingredient. Ethanol, as an oxygen-containing compound, increases the octane number of fuel (replacing toxic lead additives used in the past) and reduces the harmfulness of exhaust gases. Other oxygenating additives are also widely used: **alcohol** such as methyl and isopropyl alcohol, **ethers** e.g. methyl tert-butyl ether (MTBE) and other (ETBE, TAME). Bioethanol, as a basic fuel ingredient is e.g. E100 – 100% alcohol, E85 - 85% alcohol, though in Europe it is usually used as a minor addition to regular petrol: E5, E10 – with 5% and 10% of bioethanol respectively or MTBE, ETBE, TAME ethers.

Biodiesel – diesel oil, processed vegetable oil (soybeans, rapeseed, oil palm) converted into fatty acid methyl ester (FAME) or fatty acid ethyl esters (FAEE), either pure (B100, 100% FAME) or as additives to diesel oil (B7 – 7% FAME, B20 – 20% FAME etc.). A commonly used type of FAME is RME (*Rapeseed Methyl Ester*), a fatty acid methyl ester of rapeseed oil. Biodiesel can also be derived from waste vegetable oil, animal fat, algae.

When selecting a fuel hose, the resistance to the type of fuel for which the hose will be used should be confirmed with Tubes International. Basically, if the hose is intended for diesel oil or petrol, its application for commonly used motor fuels with less than 10% bio-components (B7, E5) is compatible with the stated purpose of the hose. The use for fuel containing a large proportion or pure bio-components (E85, E100, B100) should be preceded by detailed verification. The difference in operating conditions when loading/unloading (pouring) fuels, where contact with the fuel is limited in time, and when the hoses operate in the system and are constantly filled with and exposed to fuel must be also considered.

Standards specifying the requirements for hoses for liquid petroleum products, fuels and oils

EN 12115 - covers the requirements for rubber and thermoplastic hoses and hose assemblies for liquid or gaseous chemicals, **including petrochemicals**. The standard distinguishes two types of hoses and hose assemblies intended for chemicals with working pressure up to 10 bar and temperature up to + 65ºC: type D (delivery) and type SD (suction-delivery). In terms of electrical properties, both types can come as:

- **M** - electrically continuous (with copper wire);
- **Ω** - electrically conductive (conductive rubber; $R \leq 10^6\ \Omega$)
- **M/T** – electrically continuous and with resistance through the hose wall $R \leq 10^9\ \Omega$
- **Ω/T** – electrically conductive and with resistance through the hose wall $R \leq 10^9\ \Omega$

As far as hoses for petrochemicals according to EN 12115 are concerned, these are mainly NBR loading/unloading hoses. More standards:
EN 1761, ISO 2929 – rubber hoses and hose assemblies for fuel tank truck loading/unloading (working pressure 10 bar);
EN 1360, EN 13483 – hoses and hose assemblies for refuelling cars from a distributor;
EN ISO 1825, EN 1361 – hoses and hose assemblies for jet fuel;
SAE J517 100 R4, SAE J517 100 R6 – low-pressure hoses and hose assemblies for hydraulic oil;
DIN 73379 – hoses for vehicle fuel systems;
ISO 7840 – fuel hoses for small ships and yachts.

Static electricity and explosion hazard

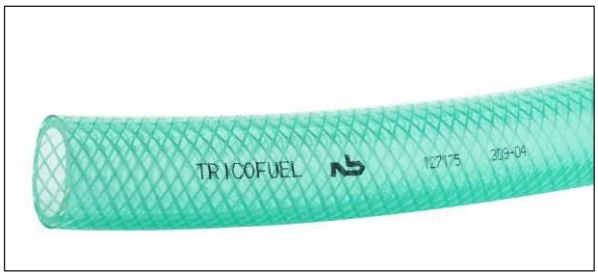
Most petrochemicals are flammable and their vapours in the air can create an explosive atmosphere.
Therefore, it is particularly important to prevent the occurrence of a spark, that may initiate a fire or explosion. When selecting a hose, special attention should be given to the possibility of the formation and accumulation of electric charges in the hose wall and on its surface, which depend on the substance flowing through the hose, flow velocity and properties of the hose wall material. The flash point of the substance and the explosion limits (vapour concentration in the air) play an important role. Not all applications for petroleum hoses will require a copper wire built into the hose, connected to the fittings or antistatic rubber (in the inner layer, outer layer, in both layers, ensuring conductivity through the layers, with resistance $R \leq 10^6\ \Omega$ or only $R \leq 10^9\ \Omega$). The **requirements of the standards** and conducting a **risk analysis** in this respect can provide guidance. We recommend obtaining a written confirmation for the correct selection from Tubes International.

The electrical properties of a flexible hose, matched with its intended application, should be verified by a resistance measurement carried out in accordance with the requirements of EN ISO 8031.

Pressure Directive. CE marking. Special requirements.

The requirements of the Pressure Equipment Directive 2014/68/EU, CE marking or special inspection requirements e.g. for tank loading/unloading hoses (in Poland – TDT) must be considered. See chapter "Chemical hoses".

General-purpose fuel and oil hoses



TRICOFUEL®

Translucent PVC oil and fuel hose

Inner layer: greenish transparent PVC
Reinforcement: synthetic braid
Outer layer: greenish transparent PVC
Work. temp.: from -15°C to +60°C (working pressure depends on temperature)

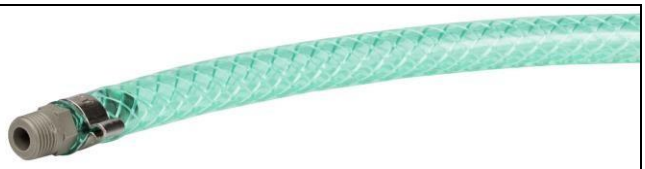
Special PVC compound hose designed for oils, fuels and other hydrocarbon-based petrochemical products. The material has an increased resistance to plasticiser leaching and retains its flexibility even over long periods of use. It withstands repeated bending while showing excellent resistance to ageing. Designed for fuel systems: pumps, burners, heating equipment, oil supply lines. Not suitable for aromatic hydrocarbons (benzene, toluene, xylene etc.). Not recommended for petrol, especially for heavy use or more demanding applications (in that case consider TECHNOBEL PU hose). It can be used for some chemical products: diluted acids, bases and alcohols.
The smooth inner and outer surfaces of the hose and the translucent wall allow visual control of the flow. Widely used in the automotive industry, assembly plants, plastics industry, wood industry, car repair garages, agriculture, forestry and municipal services.

Chemical resistance check: PVC chemical resistance chart (initial selection), PVC resistance chart column B of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [20ºC] [bar]	burst pressure [20ºC] [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
TR-TRICOFUEL-06	6.3	11	2.35	13	40	22	0.08	25
TR-TRICOFUEL-08	8	14	3	13	40	28	0.13	25
TR-TRICOFUEL-10	10	16	3	10	30	35	0.15	25
TR-TRICOFUEL-12	12	19	3.5	10	30	42	0.21	25
TR-TRICOFUEL-15	15	23	4	10	30	52.5	0.30	25
TR-TRICOFUEL-20	20	28	4	10	30	70	0.37	25
TR-TRICOFUEL-25	25	32.5	3.75	8	25	87.5	0.42	25
TR-TRICOFUEL-30	30	39	4.5	8	25	105	0.60	25

Note: colour marked codes - used most often.

The dependence of burst pressure and working pressure on temperature for typical PVC hoses	temperature	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC
	pressure	100%	74%	55%	40%	30%	22%



TRICOFUEL hose DN 6 assembled with a quick release coupling plug, double shut-off, in brass (plug with a valve RE-25SBTF06MPX). Assembly with ASFA-L 9 mm worm drive clamp (AB-03015759) in AISI 316 stainless steel. Can be easily disassembled, but the lock (bolt) of the clamp and excessive band may interfere with operation (therefore excessive band has been cut and blunted - which in turn may prevent the reuse of this clamp). On the right, the same TRICOFUEL hose DN6 with M10x1 male fitting made of polyamide (NA-7100003006), clamped with EAR CLIP made of AISI 304 stainless steel (AB-23012028). Disassembly requires cutting the clamp, but still it is a convenient solution and does not cause e.g. hand injury in case of careless operation.

TRICOFUEL hose DN25 assembled with BSP 1” male fitting (NT-2760FA4) in brass. Assembly with ASFA-S 12 mm worm drive clamp (AB-03017500) in AISI 316 stainless steel.

General-purpose fuel and oil hoses

TECHNOBEL® PU

Very flexible PVC hose with polyurethane (PU) inner layer resistant to fuel and oil

Inner layer: Transparent polyurethane (PU)
Middle layer: black PVC
Reinforcement: polyester braid
Outer layer: black PVC
Work. temp.: from -15°C to +60°C (working pressure depends on temperature)

Lightweight, extremely flexible and elastic, PVC hose with a small bending radius and polyurethane inner layer (PU, polyester-polyurethane). Due to the good chemical resistance of polyurethane, this hose can be used for petrol, unleaded petrol, oils, petroleum products and many solvents. Suitable for compressed air, also for oiled air. With its good abrasion resistance, polyurethane can also be used to transfer moderately abrasive powders or granulates. It is not recommended for acids, bases and aqueous solutions at temperatures above 40ºC. Not suitable for aromatic hydrocarbons (benzene, toluene, xylene etc.).
Widely used in all branches of industry. Also used in agriculture for agricultural spraying (insecticides, pesticides, herbicides, etc.). Used for compressed air for pneumatic tools, spray guns, painting, sandblasting, etc. The outer layer is resistant to hydrocarbons and solvent mist produced during solvent spraying. Can be mounted on hose reels.

Chemical resistance check: chemical resistance chart: PU – inner layer, PVC – outer layer (initial selection), corresponding PU resistance chart (column C) and PVC resistance chart (column B) of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
TR-TECHNOBEL-PU-06	6	11	2.5	20	60	20	0.09	50
TR-TECHNOBEL-PU-08	8	14	3	20	60	27.5	0.13	25
TR-TECHNOBEL-PU-09	9	15	3	20	60	30	0.15	50
TR-TECHNOBEL-PU-10	10	16	3	20	60	32.5	0.16	25
TR-TECHNOBEL-PU-13	12.7	19	3.15	20	60	40	0.20	25
TR-TECHNOBEL-PU-16	16	23	3.5	20	60	55	0.28	25
TR-TECHNOBEL-PU-19	19	26	3.5	20	60	70	0.32	25
TR-TECHNOBEL-PU-25	25	33	4	15	60	90	0.49	25
TR-TECHNOBEL-PU-32	32	41	4.5	12	60	117.5	0.67	25

Note: colour marked codes - used most often.

The dependence of burst pressure and working pressure on temperature for typical PVC hoses	temperature	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC
	pressure	100%	74%	55%	40%	30%	22%

TECHNOBEL PU hose DN6 assembled with BSPT 1/8” male fitting (NM-VT123-02) in stainless steel (AISI 316). Assembly with EAR CLIP made of AISI 304 stainless steel (AB-23012028).

TECHNOBEL PU hose DN6 assembled with 8 mm BANJO fitting (EC-106008) in zinc-plated steel. Crimped with a ferrule (EC-104062) in zinc-plated steel.

TECHNOBEL PU hose DN6 assembled with BSP 1/4” female thread hydraulic fitting with O-ring (TI-ZBW120-04-04-CN), made of zinc-nickel plated steel. Crimped with a ferrule (ZC-BP5-04) in zinc-plated steel.

Before assembly, make sure that the fittings do not have very sharp or deep serrations that could damage the inner polyurethane layer of TECHNOBEL PU hose.

General-purpose fuel and oil hoses

CODAN 3106

Petrol and oil hose in textile braid

Hose material: black NBR / PVC rubber
Reinforcement: outer textile braid (black polyester)
Work. temp.: from -30°C to +100°C (for a short period)
(max. working temperature depends on medium)

Flexible, soft, rubber hose with an outer textile braid designed primarily for fuel systems of leaded and unleaded petrol or diesel oil in small vehicles (cars, motorcycles, mopeds, garden tractors) or industrial equipment. Installed e.g. to connect a fuel pump with a carburettor. Not suitable for engines with a fuel injection system. Based on the requirements of DIN 73379 type B (03/1982) standard.
Black, smooth NBR/ PVC rubber compound inner layer. The outer polyester fibre braid and rubber are bonded through vulcanisation for reinforcement and protection against hot components.
Can also be used for water, coolants, non-oxidising detergents, air. The maximum operating temperature depends on the medium: for water and ethylene glycol based coolants: +90°C, for air: +80°C, for liquid, non-oxidising detergents: +80°C, for diesel oil: +80°C, for petrol, unleaded petrol, for fuel with an aromatic content up to 50%: +40°C.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
CO-3106-032	3.2	7.2	2	13	50	20	0.044	30
CO-3106-035	3.5	7.5	2	13	50	20	0.046	30
CO-3106-040	4.0	9.0	2.5	11	45	20	0.068	30
CO-3106-045	4.5	9.5	2.5	11	45	20	0.073	30
CO-3106-050	5.0	10.0	2.5	10	42	20	0.080	30
CO-3106-055	5.5	10.5	2.5	10	39	20	0.085	30
CO-3106-060	6.0	11.0	2.5	10	39	20	0.090	30
CO-3106-065	6.5	11.5	2.5	10	39	20	0.065	30
CO-3106-070	7.0	12.0	2.5	9	35	20	0.100	30
CO-3106-075	7.5	12.5	2.5	9	35	30	0.105	30
CO-3106-080	8.0	13.0	2.5	8	32	30	0.110	30
CO-3106-090	9.0	14.0	2.5	6	23	40	0.123	30
CO-3106-095	9.5	15.0	2.75	6	23	40	0.130	30
CO-3106-100	10.0	15.0	2.5	6	23	40	0.133	30
CO-3106-110	11.0	16.0	2.5	5	20	40	0.144	30
CO-3106-120	12.0	17.0	2.5	5	20	40	0.160	30
CO-3106-127	12.7	17.7	2.5	5	15	40	0.180	30

Note: colour marked codes - used most often.

CODAN 3106 hose DN6 assembled with 1/4" BSPT male fitting (NT-2660BA4) in brass. Crimped with EC-104062 ferrule in zinc-plated steel.

CODAN 3106 hose DN6 assembled with 1/8" BSPT male fitting (NT-2664AA4) in brass. Assembly with MINI CLIP (AB-03010552) in zinc-plated steel.

CODAN 3106 hose DN6 assembled with 14 mm BANJO eye fitting (EC-106014) in zinc-plated steel. Crimped with EC-104062 ferrule in zinc-plated steel.

General-purpose fuel and oil hoses

NAFTREX B

Petrol and oil hose in textile braid

Hose material: black NBR rubber
Reinforcement: black outer textile braid
Work. temp.: from -35°C to +120°C (for a short period)
(max. working temperature depends on medium)

Flexible, soft, rubber hose with an outer textile braid designed primarily for fuel systems of leaded and unleaded petrol or diesel oil in small vehicles (cars, motorcycles, mopeds, garden tractors) or industrial equipment. Installed e.g. to connect a fuel pump with a carburettor. Not suitable for engines with a fuel injection system. Can also be used for water, coolants, non-oxidising detergents, air. Based on the requirements of DIN 73379 type B (03/1982) standard.
Black, smooth NBR rubber inner layer. The outer textile braid and rubber are bonded through vulcanisation for reinforcement and protection against hot components.
The maximum working temperature depends on the medium: for petrol, unleaded petrol, for fuel with an aromatic content up to 50%: +40°C, for diesel oil: +80°C; for water and ethylene glycol based coolants: +90°C; for air: +80°C; for liquid, non-oxidising detergents: +80°C.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
BG-NAFTREX-B-03,2	3.2	7	1.9	10	30	40	0.045	20
BG-NAFTREX-B-03,5	3.5	7.5	2.0	10	30	45	0.050	20
BG-NAFTREX-B-04	4	9	2.5	10	30	45	0.075	20
BG- NAFTREX-B-04,5	4.5	9.5	2.5	10	30	50	0.080	20
BG-NAFTREX-B-05	5	10	2.5	10	30	50	0.085	20
BG-NAFTREX-B-05,5	5.5	10.5	2.5	10	30	50	0.090	20
BG-NAFTREX-B-06	6	11	2.5	10	30	60	0.100	20
BG-NAFTREX-B-07	7	12	2.5	10	30	60	0.110	20
BG-NAFTREX-B-07,5	7.5	12.5	2.5	10	30	65	0.115	20
BG-NAFTREX-B-08	8	13	2.5	10	30	65	0.120	20
BG-NAFTREX-B-09	9	14	2.5	10	30	65	0.135	20
BG-NAFTREX-B-11,5	11.5	17	2.75	10	30	75	0.180	20

Note: colour marked codes - used most often.

NAFTREX B hose DN6 assembled with a double BANJO fitting (type EC) in zinc-plated steel. Crimped with smooth ferrules (type EC) in zinc-plated steel.	
NAFTREX B hose DN7 assembled with M16x1,5 female hydraulic fitting in zinc-plated steel. Crimped with ZC-BP5-05 ferrule (zinc-plated steel).	
NAFTREX B hose DN11,5 assembled with BSPT 1/2" male fitting (NT-2660DA4) in brass. Assembly with EAR CLIP made of AISI 304 stainless steel (AB-23012060).	

General-purpose fuel and oil hoses

GALVOIL L

Petrol and oil hose in steel braid

Hose material: black NBR rubber
Reinforcement: outer zinc-plated steel wire braid
Work. temp.: from -35°C to +90°C (max. working temperature depends on medium)

Flexible, soft, rubber hose with an outer, zinc-plated steel braid designed for petrol and petroleum oils such as gear oil, heating oil, diesel oil. Mounted in fuel and oil systems of small vehicles and industrial equipment. Also suitable for water, coolants, non-oxidising detergents, air.
Black, smooth NBR rubber inner layer. The outer reinforcement braid of zinc-plated steel gives excellent pressure resistance. A coloured marking strip in the braid.
The maximum working temperature depends on the medium: for petrol, unleaded petrol, for fuel with an aromatic content up to 50%: +40°C, for diesel oil: +80°C; for water and ethylene glycol based coolants: +90°C; for air: +80°C; for liquid, non-oxidising detergents: +80°C.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

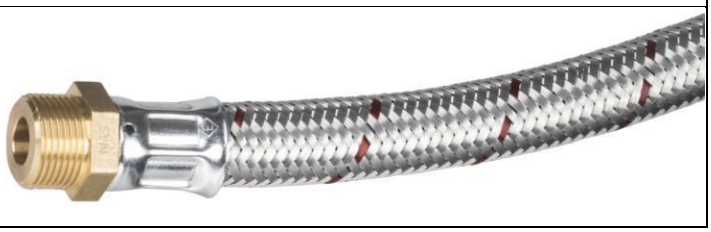
code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
SL-GALVOIL-L-04*	4.5	9.5	2.5	25	75	25	0.070	100
SL-GALVOIL-L-05	5	10	2.5	25	75	25	0.080	100
SL-GALVOIL-L-06	6	11	2.5	25	75	30	0.090	100
SL-GALVOIL-L-07	7.5	12.5	2.5	25	75	35	0.105	100
SL-GALVOIL-L-08	8	13	2.5	25	75	40	0.115	100
SL-GALVOIL-L-10	10	15	2.5	25	75	50	0.135	100
SL-GALVOIL-L-11	11	17.5	3.25	20	60	55	0.155	100
SL-GALVOIL-L-13	13	19	3	20	60	65	0.185	100
SL-GALVOIL-L-14	14	21.5	3.75	20	60	70	0.280	50
SL-GALVOIL-L-16	16	22	3	20	60	80	0.290	50

Note: colour marked codes - used most often. * - while stocks last

GALVOIL L hose DN4 assembled with a fitting type EC with a ball-shaped end, with BSP 1/8” female nut, in zinc-plated steel (EC-105050 + EC-105605). Crimped with EC-104050 ferrule in zinc-plated steel.

GALVOIL L hose DN10 assembled with 45º angle M18x1.5 female hydraulic fitting (TI-ZMW311-18-06) in zinc-plated steel. Crimped with TI-L-18-06 ferrule in zinc-plated steel.

GALVOIL L hose DN16 assembled with BSP 3/4” male fitting (NT-2764EA4) in brass. Crimped with EC-104124 ferrule in zinc-plated steel.



General-purpose fuel and oil hoses

PZ

Petrol and oil hose in steel braid

Hose material: black NBR rubber
Reinforcement: outer zinc-plated steel wire braid
Work. temp.: from -35°C to +80°C (max. working temperature depends on medium)

Flexible, soft, rubber hose with an outer, zinc-plated steel braid designed for petrol and petroleum oils such as e.g. diesel oil, heating oil, lubricating oil. Mounted in fuel and oil systems of small vehicles and industrial equipment. Can also be used for water, coolants, non-oxidising detergents, air. Based on the requirements of DIN 73379.
Black, smooth NBR rubber inner layer. The outer reinforcement braid of zinc-plated steel offers excellent pressure resistance. A black marking strip in the braid.
The maximum working temperature depends on the medium: for petrol, unleaded petrol, for fuel with an aromatic content up to 50%: +40°C, for diesel oil: +80°C; for water and ethylene glycol based coolants: +90°C; for air: +80°C; for liquid, non-oxidising detergents: +80°C.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
EC-101005	4.5	9.5	2.5	20	60	25	0.110	50
EC-101006	5.5	10.5	2.5	20	60	30	0.130	50
EC-101008	7.5	12.5	2.5	15	50	35	0.165	50
EC-101010	9.5	14	2.25	15	50	45	0.220	50
EC-101012	11.5	18	3.25	15	50	55	0.290	50
EC-101015	14.5	22	3.75	15	50	75	0.390	50
EC-101018	17	25	4	15	50	85	0.455	50
EC-101019	20	28	4	10	30	100	0.530	50
EC-101020	22	30	4	10	30	130	0.560	50
EC-101025	25	33	4	10	25	150	0.600	50

Note: colour marked codes - used most often.

PZ hose DN5.5 with a fitting type EC, M12x1.5 female thread, flat seal, crimped with a smooth ferrule type EC. Fittings made of zinc-plated carbon steel.

PZ hose DN5,5 with a brass 1/4" BSPT male fitting (NT-2660BA4) assembled with MINI CLIP in AISI 304 stainless steel (AB-622010).

PZ hose DN11.5 with AISI 316 stainless steel fitting assembled with EAR CLIP (AB-23012423).

General-purpose fuel and oil hoses

PZVA

Oil and petrol hose in stainless steel braid

Hose material: black NBR rubber
Reinforcement: outer AISI 304 stainless steel wire braid
Work. temp.: from -35°C to +80°C (max. working temperature depends on medium)

Flexible, soft, rubber hose with an outer, stainless steel braid designed for petrol and petroleum oils such as e.g. diesel oil, heating oil, lubricating oil. Used in fuel and oil systems of small vehicles and industrial equipment. Can also be used for water, coolants, non-oxidising detergents, air. Based on the requirements of DIN 73379.
Black, smooth NBR rubber inner layer. The outer reinforcement braid of stainless steel offers excellent pressure resistance and corrosion resistance.
The maximum working temperature depends on the medium: for petrol, unleaded petrol, for fuel with an aromatic content up to 50%: +40°C, for diesel oil: +80°C; for water and ethylene glycol based coolants: +90°C; for air: +80°C; for liquid, non-oxidising detergents: +80°C.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
EC-101356	5.5	10.5	2.5	20	60	30	0.130	50
EC-101358	7.5	12.5	2.5	15	50	35	0.165	50
EC-101360	9	15	3	15	50	40	0.240	50
EC-101362	11.5	18	3.25	15	50	55	0.290	50
EC-101364	14.5	21	3.25	15	50	75	0.380	50
EC-101365	17.5	24.5	3.5	15	50	90	0.430	50
EC-101368	19	29	5	10	30	95	0.560	50
EC-101370	25	33	4	10	30	150	0.600	50

Note: colour marked codes - used most often.

PZVA hose DN11.5 with AISI 316 stainless steel 1/2” BSPT male fitting (NM-VT123-08) assembled with EAR CLIP in AISI 304 stainless steel (AB-2301423).

PZVA hose DN11.5 with AISI 316 stainless steel 1/2” BSPT male fitting (NM-VT123-08) crimped with a smooth ferrule type EC in AISI 304 stainless steel.

General purpose fuel and oil hoses - biofuel hoses

RME

Biodiesel fuel hose

Inner layer: special NBR rubber
Reinforcement: synthetic textile braid
Outer layer: CR rubber
Work. temp.: from -30°C to +100°C (with peaks up to +120°C)

Flexible, soft, fuel hose made of special NBR rubber resistant to rapeseed oil fatty acid methyl ester (RME). Synthetic textile braid reinforcement. The outer layer is made of CR chloroprene rubber, antistatic and self-extinguishing, resistant to abrasion, temperature and ageing. Particularly recommended for biofuels based on fatty acid methyl esters (FAME, RME), e.g. biodiesel B10, B20, B100. It can also be used for regular diesel fuel.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
EC-101170	6	12	3	15	45	45	0.110	20
EC-101172	8	14	3	15	45	55	0.135	20
EC-101174	10	17	3.5	15	45	70	0.195	20
EC-101177	13	20	3.5	15	45	90	0.240	20
EC-101180	16	23	3.5	15	45	120	0.283	20
EC-101183	19	28	4.5	15	45	130	0.439	20

FPM ECO

High-temperature, biodiesel fuel hose

Inner layer: FPM rubber (Viton)
Middle layer: epichlorohydrin rubber (ECO)
Reinforcement: aramid textile braid
Outer layer: epichlorohydrin rubber (ECO)
Work. temp.: from -40°C to +125°C

High-quality, multilayer, fuel hose based on the requirements of DIN 73379-3E (11/97). Construction: inner layer made of chemical and temperature resistant Viton (FPM), middle layer made of epichlorohydrin (ECO), temperature resistant and durable aramid fibre braid, outer layer made of epichlorohydrin (ECO) – resistant to temperature, ozone and micro cracks. The Viton inner layer provides excellent chemical resistance to hydrocarbons, petrochemicals, many aggressive chemicals and fuel additives, even at elevated working temperatures. Particularly recommended for biofuels based on fatty acid methyl esters (FAME) e.g. biodiesel B10, B20, B100. Resistant to rapeseed oil fatty acid methyl ester (RME). Can be used for biopetrol containing ethyl alcohol, e.g. E10, E100. Resistant to phosphate esters (which are also liquid fuel additives). It is also suitable for regular diesel fuel, petrol, mineral oils. Recommended for demanding applications in terms of high fuel purity, temperature and ageing resistance. It has a low rate of hydrocarbon permeation through the hose wall.

Chemical resistance check: FPM (FKM) chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
EC-101155	5.5	11.5	3.0	10	30	60	0.105	20
EC-101158	7.3	13.3	3.0	10	30	70	0.130	20
EC-101160	9.3	15.3	3.0	10	30	80	0.150	20
EC-101162	11.5	17.5	3.0	10	30	90	0.180	20
EC-101163	14.3	21.3	3.5	10	30	110	0.260	20
EC-101165	17.0	24.0	3.5	10	30	125	0.300	20

General-purpose fuel and oil hoses

CARBUR 10 – 20 BAR

Delivery fuel hose – for petrol, oil and lubricants

Inner layer: black NBR rubber
Reinforcement: synthetic braid
Outer layer: black NBR / PVC rubber
Work. temp.: from -20°C to +90°C

Flexible and elastic, delivery hose designed to transfer fuels and oils containing up to 50% aromatic hydrocarbons. Used in fuel systems (petrol, diesel and heating oil) as well as oil and lubrication systems of various industrial equipment. The inner layer is made of black, smooth, seamless, conductive NBR rubber. Synthetic textile braid reinforcement. The outer layer of smooth, seamless NBR / PVC rubber compound is resistant to fuel, oil and weather conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
CARBUR 10 BAR								
IV-CARBUR10-05	5	12	3.5	10	30	40	0.12	100
IV-CARBUR10-06	6	13	3.5	10	30	50	0.14	100
IV-CARBUR10-08	8	15	3.5	10	30	65	0.17	100
IV-CARBUR10-10	10	17	3.5	10	30	80	0.20	100
IV-CARBUR10-13	13	20	3.5	10	30	105	0.24	60
IV-CARBUR10-15	15	23	3.5	10	30	120	0.32	60
IV-CARBUR10-19	19	27	4	10	30	150	0.39	60
IV-CARBUR10-25	25	35	5	10	30	200	0.63	40
CARBUR 20 BAR								
IV-CARBUR20-06	6	14	4	20	60	60	0.17	100
IV-CARBUR20-08	8	17	4.5	20	60	65	0.23	100
IV-CARBUR20-10	10	19	4.5	20	60	80	0.28	100

Note: colour marked codes - used most often.

CARBUR 10 hose DN6 assembled with 14 mm eye fitting (banjo) in zinc-plated steel (EC-106014). Crimped with EC-104084 ferrule in zinc-plated steel.

CARBUR 10 hose DN13 with 1/2" BSP male thread, 60º cone hydraulic fitting in AISI 316 stainless steel (TI-ZBZ110-08-08-SS-PH) crimped with AISI 304 stainless steel ferrule TI-L-22-08-SS.

General-purpose fuel and oil hoses

FUB

Hose for automotive fuels, biofuels and oils

Inner layer: NBR rubber
Reinforcement: textile braid
Outer layer: black synthetic rubber
Work. temp.: from -40°C to +100°C
ambient up to +120°C

Very flexible and elastic hose for unleaded petrol and diesel oil for passenger cars, trucks and tractors. Can be used in the engine compartment of a truck. The inner layer is made of black, smooth NBR rubber highly resistant to fuel (oil resistance: RMA class A), suitable for most automotive fuels (B7 standard diesel (EN590:2017), B20, B100 biodiesel, E5 standard unleaded petrol (EN228:2017), E10, E85 and E100 - 100% ethanol). Reinforced with a robust textile braid for a safety factor of 4:1. The outer layer is made of black, smooth, high-quality synthetic rubber resistant to oil, ozone and weather conditions. A commonly used fuel hose for automotive vehicles. Compliant with SAE J30R2 and SAE J30 R6 standards.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
SP-FUB-03,2	3.2	9.2	3	12	48	20	0.08	50
SP-FUB-04	4	10	3	12	48	25	0.08	50
SP-FUB-04,5	4.5	10.5	3	12	48	27	0.09	50
SP-FUB-05	5	11	3	12	48	30	0.11	50
SP-FUB-05,5	5.5	11.5	3	12	48	33	0.11	50
SP-FUB-06	6	12	3	12	48	35	0.10	50
SP-FUB-07	7	13	3	12	48	42	0.12	50
SP-FUB-07,5	7.5	13.5	3	12	48	45	0.13	50
SP-FUB-08	8	14	3	12	48	50	0.13	50
SP-FUB-09	9	15	3	12	48	55	0.14	50
SP-FUB-09,5	9.5	15.5	3	12	48	60	0.15	50
SP-FUB-10	10	16	3	12	48	60	0.16	50
SP-FUB-12	12	19	3.5	12	48	70	0.21	50

Note: colour marked codes - used most often.

FUB hose DN8 with AISI 316 stainless steel BSPT 1/4” male thread fitting (NM-VT123-04) clamped with MINI CLIP in AISI 304 stainless steel (AB-622014).	
FUB hose DN8 with M18x1.5 female hydraulic fitting (TI-ZMW111-18-05) crimped with a ferrule (TI-L-15-05). Fittings made of zinc-plated steel.	
FUB hose DN8 with NPT 1/4” male thread hydraulic fitting (TI-ZNZ110-04-05-SS) crimped with a ferrule (TI-L-15-05-SS). Fittings made of stainless steel.	

General-purpose fuel and oil hoses

TU 25

Flexible hose for oil, fuel and air (25 bar)

Inner layer: black NBR rubber
Reinforcement: textile braid
Outer layer: black NBR / EPDM rubber
Work. temp.: from -40°C to +80°C

Flexible, pressure hose for industrial oils, mineral oils, unleaded petrol (EN 228:2017), diesel (EN 590:2010), heating oil (DIN 51 603 1÷5). Also suitable for compressed air. The inner layer is made of black, smooth NBR rubber, antistatic $R<10^6$ Ω/m (EN ISO 8031:2009). Reinforced with a textile braid for a safety factor of 3.15 : 1. Resistant to slight vacuum up to around 0.5 bar. The outer layer of black, smooth NBR / EPDM rubber compound is resistant to oil, ozone, abrasion and weather conditions.
Widely used in the industry, repair shops, garages and filling stations (not recommended for use as a fuel dispensing hose).

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
SP-TU25-06	6	14	4	25	78.8	40	0.17	100
SP-TU25-08	8	16	4	25	78.8	50	0.19	100
SP-TU25-10	10	18	4	25	78.8	60	0.23	50
SP-TU25-13	13	21	4	25	78.8	80	0.28	50
SP-TU25-16	16	25	4.5	25	78.8	100	0.38	50
SP-TU25-19	19	29	5	25	78.8	120	0.50	50
SP-TU25-25	25	36	5.5	25	78.8	150	0.73	50

Note: colour marked codes - used most often.

TU25 hose DN6 with AISI 316 stainless steel BSPT 1/8” male thread fitting (NM-VT123-02) clamped with EAR CLIP in AISI 304 stainless steel.

TU25 hose DN19 with brass BSPT 3/4” male thread fitting (NT-2660EA4) clamped with a worm drive clamp (AB-03009002) in zinc-plated steel.

TU25 hose DN19 with M30x2 female thread hydraulic fitting with an O-ring (TI-ZMW121-30-12-CN), zinc-plated (zinc-nickel) crimped with a ferrule (TI-L-30-12) in zinc-plated carbon steel.

General-purpose fuel and oil hoses

TU 40

Flexible hose for oil and air (40 bar)

Inner layer: black NBR rubber
Reinforcement: polyester braid
Outer layer: black SBR/NVC rubber
Work. temp.: from -45°C to +100°C
(from -45°C to +70°C for air)

Flexible hose designed to transfer industrial oils, mineral oils, diesel (EN 590:2010), biodiesel and heating oil (DIN 51 603 1÷5) under higher pressure. Also suitable for compressed air, glycol-based coolants. The inner layer is made of black, smooth NBR rubber, antistatic R<10^6 Ω/m (EN ISO 8031:2009). Reinforced with a robust textile braid for a safety factor of 4:1. 1. Resistant to slight vacuum up to around 0.6 bar. The outer layer of black, smooth SBR / NVC rubber (NVC - NBR and PVC compound) is resistant to oil, ozone and weather conditions.
The hose is used in the industry, workshops, garages and filling stations for applications at higher working pressures.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
SP-TU40-04	4	11	3.5	40	160	50	0.11	50*
SP-TU40-06	6	13	3.5	40	160	64	0.15	50*
SP-TU40-08	8	15	3.5	40	160	73	0.18	50*
SP-TU40-10	10	17	3.5	40	160	77	0.22	50*

Note: colour marked codes - used most often; * - manufacturer's coil (50 m) may contain 3 sections, minimum length of the section is 5 m.

TU40 hose DN6 with BSP 1/8" BANJO hydraulic fitting (TI-ZBB600-02-04) crimped with a ferrule (TI-L-15-04). Fittings made of zinc-plated steel.

TU40 hose DN10 with M16x1.5 male thread hydraulic fitting (TI-ZMZ111-16-06) crimped with a ferrule (TI-L-19-06). Fittings made of zinc-plated steel.

TU40 hose DN10 with M20x1.5 female thread hydraulic fitting with O-ring (TI-ZMW122-20-06-SS) crimped with a ferrule (TI- L-19-06-SS). Fittings made of stainless steel.

Hydraulic oil hoses

OIL COMPRESSOR

Robust delivery hose for hot oil (40 bar)

Inner layer: black synthetic rubber
Reinforcement: synthetic cord
Outer layer: blue synthetic rubber
Work. temp.: from -30°C to +130°C (with peaks up to +150°C)

Robust, delivery hose designed for hot oil in hydraulic systems up to 40 bar. The inner layer of black, smooth, synthetic rubber is resistant to hot oil. Reinforced with high-strength synthetic cord. The outer layer is made of blue synthetic rubber, self-extinguishing (according to MSHA requirements), resistant to weather conditions.
As the hose is made of specially designed synthetic rubber compound, it can be used to transfer hot oil under pressure (except ester-based oils) in hydraulic systems and a variety of industrial applications.

Note: Hot oil is dangerous. Complete hose assemblies, and in particular, installation of fittings to hoses, should be designed and verified for leakage and integrity under high temperature conditions.

Chemical resistance check: confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
IV-COMPRESSOR-10	10	19	4.5	40	120	0.27	60 / 120
IV-COMPRESSOR-13	13	22	4.5	40	120	0.32	60 / 120
IV-COMPRESSOR-16	16	28	6	40	120	0.49	60 / 120
IV-COMPRESSOR-19	19	31	6	40	120	0.56	60 / 120
IV-COMPRESSOR-25	25	37	6	40	120	0.70	60 / 120
IV-COMPRESSOR-32	32	46	7	40	120	1.05	60 / 120
IV-COMPRESSOR-38	38	55	8.5	40	120	1.49	60 / 120
IV-COMPRESSOR-51	51	67	8	40	120	1.79	60 / 120

Note: colour marked codes - used most often.

COMPRESSOR hose DN13 with BSPT 1/2” male thread hydraulic fitting (TI-ZBZ130-08-08-CN) crimped with a ferrule (TI-L-24-08). Fittings made of zinc-plated steel. This hose will be used for hot hydraulic oil.

COMPRESSOR hose DN51 with BSP 2” female thread hydraulic fitting, with flat seal, in AISI 316 stainless steel crimped with a ferrule (TI-LDR-068-32-SS) in AISI 304 stainless steel.

Hydraulic oil hoses

SAE 100 R4

Suction - delivery hose for hydraulic oil

Inner layer: black synthetic rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black synthetic rubber
Work. temp.: from -40°C to +100°C

Robust and flexible, suction-delivery hose for low-pressure sections of high-pressure hydraulic systems, based on the requirements of SAE J517 100 R4 standard. It is a hose for oil suction and oil return lines in particular. Intended mainly for mineral oil-based hydraulic fluids and certain synthetic hydraulic fluids. It can also be used for water-based hydraulic fluids and for water with the upper temperature limit of +70°C. Suitable for conveying liquid petrochemical products with a low aromatic content. Not recommended for petrol, diesel and phosphate ester-based oils.
The inner layer is made of black, smooth, oil-resistant synthetic rubber. Reinforcement is made up of layers of synthetic cord and a steel helix, which ensures high resistance to vacuum and very good flexibility without kinking. The outer layer of black, synthetic rubber is resistant to abrasion, weather conditions and slightly oily conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

Assembly: use industrial hose fittings mounted with hose clamps or hydraulic hose fittings crimped with ferrules.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil lengt h [m]
IV-SAE100R4-19	19	30	5.5	21	83	0.9	114	0.61	60 / 120
IV-SAE100R4-25	25	38	6.5	17	69	0.9	150	0.90	60 / 120
IV-SAE100R4-30	30	41	5.5	17	69	0.9	180	0.91	60 / 120
IV-SAE100R4-32	32	43	5.5	14	55	0.9	192	0.96	60 / 120
IV-SAE100R4-35	35	47	6	14	55	0.9	210	1.17	60 / 120
IV-SAE100R4-38	38	49.5	5.75	10	41	0.9	228	1.26	60 / 120
IV-SAE100R4-40X51	40	51	5.5	10	41	0.9	240	1.14	60 / 120
IV-SAE100R4-40	40	53	6.5	10	41	0.9	240	1.44	60 / 120
IV-SAE100R4-42	42	54	6	10	41	0.9	252	1.37	60 / 120
IV-SAE100R4-45	45	56.5	5.75	10	41	0.9	270	1.41	60 / 120
IV-SAE100R4-51	51	64	6.5	7	28	0.9	306	1.78	60 / 120
IV-SAE100R4-63	63.5	76	6.25	4	17	0.9	381	2.14	60 / 120
IV-SAE100R4-76	76	88	6	4	17	0.9	456	2.56	60 / 120
IV-SAE100R4-102	102	115	6.5	2	10	0.9	612	3.78	60 / 120

Note: colour marked codes - used most often.

SAE 100 R4 hose DN25 with UNF 1.5/8” male thread JIC hydraulic fitting, 74º cone (TI-ZJZ110-26-16) crimped with a ferrule (TI-L-39-16).

SAE 100 R4 hose DN51 with CAMLOCK C 2” coupling in aluminium (AC-C-200-AX) mounted with two T-bolt clamps in zinc-plated steel (AB-HDC-064- 067-W1).

Hydraulic oil hoses

HW R6

Delivery hose for hydraulic oil

Inner layer: black synthetic rubber
Reinforcement: single textile braid
Outer layer: black synthetic rubber
Work. temp.: from -40°C to +100°C

Delivery hose for low-pressure sections of high-pressure hydraulic systems compliant with SAE 100 R6 and ISO 4079 R6. Intended mainly for mineral oil-based hydraulic fluids and certain synthetic hydraulic fluids. It can also be used for water-based hydraulic fluids and for water and air with the upper temperature limit of +70°C (outer layer may require pinpricking if the hose is used for air). Suitable for a variety of liquid petrochemical products: mineral and synthetic oils, diesel and heating oil, ethylene glycol and many other. Not recommended for petrol and ester-based oils, not suitable for aromatic hydrocarbons.
The inner layer is made of black, smooth synthetic rubber. Textile braid reinforcement. The outer layer of black, synthetic rubber is resistant to abrasion, oil, ozone and weather conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

Assembly: use hydraulic fittings crimped with ferrules.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
HW-R6-06	6.4	12.8	3.2	28	112	65	0.100	20
HW-R6-08	8.1	14.1	3.0	28	112	75	0.125	20
HW-R6-10	9.7	16.0	3.15	28	112	75	0.150	20
HW-R6-13	13.0	19.8	3.4	28	112	100	0.200	20
HW-R6-16	16.1	23.1	3.5	24	96	125	0.250	20
HW-R6-19	19.2	26.9	3.85	21	84	150	0.300	20
HW-R6-25*	25.4	33.4	4.0	12	48	135	0.450	20

Note: colour marked codes - used most often. * - diameter not included in ISO 4079 standard type R6

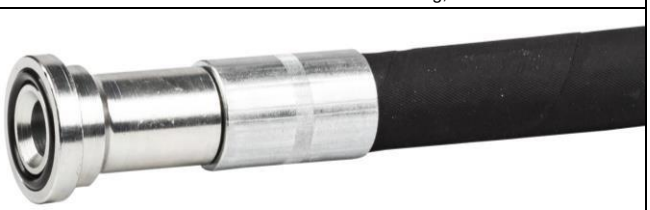
HW-R6 hose DN6 with TI-ZNZ110-02-04 fitting, MC-BP7-04 ferrule.

HW-R6 hose DN8 with TI-ZMW11-16-05-CN fitting, TI-L-15-05 ferrule.

HW-R6 hose DN10 with TI-ZBZ110-06-06 fitting, MC-BP7-06 ferrule.

HW-R6 hose DN13 with TI-ZOZ110-13-08-CN fitting, TI-L-22-08 ferrule.

HW-R6 hose DN16 with TI-ZMW121-26-10-SS304 fitting, TI-L-25-10-SS ferrule.



HW-R6 hose DN19 with TI-ZSK111-12-12 fitting, MC-BP7-12 ferrule.

Hoses for fuel systems of small ships, boats and yachts

Hoses for fuel systems of small ships, boats, motor yachts must, apart from fuel resistance, meet specific requirements concerning mainly fire resistance and installation in tight spaces of the boat, in places directly adjacent to crew cabins and accommodation. One of the important requirements of the standards is to limit slow permeation of fuel vapour through the surface of the hose wall. Only good quality fuel hoses should be used on motorboats. They must conform to standards and be approved by recognised classification bodies.

POSEIDON EX

Fuel delivery hose for boats and yachts

Inner layer: black, synthetic rubber
Reinforcement: synthetic braid
Outer layer: black, synthetic rubber
Work. temp.: from -20°C to +100°C

Soft, flexible, extruded, delivery hose for low-pressure transfer of petrol and diesel oil, fire-resistant, intended for small water vessels - pleasure boats up to 24 m long. Designed for fuel systems of inboard engines on ships, motor boats, yachts, etc. Suitable for unleaded petrol, petrol containing up to 10% ethanol (E10 petrol), diesel oil and diesel oil containing up to 10% FAME ester (B10 – biodiesel). Complies with ISO 7840 type A1 (fire-resistant, fuel vapour permeation less than or equal to 100 g/m^2/24 h), complies with Directive 94/25/EC, RINA certified, complies with SAE 1527, USCG type A1.
The inner layer of black, seamless, synthetic rubber is resistant to oils and fuels containing up to 50% aromatic hydrocarbons. Synthetic textile braid reinforcement. The outer layer is made of black, fire-resistant, seamless synthetic rubber, which is resistant to ageing, grease, weather conditions and temperature (fire resistance): ISO 7840 Annex A: a hose filled with fuel should withstand a fire for 2.5 minutes).

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-POSEIDON-EX-06	6	14	4	3.4	13.6	45	0.22	40
IV-POSEIDON-EX-08	8	16	4	3.4	13.6	55	0.27	40
IV-POSEIDON-EX-10	10	19	4.5	3.4	13.6	65	0.36	40
IV-POSEIDON-EX-13	13	22	4.5	2.5	10	80	0.43	40
IV-POSEIDON-EX-16	16	25	4.5	2.5	10	100	0.50	40
IV-POSEIDON-EX-19	19	28	4.5	2.5	10	110	0.58	40

Note: colour marked codes - used most often.

1. POSEIDON EX hose DN8 with BSPT 1/4” male thread fitting in AISI 316 stainless steel (NM-VT123-04), clamped with MINI CLIP in AISI 316 stainless steel (AB-622016).
2. POSEIDON EX hose DN16 with BSP 5/8” male thread fitting in AISI 316 stainless steel (TI-ZBZ140-10-10-SS), crimped with AISI 304 stainless steel ferrule (TI-L-28-10-SS).

Hoses for fuel systems of small ships, boats and yachts

POSEIDON, POSEIDON LL

Fuel hose for boats and yachts 10 bar

Inner layer: black synthetic rubber
Reinforcement: synthetic cord (POSEIDON)
synthetic cord, steel helix (POSEIDON LL)
Outer layer: synthetic rubber
Work. temp.: from -30°C to +100°C

Flexible, very elastic, extruded hose for conveying petrol and diesel oil, fire-resistant, intended for small water vessels - pleasure boats up to 24 m long. The hose is mandrel-built and operates at a working pressure of 10 bar. Designed for fuel systems of inboard engines on ships, motor boats, yachts, etc. Suitable for unleaded petrol, petrol containing up to 10% ethanol (E10 petrol), diesel oil and diesel oil containing up to 10% FAME ester (B10 – biodiesel). Complies with ISO 7840 type A1 (fire-resistant, fuel vapour permeation less than or equal to 100 g/m^2/24 h), complies with Directive 94/25/EC, RINA certified, complies with SAE 1527, USCG type A1.
The inner layer of black, smooth, synthetic rubber is resistant to oils and fuels containing up to 50% aromatic hydrocarbons. Reinforcement with layers of synthetic cord and, for POSEIDON LL hose, with an additional steel helix. The outer layer of black, self-extinguishing, synthetic rubber is resistant to oil and weather conditions (fire resistance: ISO 7840 Annex A: a hose filled with fuel should withstand a fire for 2.5 minutes).

POSEIDON: POSEIDON hose is a soft delivery hose without steel helix reinforcement. The manufacturer recommends installing POSEIDON hoses with a diameter of over 19 mm in straight sections or with a smooth (large) bending radius. The hose is perfect for the filling system of a boat fuel tank. On special request, POSEIDON hose is available in smaller diameters (6, 8,10,13,16 and 19 mm – as is POSEIDON EX) and a working pressure of 10 bar.

POSEIDON LL: POSEIDON LL hose is additionally reinforced with a steel helix for vacuum and kink resistance. The hose is very flexible, its minimum bend radius is only three times its inside diameter and it can be easily installed in tight spaces in the engine compartment of a boat. With its versatility and high quality, the hose is readily and frequently used by manufacturers of larger motor yachts.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
POSEIDON (delivery hose, without helix, smaller diameters available on request)								
IV-POSEIDON-22	22	32.5	5.25	10	30	~	0.61	60 / 120
IV-POSEIDON-25	25	35.5	5.25	10	30	~	0.68	60 / 120
IV-POSEIDON-30	30	40.5	5.25	10	30	~	0.79	60 / 120
IV-POSEIDON-32	32	42.5	5.25	10	30	~	0.83	60 / 120
IV-POSEIDON-35	35	45.5	5.25	10	30	~	0.89	60 / 120
IV-POSEIDON-38	38	48.5	5.25	10	30	~	0.97	60 / 120
IV-POSEIDON-40	40	50.5	5.25	10	30	~	0.96	60 / 120
IV-POSEIDON-45	45	55.5	5.25	10	30	~	1.07	60 / 120
IV-POSEIDON-50	50	60.5	5.25	10	30	~	1.17	60 / 120
IV-POSEIDON-60	60	71.5	5.75	10	30	~	1.57	60 / 120
POSEIDON LL (suction-delivery hose, with helix reinforcement)								
IV-POSEIDON-LL-16	16	27.5	5.75	10	30	48	0.67	60 / 120
IV-POSEIDON-LL-19	19	30.5	5.75	10	30	57	0.75	60 / 120
IV-POSEIDON-LL-25	25	36.5	5.75	10	30	75	0.93	60 / 120
IV-POSEIDON-LL-32	32	44	6	10	30	96	1.18	60 / 120
IV-POSEIDON-LL-35	35	47	6	10	30	105	1.27	60 / 120
IV-POSEIDON-LL-38	38	50	6	10	30	114	1.36	60 / 120
IV-POSEIDON-LL-45	45	58	6.5	10	30	135	1.71	60 / 120
IV-POSEIDON-LL-50	50	63	6.5	10	30	150	1.88	60 / 120
IV-POSEIDON-LL-63	63.5	77	6.75	10	30	190	2.55	60 / 120

Note: colour marked codes - used most often.

POSEIDON LL hose DN25 with BSPT 1" male thread fitting in AISI 316 stainless steel (NM-VT123-16), assembled with FLEX GEAR clamp with a spring in stainless steel (AB-847024). The clamp with a spring maintains constant tension at fluctuating temperature and pressure.

Fuel and oil distribution and dispensing hoses

SPIRABEL® OIL

PVC hose reinforced with rigid PVC helix, oil resistant

Hose material: blue PVC
Reinforcement: white, rigid PVC helix
Work. temp.: from -25°C to +60°C (working pressure depends on temperature)

Lightweight and flexible, suction-delivery hose made of special, oil-resistant PVC compound. Designed for conveying mineral oils and hydrocarbons as well as industrial water, sewage, liquid fertilizers, some chemicals - especially where increased resistance of PVC to hydrocarbons is required. Not suitable for aromatic hydrocarbons (benzene, toluene, xylene etc.). Can be used for some chemical products - diluted acids, bases and alcohols. The hose retains flexibility even at sub-zero working temperatures, its low weight and small bending radius ensure comfortable and easy handling. The rigid PVC helix reinforcement, which is impact-resistant, provides very good resistance to vacuum and kinking on bends. Smooth inner and outer surface. Resistant to UV radiation, ozone, weather conditions, abrasion. Widely used in the industry, agriculture, construction and road-building.
As this hose is reinforced with rigid PVC helix (without braid), it stretches under pressure to a certain extent, which must be taken into account in its application, especially at temperatures above + 40°C.

Chemical resistance check: PVC chemical resistance chart (initial selection), PVC resistance chart column B of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure 20ºC [bar]	burst pressure 20ºC [bar]	vacuum 20ºC [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
TR-SPIRABEL-OIL-025	25	33	4.0	5	15	0.95	88	0.485	30
TR-SPIRABEL-OIL-032	32	40	4.0	5	15	0.95	112	0.585	30
TR-SPIRABEL-OIL-038	38	46	4.0	5	15	0.95	133	0.715	30
TR-SPIRABEL-OIL-040	40	48.4	4.2	5	15	0.95	135	0.820	30
TR-SPIRABEL-OIL-051	51	60.2	4.6	5	15	0.95	179	1.105	30
TR-SPIRABEL-OIL-060	60	70	5.0	4	12	0.95	211	1.360	30
TR-SPIRABEL-OIL-063	63	73	5.0	4	12	0.95	221	1.465	30
TR-SPIRABEL-OIL-076	76	86.6	5.3	4	12	0.95	266	1.780	30
TR-SPIRABEL-OIL-080	80	91	5.5	4	12	0.95	280	2.069	30
TR-SPIRABEL-OIL-102	102	114.6	6.3	3	9	0.95	357	2.820	30
TR-SPIRABEL-OIL-152	152	166	7	2	6	0.95	680	4.820	20

Note: colour marked codes - used most often.

The dependence of burst pressure and working pressure on temperature for typical PVC hoses	temperature	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC
	pressure	100%	74%	55%	40%	30%	22%

SPIRABEL OIL hose DN25 with a brass STORZ coupling size 25-D (lug distance 31 mm) ST-12-031025-30 assembled with a worm drive clamp AB-03009003 in zinc-plated steel. The hose will be used for oily waste water.

Fuel and oil distribution and dispensing hoses

VACUPRESS® OIL

PVC hose reinforced with wire helix and braid, oil resistant

Inner layer: black PVC / PU / NBR
Reinforcement: steel helix, polyester braid
Outer layer: black PVC / PU / NBR
black PU (76 mm diameter and above)
Work. temp.: from -25°C to +60°C (working pressure depends on temperature)

Ultra-tough and flexible, abrasion resistant, suction-delivery hose designed for the pressure transfer of oils and fuels. A special PVC, PU and NBR compound provides high resistance to diesel oil, biodiesel, blue diesel (marine fuel). With reinforcement made of zinc-plated steel wire, embedded in PVC inner wall, the hose is resistant to vacuum and kinking. The smooth internal surface reduces flow losses. The hose is reinforced with braid to offer high working pressure and low deformation under pressure.
Used for the distribution, dispensing, loading and unloading of oils and fuels, e.g. in tanker trucks for heating oil refuelling in home heating systems. Hoses with diameters 76 ÷ 102 mm have an outer polyurethane layer (significantly increasing abrasion resistance) and antistatic copper wire.

Chemical resistance check: PVC chemical resistance chart (initial selection), PVC OIL resistance chart of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure 20ºC [bar]	burst pressure 20ºC [bar]	vacuum 20ºC [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
ME-VACUPROIL-019	19	28	4.5	16	48	0.9	70	0.45	60
ME-VACUPROIL-025	25	35.5	5.25	16	48	0.9	80	0.67	60
ME-VACUPROIL-030	30	40.6	5.3	16	48	0.9	90	0.77	60
ME-VACUPROIL-032	32	42.5	5.25	16	48	0.9	100	0.80	60
ME-VACUPROIL-035	35	48	6.5	14	42	0.9	120	1.05	60
ME-VACUPROIL-038	38	51	6.5	14	42	0.9	125	1.20	40
ME-VACUPROIL-040	40	53	6.5	14	42	0.9	130	1.25	40
ME-VACUPROIL-045	45	58	6.5	12	36	0.9	140	1.34	40
ME-VACUPROIL-050	50	63	6.5	12	36	0.9	150	1.73	40
ME-VACUPROIL-060	60	74	7	12	36	0.9	180	1.95	40
ME-VACUPROIL-063	63	77	7	12	36	0.9	190	2.03	40
hoses with PU outer layer and antistatic copper wire									
ME-VACUPROIL-076	76	90.5	7.25	10	30	0.9	210	2.70	30
ME-VACUPROIL-080	80	94.5	7.25	10	30	0.9	220	2.80	30
ME-VACUPROIL-090	90	106	8	10	30	0.9	250	3.25	30
ME-VACUPROIL-102	102	117.5	7.75	10	30	0.9	300	3.70	30

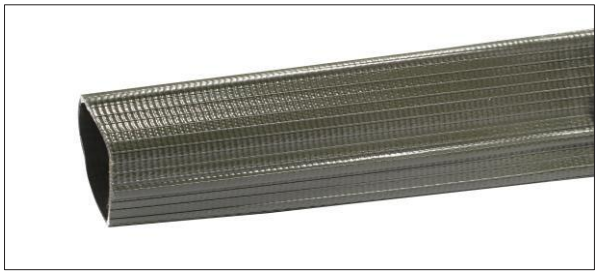
Note: colour marked codes - used most often.

The dependence of burst pressure and working pressure on temperature for typical PVC hoses	temperature	20ºC	30ºC	40ºC	50ºC	60ºC	70ºC
	pressure	100%	74%	55%	40%	30%	22%

VACUPRESS OIL hose DN25 with brass 1" BSP male thread fitting (MU-2864) clamped with a heavy-duty T-bolt clamp (AB-HDC-032-035-W1) in zinc-plated steel.

VACUPRESS OIL hose DN50 with CAMLOCK 2" coupling (AC-C-200-AX) in aluminium, assembled with two worm drive clamps (AB-03017543) made of AISI 316 stainless steel.

Fuel and oil distribution and dispensing hoses

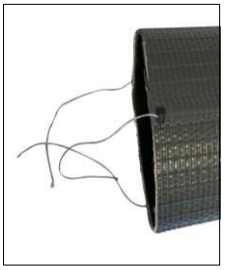


HILCOFLEX OIL

Layflat hose for fuel and oil

Hose material: green-grey NBR/PVC compound extruded through polyester-polyamide braid in a hose extrusion process
Work. temp.: from -20°C to +80°C

Durable, delivery hose for oils and fuels. Lighter and more flexible than standard rubber hoses. Flat when unpressurised, for easier operation and compact storage. Designed for transferring, loading and unloading petrochemical products, oils and fuels in refineries, industry and transportation. Used for ship refuelling, tank cleaning, firefighting and for military purposes.



The hose is constructed of high tenacity polyester-polyamide braid fully embedded into NBR/PVC compound. **It has copper wires to ensure electrical continuity between the fittings of a hose assembly - provided they are correctly connected to these fittings.** The inner NBR/PVC surface is smooth for minimum pressure loss, the outer NBR/PVC surface is slightly ribbed lengthwise for increased abrasion resistance and protection from contact with hot elements. External resistance to abrasion, ozone, weather conditions, oils, fuels and a wide range of chemicals. Requires no washing or drying. Resistant to longitudinal strains - during unrolling and pulling (longitudinal load should never exceed 1/3 of specified tensile breaking load, the installation of the fittings should account for this longitudinal load). Green-grey colour as standard (*army green*).

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	wall thickness [mm]	O.D. [mm]	working pressure [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]	tensile breaking load [kG]
GH-HFLEX-OIL-032	32	2.2	36.4	20	60	0.26	100	1500
GH-HFLEX-OIL-038	38	2.3	42.6	16	50	0.34	100	1700
GH-HFLEX-OIL-042	42	2.3	46.6	16	50	0.35	100	2600
GH-HFLEX-OIL-052	52	2.5	57	16	50	0.45	100	3900
GH-HFLEX-OIL-076	76	2.9	81.8	16	50	0.70	100	6500
GH-HFLEX-OIL-102	102	3.3	108.6	16	50	1.20	100	9500

HILCOFLEX OIL hose DN52 with special STORZ couplings with a nut to attach a grounding wire.

Fuel and oil distribution and dispensing hoses

FUELMAN

Layflat hose for fuel and liquid hydrocarbons

Hose material: polyurethane (PU) extruded through braid in a hose extrusion process
Work. temp.: from -50°C to +50°C

Durable, abrasion resistant, delivery hose designed specifically for transferring fuels, other liquid hydrocarbons or for use as a general purpose antistatic hose. Lighter and more flexible than standard rubber hoses, it has buoyancy (stays afloat) in fresh and seawater. Flat, when not in use, for easier operation and compact storage. Designed for transferring, loading and unloading petrochemical products, oils and fuels in refineries, industry and transportation. Used for ship refuelling, tank cleaning, firefighting and for military purposes. **Meets the requirements of MIL-PRF-370J standard for fuel hoses.**
The hose is constructed of high strength synthetic braid fully embedded into polyurethane compound. **Antistatic – has two copper wires running along on the surface of the hose to ensure electrical continuity between hose fittings, easily accessible for proper connection to the fittings (R < 0.02 Ω/m, exceeds the requirements of MIL-PRF-370J standard).** Smooth inner surface, no loss of flow. Resistant to abrasion, weathering, hydrolysis, ozone, fuels and commonly used chemicals (recommended pH range: 5 ÷ 9). Resistant to longitudinal strains during unrolling and pulling

Chemical resistance check: PU chemical resistance chart (initial selection), PU resistance chart of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	wall thickness [mm]	O.D. [mm]	working pressure * [bar] fuel / water	burst pressure [bar]	weight [kg/m]	coil length [m]	Hose breaking load (calculated) [kG]
MR-FUELMAN-051	51.0+2.0	3.2	57.4	15.5 / 31	62	0.7	200	4600
MR-FUELMAN-065	65.0+2.0	2.6	70.2	12.5 / 25	50	0.64	200	6500
MR-FUELMAN-076	76.0+2.0	2.8	81.6	12 / 24	48	0.78	200	7900
MR-FUELMAN-102	102.0+2.5	3.0	108.0	9 / 18	36	1.16	200	10100
MR-FUELMAN-152	152.0+3.0	3.7	159.4	11.25 / 22.5	45	2.00	200	21000
MR-FUELMAN-203	203.0+3.0	4.2	211.4	10.5 / 21	42	3.20	200	37000
MR-FUELMAN-254	254.0+3.0	4.3	262.6	9 / 18	36	4.10	200	46000
MR-FUELMAN-305	305.0+5.0	4.5	314.0	7.5 / 15	30	5.05	200	54500

* Working pressure for fuel: 25% of burst pressure (safety factor 4:1); working pressure for water and other non-flammable or non-hazardous substances: 50% of burst pressure (safety factor 2:1). Working pressure of fittings must be take into consideration.

Fuel and oil distribution and dispensing hoses

AUSTRALIA® EN 1360

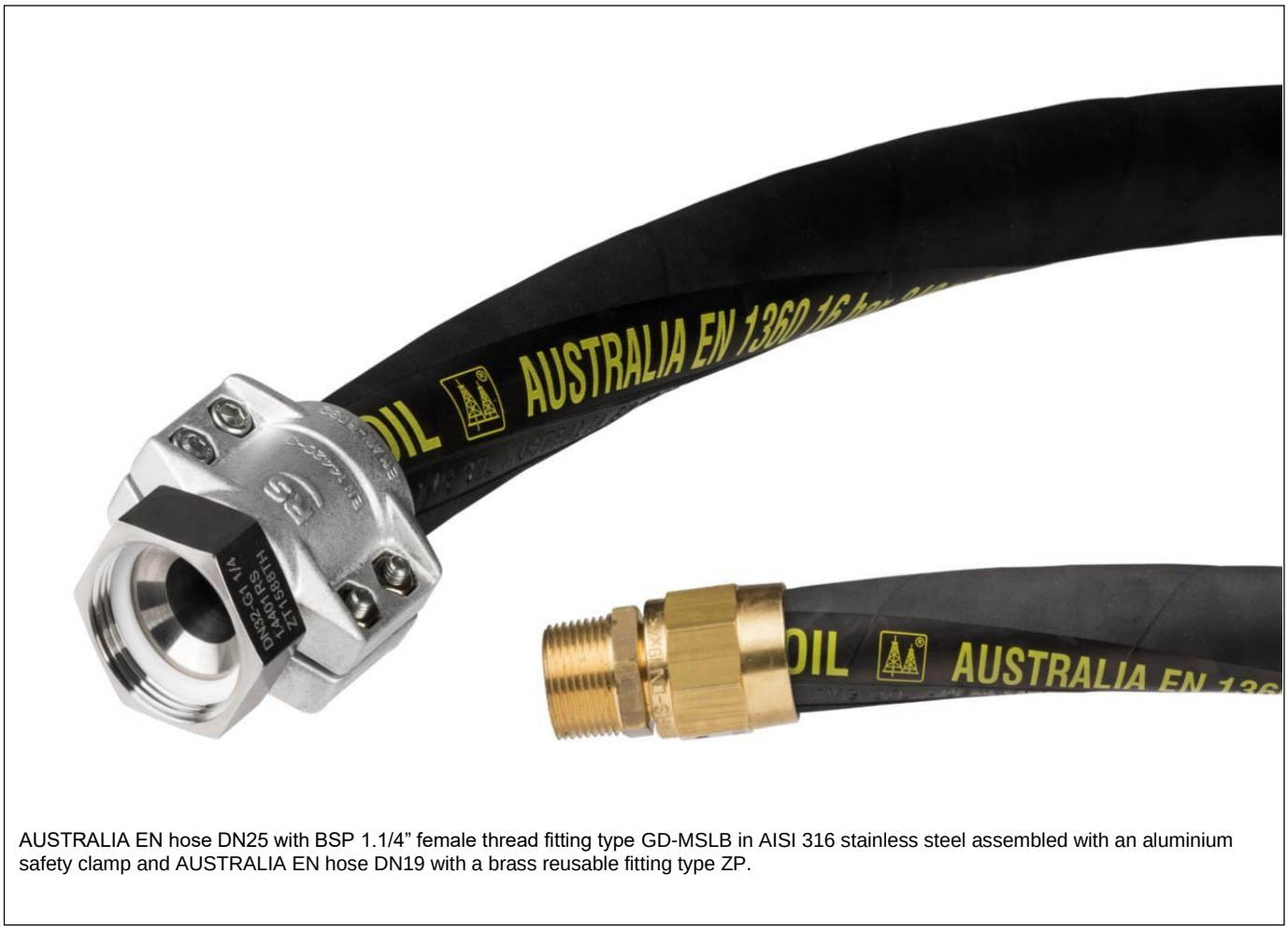
Delivery hose for fuel with 50% aromatics

Inner layer: black synthetic rubber
Reinforcement: synthetic cord
Outer layer: black synthetic rubber
Work. temp.: from -30°C to +55°C

Lightweight and flexible, delivery hose designed for the transfer and distribution of liquid petrochemical products containing up to 50% aromatic hydrocarbons (e.g. diesel oil, heating oil, petrol up to 50% aromatics). Suitable for fuel dispensing pumps. The inner layer is made of black, smooth synthetic rubber. Synthetic cord reinforcement. **It has two copper wires to ensure electrical continuity between the fittings of a hose assembly (resistance between the fittings R<100 Ω - provided they are correctly connected to these fittings).** The outer layer of high-quality synthetic rubber is resistant to oil and weather conditions. The hose complies with the requirements of EN 1360:2013 type 1 grade M, for hoses for fuel dispensing systems.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
IV-AUSTRALIA-EN-16	16	28	6	16	48	0.55	60 / 120
IV-AUSTRALIA-EN-19	19	31	6	16	48	0.62	60 / 120
IV-AUSTRALIA-EN-25	25	37	6	16	48	0.77	60 / 120



AUSTRALIA EN hose DN25 with BSP 1.1/4” female thread fitting type GD-MSLB in AISI 316 stainless steel assembled with an aluminium safety clamp and AUSTRALIA EN hose DN19 with a brass reusable fitting type ZP.

Fuel and oil distribution and dispensing hoses

VRS - VAPOUR RECOVERY SYSTEM

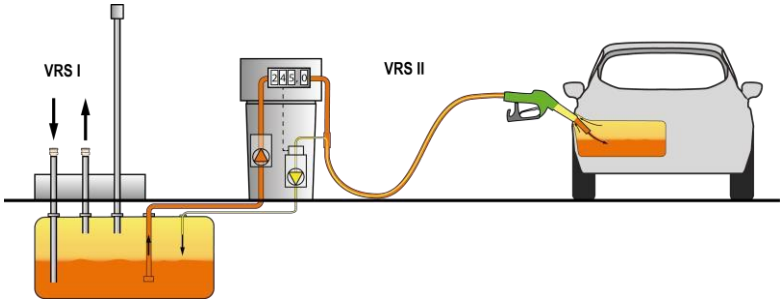
Hoses for fuel dispensers with vapour recovery

Inner layer: black NBR rubber
Reinforcement: synthetic braid
Outer layer: black NBR / PVC rubber
Vapour hose: polyurethane (PU) with steel braid reinforcement
Work. temp.: from -30°C to +65°C
(the data above are for a sample VRS hose)

Vapour recovery systems in fuel distribution

The increasingly stringent environment safety and protection requirements for filling stations has forced the introduction of systems, controlled by standards and regulations, which prevent the release of harmful fuel vapours into the atmosphere. It concerns both the operation of filling a storage tank from a tanker truck and refuelling a car fuel tank from a dispenser located at a filling station. Both operations should be performed according to the principle of a gas pendulum, i.e. vapour from a container being filled should be transferred to a container being emptied, without escaping into the atmosphere. Depending on the size of the filling station and its location in relation to residential areas, the filling stations should be equipped with two types of vapour recovery equipment (Vapour Recovery System):

- VRS I (*Stage I Vapour Recovery)*: during unloading of fuel from a road tanker into a storage tank at a petrol station, the road tanker is connected to the storage tank with two flexible hoses. The fuel flows into the storage tank with one hose while fuel vapours from the storage tank are transferred to the tanker truck with the other hose (check also chapter „Loading/unloading couplings – general information" in the section INDUSTRIAL FITTINGS);
- VRS II (*Stage II Vapour Recovery)*: during dispensing of fuel from a fuel dispenser to the fuel tank in a vehicle - by a customer using a hose with a fuel dispensing nozzle, the vapours from the fuel tank of the vehicle are transferred to the fuel dispenser and then to the petrol station storage tank through a special hose of a smaller diameter, which is inside the fuel dispenser hose. The most basic option is the natural transfer of the vapours by overpressure created in the fuel tank by the fuel being poured in. However, it is inefficient as it requires the fuel nozzle to seal tightly in the car fuel intake. Today, active vapour suction forced by a vacuum pump in the dispenser is more popular.



Hoses and complete hose assemblies with M34x1.5 fittings for fuel dispensers

Hoses for fuel dispensers with a vapour suction system are available as complete hose assemblies of a certain length, on request – contact Tubes International. A sample complete hose assembly with fittings has the following characteristics:

The construction of a hose assembly for fuel dispensing with a vapour suction system:
A – M34x1.5 male thread fitting; B – standpipe fitting of the vapour hose; C – vapour hose; D – fuel hose DN21; E – bend restrictor

Lightweight and flexible, delivery hose designed for manual fuel filling at petrol stations, compliant with the requirements of EN 1360:2013 and EN 13483:2013 (type 1 grade Ω).
The inner layer is made of black, smooth, fuel resistant NBR rubber, antistatic ($R < 10^6\ \Omega$). Textile braid reinforcement. The outer layer of black, smooth NBR / PVC rubber is resistant to oil and weather conditions. It has good resistance to ageing and abrasion (dragging along oily ground). The small bend radius makes it ideal for hose retraction systems (pulling in) in petrol pumps. The inner vapour hose, 8 x 12 mm, made of polyurethane with steel reinforcement, has low permeability and is resistant to fuel, ozone and vacuum up to 0.8 bar. Aluminium and stainless steel fittings are permanently crimped on the hoses with ferrules. The fittings come with end connection as per specification in EN 13483:2013: M34x1.5 male thread and the vapour hose has a standpipe fitting for 12.5 mm socket with O-rings. The ends of the hose are fitted with a black or green sleeve-style bend restrictor.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

(hose type)	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	length max [m]
(VRS-TR-21)	21	31	5	16	48	75	0.65	80

Aircraft refuelling hoses

Aircraft refuelling and defueling operations (draining a fuel tank) are critical in terms of safety and cost of an aircraft fuelling shutdown. Refuelling of modern, civil and military aircraft is usually carried out using a pressure method, where a hose with a suitable coupling is tightly attached to a tank coupling (small aircraft can be refuelled without pressure through a tank filler, using a fuel nozzle). Tanker trucks are used for refuelling operations. They are equipped with pumps, filters, measuring systems and hoses. Big airports are equipped with underground fuel pipelines supplying fuel to a hydrant in a manhole in an airport pavement. Refuelling is carried out via a pumping unit i.e. a dispenser connected to an underground hydrant with one hose, and to an aircraft fuel tank with the other hose. The hoses are often wound on special hose reels. Lifting platforms are also used.

Hoses for pressure refuelling used at airfields must meet the requirements stated in the standards, which are higher than for industrial fuel hoses. Their main characteristics include a high working pressure of 20 bar, high resistance to jet fuel; they do not cause fuel contamination, are resistant to abrasion, ageing, kinking or delamination - separation of hose layers. Another essential requirement concerns electrical properties i.e. safe removal of electrical charges. It is achieved through an antistatic, conductive rubber outer layer or built-in copper wires. Fittings for the fuelling hoses are usually assembled with aluminium safety clamps. All complete hose assemblies undergo pressure and electrical resistance tests.

Types of aircraft refuelling hoses (according to EN ISO 1825)			
type	electrical properties		construction and application
	marking	requirement *	
B	M	R < 100 Ω	Delivery hose with built-in antistatic wires. Not suitable for use in civil aviation.
C	Ω	10^3 Ω < R < 10^6 Ω	Delivery hose with an antistatic (conductive) rubber outer layer. A basic hose for conveying fuel directly into an aircraft fuel tank. Suitable for defueling at low vacuum. Also used as a supply hose for hydrants and in dispensers.
E	M	R < 100 Ω	Suction-delivery hose (steel helix reinforced), with built-in antistatic wires. Used on tanker trucks, as connection to trailers, lift platforms. Not suitable for direct connection to an aircraft fuel tank or as a hydrant supply hose.
F	Ω	10^3 Ω < R < 10^6 Ω	Suction-delivery hose (plastic helix reinforced), with an antistatic (conductive) rubber outer layer. There are no metal parts in the hose construction, it is suitable for alternative into-plane fuelling and defueling of aircraft fuel tanks.

* - measurement of resistance between fittings of a complete hose assembly, in accordance with ISO 8031

AVIO GLOBAL „C”

Aircraft refuelling delivery hose

Inner layer: black NBR rubber
Reinforcement: synthetic cord
Outer layer: black synthetic rubber
Work. temp.: from -25°C to +70°C

Extra sturdy, aviation fuel, delivery hose designed for direct, pressure refuelling of aircraft. It can also be used for fuel transfer operations in airport fuel tanker-dispensers (aircraft refuellers), where high vacuum is not required. Can be wound up on a hose reel. Suitable for aviation fuel for turbine engines (aviation kerosene, kerosene, e.g. Jet A1), aviation petrol and fuels with an aromatic hydrocarbon content up to 50%.

Black, smooth NBR rubber inner layer. Reinforcement with layers of high-strength synthetic cord. The outer layer of black, antistatic synthetic rubber is resistant to abrasion, weather conditions and contact with oil. **The antistatic outer layer, in accordance with the requirements of EN ISO 1825, ensures the required low resistance of a hose assembly between its fittings (10^3 Ω < R < 10^6 Ω, ISO 8031).**

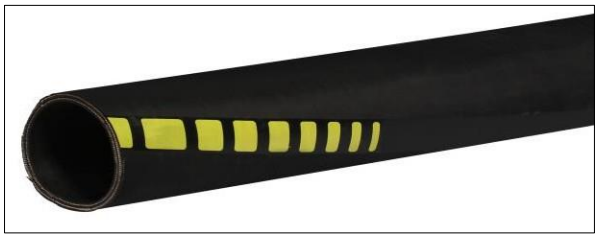
Conforms to jet fuel hose requirements (type C/Ω) ISO 1825, API 1529:05, AS 2683, VG 95955, NFPA 407.

Hoses with fluorescent marking visible at night and a delivery hose with antistatic wire (type B/M) are available to special order.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-AVIO-C-025	25	38	6.5	20	80	300	0.73	60
IV-AVIO-C-032	32	45	6.5	20	80	375	0.90	60
IV-AVIO-C-038	38	52	7	20	80	450	1.10	60
IV-AVIO-C-050	50	67	8.5	20	80	550	1.74	60
IV-AVIO-C-063	63.5	80	8.25	20	80	600	2.07	60
IV-AVIO-C-075	75	91	8	20	80	600	2.32	60

Aircraft refuelling hoses



AVIO GLOBAL „E”

Aircraft refuelling suction-delivery hose

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black synthetic rubber
Work. temp.: from -25°C to +70°C

Extra sturdy, suction-delivery hose for aviation fuel, designed for aircraft fuel tank defueling, loading and unloading airport tanker trucks and fuel dispensers. Suitable for aviation fuel for turbine engines (aviation kerosene, kerosene, e.g. Jet A1), aviation petrol and fuels with an aromatic hydrocarbon content up to 50%.
Black, smooth NBR rubber inner layer. Reinforcement with layers of high-strength synthetic cord and steel helix protected by galvanised coating. The outer layer of black, antistatic synthetic rubber is resistant to abrasion, weather conditions and contact with oil. **It has copper wires to ensure electrical continuity (R < 100 Ω) between the fittings of a hose assembly and discharge static charges - provided the wires are correctly connected to these fittings.** Conforms to the requirements for aviation fuel hoses (type E/M) ISO 1825, API 1529:05, AS 2683, VG 95955, NFPA 407.
Hoses with fluorescent marking visible at night are available to special order.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-AVIO-E-050	50	67.5	8.75	20	80	0.85	550	2.33	60
IV-AVIO-E-075	75	94	9.5	20	80	0.85	600	3.60	60
IV-AVIO-E-100	100	118.5	9.25	20	80	0.85	900	4.74	60

AVIO GLOBAL „F”

Aircraft refuelling suction-delivery hose „NON-METALLIC”

Inner layer: black NBR rubber
Reinforcement: synthetic cord, PET helix
Outer layer: black synthetic rubber
Work. temp.: from -25°C to +70°C

Very robust, suction-delivery hose for aviation fuel, designed for refuelling and defuelling aircraft fuel tanks, loading and unloading airport tanker trucks and for fuel dispensers. As the hose has no metal elements, it is suitable for into-plane fuelling and defuelling aircraft fuel tanks. Can be coiled on a hose reel. Suitable for aviation fuel for turbine engines (aviation kerosene, kerosene, e.g. Jet A1), aviation petrol and fuels with an aromatic hydrocarbon content up to 50%.
Black, smooth NBR rubber inner layer. Reinforced with layers of high-strength synthetic cord and plastic polymer (PET) helix. The outer layer of black, antistatic synthetic rubber is resistant to abrasion, weather conditions and contact with oil. **The antistatic outer layer ensures the required low resistance of a hose assembly between its fittings (10^3 Ω < R < 10^6 Ω, ISO 8031).** Conforms to the requirements for aviation fuel hoses (type F/Ω) API 1529:05, AS 2683, VG 95955, NFPA 407.
Hoses with fluorescent marking visible at night or other hose diameters are available to special order.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-AVIO-F-050	50	69	9.5	20	80	0.65	550	2.36	60

Aircraft refuelling hoses

MANITANK AVIO „C”

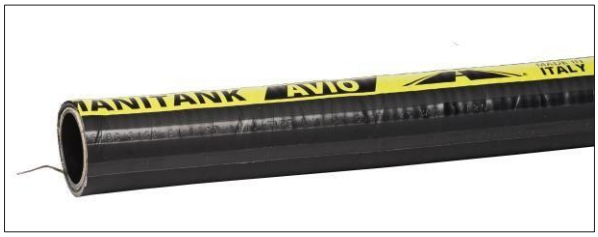
Aircraft refuelling delivery hose

Inner layer: black NBR rubber
Reinforcement: synthetic cord
Outer layer: black CR rubber
Work. temp.: from -30°C to +70°C (for jet fuel acc. to EN 1825)

Extra strong, aviation fuel, delivery hose designed for into-plane pressure refuelling on ground. It can also be used for fuel transfer operations in airport fuel tanker-dispensers (aircraft refuellers), where high vacuum is not required. Specially designed for kerosene (aviation kerosene - fuel for aviation turbine engines e.g. JET A1), aviation petrol and fuels with an aromatic hydrocarbon content up to 50%. Can be used on a hose reel.
Black, smooth, antistatic NBR rubber inner layer. Reinforcement with layers of high-strength synthetic cord. The outer layer of black, antistatic, self-extinguishing, chloroprene rubber (CR) is resistant to abrasion, weather conditions and contact with hydrocarbons. **The antistatic outer layer, in accordance with the requirements of EN ISO 1825, ensures the required low resistance of a hose assembly between the fittings ($10^3\ \Omega < R < 10^6\ \Omega$, ISO 8031).**
Conforms to jet fuel hose requirements (type C/Ω) EN ISO 1825, EN 1361, BS 3158, EI 1529.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	min. reel DN	coil length [m]
MT-MANITANK-AVIO-C-019	19	31	6	20	80	0.5	100	0.70	225	40
MT-MANITANK-AVIO-C-025	25	38.5	6.75	20	80	0.4	125	0.98	300	40
MT-MANITANK-AVIO-C-032	32	46	7	20	80	0.4	140	1.20	375	40
MT-MANITANK-AVIO-C-038	38	52	7	20	80	0.4	180	1.35	450	40
MT-MANITANK-AVIO-C-050	50	65	7.5	20	80	0.3	215	1.80	550	40
MT-MANITANK-AVIO-C-063	63.5	81	8.75	20	80	-	230	2.75	600	40
MT-MANITANK-AVIO-C-075	75	93.5	9.25	20	80	-	230	3.40	600	40
MT-MANITANK-AVIO-C-100	100	122	11	20	80	-	345	4.40	900	40



MANITANK AVIO „E”

Aviation fuel loading/unloading and conveying hose

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black CR rubber
Work. temp.: from -25°C to +70°C (for jet fuel acc. to EN 1825)

Very robust, suction-delivery hose designed for the transfer, loading and unloading of aviation fuel. Specially designed for kerosene (fuel for aviation turbine engines e.g. JET A1), aviation petrol and fuels with an aromatic hydrocarbon content up to 50%. Can be used on a hose reel.
Black, smooth **antistatic** NBR rubber inner layer. Reinforcement with layers of high-strength synthetic cord and steel helix protected by galvanised coating. **It has copper wires to ensure electrical continuity (R < 100 Ω) between the fittings of a hose assembly and discharge static charges - provided the wires are correctly connected to these fittings.** The outer layer of black, conductive, self-extinguishing, chloroprene rubber (CR) is resistant to abrasion, weather conditions and contact with hydrocarbons.
Conforms to jet fuel hose requirements (type E/M) EN ISO 1825, EN 1361, BS 3158, EI 1529.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	min. reel DN [mm]	coil length [m]
MT-MANITANK-AVIO-E-025	25	38.5	6.75	20	80	0.9	125	1.00	300	40
MT-MANITANK-AVIO-E-032	32	46	7	20	80	0.9	140	1.45	375	40
MT-MANITANK-AVIO-E-038	38	52	7	20	80	0.9	180	1.68	450	40
MT-MANITANK-AVIO-E-050	50	65	7.5	20	80	0.9	215	2.05	550	40
MT-MANITANK-AVIO-E-063	63.5	81	8.75	20	80	0.9	230	3.00	600	40
MT-MANITANK-AVIO-E-075	75	93.5	9.25	20	80	0.9	230	3.80	600	40
MT-MANITANK-AVIO-E-100	100	120	10	20	80	0.9	345	4.40	900	40

Hoses for fuel and oil loading/unloading

AUSTRALIA®

Lightweight delivery hose for diesel and heating oil (up to 30% aromatics)

Inner layer: black NBR rubber
Reinforcement: synthetic cord
Outer layer: black synthetic rubber
Work. temp.: from -20°C to +70°C

Lightweight and flexible, delivery hose designed for transferring liquid petrochemical products containing up to 30% aromatic compounds (e.g. diesel oil, heating oil). Black, smooth NBR rubber inner layer. Synthetic cord reinforcement. It has a copper wire to ensure electrical continuity between the fittings of a hose assembly. The outer layer of high-quality synthetic rubber is resistant to abrasion, oil, ozone and weather conditions.
It is a very light and handy hose with soft and flexible construction. The hose comes in a variety of sizes and with different types of fittings, making it a favourite choice for light to medium duty applications.
Versions available to special order: AUSTRALIA SUPER (aromatic compounds up to 50%) and AUSTRALIA REEL (for rolling up on reels, aromatic compounds also up to 50%). See also 16 bar version: AUSTRALIA EN 1360.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
IV-AUSTRALIA-010	10	17	3.5	10	30	0.19	60 / 120
IV-AUSTRALIA-013	13	20	3.5	10	30	0.24	60 / 120
IV-AUSTRALIA-019	19	27	4	10	30	0.36	60 / 120
IV-AUSTRALIA-022	22	31	4.5	10	30	0.48	60 / 120
IV-AUSTRALIA-025	25	35	5	10	30	0.62	60 / 120
IV-AUSTRALIA-028	28	38	5	10	30	0.68	60 / 120
IV-AUSTRALIA-032	32	42	5	10	30	0.76	60 / 120
IV-AUSTRALIA-035	35	45	5	10	30	0.76	60 / 120
IV-AUSTRALIA-038	38	47	4.5	10	30	0.74	60 / 120
IV-AUSTRALIA-040	40	50	5	10	30	0.85	60 / 120
IV-AUSTRALIA-045	45	55	5	10	30	0.95	60 / 120
IV-AUSTRALIA-051	51	61	5	10	30	1.06	60 / 120
IV-AUSTRALIA-060	60	73	6.5	10	30	1.72	60 / 120
IV-AUSTRALIA-063	63.5	74	5.25	10	30	1.39	60 / 120
IV-AUSTRALIA-076	76	89	6.5	10	30	2.03	60 / 120
IV-AUSTRALIA-090	90	105	7.5	10	30	2.70	60 / 120

Note: colour marked codes - used most often.

AUSTRALIA hose DN10 with NPT 1/2" male thread hydraulic fitting (TI-ZNZ110-08-06-CN) crimped with a ferrule (TI-L19-06).

AUSTRALIA hose DN51 with brass CAMLOCK coupling (AC-C-200-B) assembled with two worm drive clamps in stainless steel.

Hoses for fuel and oil loading/unloading

IVALO®

Very lightweight and flexible suction-delivery hose for oil (up to 30% aromatics)

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helices
Outer layer: black CR rubber
Work. temp.: from -30°C to +120°C

Very light and flexible, externally corrugated, suction-delivery hose designed to transfer liquid petrochemical products with an aromatic content up to 30% (e.g. diesel oil, heating oil, lubricating oil). Not suitable for ester-based oils.
Black, smooth NBR rubber inner layer. Reinforced with synthetic cord and two steel wire helices. Deep corrugated cover construction provides a tight minimum bending radius, so a hose assembly is easy to route and manoeuvre. The outer layer is made of CR chloroprene rubber, flame resistant according to ASTM C 542, resistant to abrasion and weather conditions.
Excellent flexibility and light weight make the hose very easy and handy to use. It comes in a variety of sizes and with different types of fittings, widely used for conveying, loading/unloading applications in light-duty external operating conditions, also in industrial equipment and vehicles.
IVALO COLD (- 40ºC ÷ +100ºC) hose version is available to special request.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. * [mm]	wall thickness * [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-IVALO-016	16	24.5	4.25	5	15	0.5	48	0.35	60
IV-IVALO-019	19	28.0	4.5	5	15	0.5	57	0.40	60
IV-IVALO-022	22	32.0	5.0	5	15	0.5	66	0.44	60
IV-IVALO-025	25	35.0	5.0	5	15	0.5	75	0.50	60
IV-IVALO-032	32	41.0	4.5	5	15	0.5	96	0.61	60
IV-IVALO-035	35	45.0	5.0	5	15	0.5	105	0.66	60
IV-IVALO-038	38	48.0	5.0	5	15	0.5	114	0.69	60
IV-IVALO-045	45	55.0	5.0	5	15	0.5	135	0.81	60
IV-IVALO-051	51	61.5	5.25	5	15	0.5	153	1.01	60
IV-IVALO-063	63.5	74.0	5.25	5	15	0.5	191	1.23	60
IV-IVALO-076	76	87.0	5.5	5	15	0.5	228	1.68	60
IV-IVALO-090	90	101.5	5.75	5	15	0.5	270	2.05	60
IV-IVALO-102	102	113.5	5.75	5	15	0.5	306	2.51	60

Note: colour marked codes - used most often; * - approximate values due to corrugated hose construction

IVALO hose DN25 with 1" BSP female thread fitting in AISI 316 stainless steel (TI-ZBW110-16-16-SS) assembled with a ferrule (TI-L-37-16-SS) in AISI 304 stainless steel and IVALO hose DN76 with aluminium CAMLOCK E 3" coupling (AC-E-300-A) assembled with clamps (AB-03009009) in zinc-plated steel.

IVALO hose DN19 with aluminium CAMLOCK E 3/4" coupling (AC-E-075-A) assembled with worm drive clamps in zinc-plated steel and IVALO hose DN38 with brass 1.1/2" BSP male thread coupling (GD-VRSB-38-38-MS) with a T-bolt clamp (AB-HDC-048-051-W5) in stainless steel.

Hoses for fuel and oil loading/unloading

CARACAS®, CARACAS 50

Lightweight and flexible hose for fuel and oil loading/unloading with built-in copper antistatic wire

Inner layer: black synthetic rubber
Reinforcement: Synthetic braid, steel helices
Outer layer : black synthetic rubber
Work. temp.: from -20°C to +70°C

Lightweight, highly flexible, suction-delivery hose for loading/unloading and conveying liquid petrochemical products. Can be used for diesel oil and petrol. The standard CARACAS hose is suitable for fuels containing up to 30% aromatic hydrocarbons, whereas CARACAS 50 is suitable for more aggressive fuels (up to 50% aromatics).
The inner layer is made of black, smooth synthetic rubber. Reinforced with synthetic cord and two steel wire helices. **It has a copper wire to ensure electrical continuity (R < 100 Ω) between the fittings of a hose assembly and discharge static charges - provided the wire is correctly attached to these fittings.** The outer layer of black, corrugated, synthetic rubber is resistant to oil, fuels and weather conditions.
External corrugations make the hose very flexible and elastic - its minimum bend radius is only 2.5 x inside diameter. It is very light and handy. Ideal for loading/unloading systems, fuel tankers in medium harsh external working conditions.
Versions available to special order: CARACAS EASY – suitable for EASY SHELL safety clamps and CARACAS COLD EVOLUTION hose with working temperature from -50°C to +50°C for cold climate environment.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. * [mm]	wall thickness * [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
CARACAS version up to 30% aromatic compounds									
IV-CARACAS-032	32	43.5	5.75	6	18	0.6	80	0.93	60
IV-CARACAS-038	38	50	6	6	18	0.6	95	1.19	60
IV-CARACAS-051	51	63	6	6	18	0.6	128	1.54	60
IV-CARACAS-063	63.5	77	6.75	6	18	0.6	159	2.27	60
IV-CARACAS-076	76	90	7	6	18	0.6	190	2.65	60
IV-CARACAS-102	102	117	7.5	6	18	0.6	255	3.68	60
CARACAS 50 version up to 50% aromatic compounds									
IV-CARACAS50-050	51	63	6	6	18	0.6	128	1.39	60
IV-CARACAS50-063	63.5	77	6.75	6	18	0.6	159	1.77	60
IV-CARACAS50-075	76	90	7	6	18	0.6	190	2.19	60
IV-CARACAS50-102	102	117	7.5	6	18	0.6	255	2.90	60

Note: colour marked codes - used most often; * - approximate values due to corrugated hose construction

CARACAS hose DN51 with aluminium CAMLOCK E 2” coupling (AC-E-200-A) assembled with worm drive clamps in zinc-plated steel.

CARACAS hose DN102 with CAMLOCK E 4” coupling (AC-E-400-SS) in stainless steel (AISI 316) assembled with heavy-duty T-bolt clamps in AISI 316 stainless steel (AB-DPC-110-120-W5).

Hoses for fuel and oil loading/unloading

RAFFINERIA CLC

Lightweight and flexible hose for fuel and oil loading/unloading with built-in copper antistatic wire

Inner layer: black NBR rubber
Reinforcement: synthetic braid, steel helices
Outer layer: black synthetic rubber
Work. temp.: from -30°C to +80°C (with peaks up to +120°C depending on the type of medium)

Lightweight and flexible, suction-delivery hose designed to transfer liquid petrochemicals containing **up to 50% aromatic compounds.** Can be used for diesel oil and petrol.
The inner layer is made of black, smooth, **antistatic (R ≤10^6 Ω)** NBR rubber. Reinforced with synthetic cord layers and steel wire helices. **A copper wire ensures electrical continuity between the fittings of a hose assembly and removes static electric charges - provided the wire is correctly connected to these fittings.** The outer layer of black, corrugated, synthetic rubber is resistant to abrasion, mineral oils, ozone, ageing, weather conditions and temporary contact with hydrocarbons.
External corrugations make the hose very flexible and elastic. It is lightweight and handy. Ideal for loading/unloading systems, broadly used for fuel tanker trucks and special sewer cleaning trucks.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
MT-RAFFINERIA-CLC-019	19	30	5.5	16	48	0.9	60	0.56	40
MT-RAFFINERIA-CLC-025	25	37	6	16	48	0.9	75	0.58	40
MT-RAFFINERIA-CLC-032	32	43	5.5	16	48	0.9	100	0.90	40
MT-RAFFINERIA-CLC-038	38	51	6.5	16	48	0.9	120	1.10	40
MT-RAFFINERIA-CLC-040	40	52	6	16	48	0.9	120	1.15	40
MT-RAFFINERIA-CLC-045	45	57	6	16	48	0.9	150	1.48	40
MT-RAFFINERIA-CLC-050	50	64	7	16	48	0.9	180	1.60	40
MT-RAFFINERIA-CLC-063	63.5	77.5	7	12	36	0.9	250	2.05	40
MT-RAFFINERIA-CLC-070	70	85	7.5	12	36	0.9	280	2.43	40
MT-RAFFINERIA-CLC-076	76	91	7.5	10	30	0.9	300	2.60	40
MT-RAFFINERIA-CLC-080	80	95	7.5	10	30	0.9	320	2.73	40
MT-RAFFINERIA-CLC-100	100	120	10	10	30	0.9	400	3.67	40
MT-RAFFINERIA-CLC-102	102	122	10	10	30	0.9	400	3.73	40

Note: colour marked codes - used most often.

RAFFINERIA CLC hose DN25 with brass CAMLOCK coupling assembled with two worm drive clamps in stainless steel.

Hoses for fuel and oil loading/unloading

EXTREMEFLEX ™

Extremely flexible and elastic hose for petrol and diesel oil up to 60% aromatic compounds

Inner layer:	black NBR rubber (Chemigum®)
Reinforcement:	synthetic cord, steel helices
Outer layer:	black NBR/PVC synthetic rubber (Chemivic®)
Work. temp.:	from -40°C to +93°C

Suction-delivery, **extremely flexible** hose designed to transfer liquid petrochemicals with **up to 60% aromatic content.** Suitable for use in tanker trucks to transport diesel oil, ethanol, petrol, oils.
The inner layer is made of black, smooth Chemigum® rubber (NBR, resistance to oil: RMA class A). Reinforced with synthetic cord and two steel wire helices. The outer, deep corrugated layer is made of black, synthetic Chemivic® (NBR/PVC) rubber, resistant to petrochemicals, oils and lubricants and also to abrasion. **A copper wire ensures electrical continuity between the fittings of a hose assembly - provided the wire is correctly connected to these fittings.** External corrugations offer extreme flexibility - minimum bend radius equal to the inner diameter of the hose; very low force is needed to bend it. These external corrugations also reduce coefficient of friction when dragging the hose over the ground, whereas lightweight construction makes the hose ease to move and handle.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
GY-EXTREMEFLEX-019	19.1	30.5	5.7	17	68	0.9	19	0.65	30.5
GY-EXTREMEFLEX-025	25.4	36.8	5.7	17	68	0.9	25	0.81	30.5
GY-EXTREMEFLEX-038	38.1	48.5	5.2	17	68	0.9	38	1.08	30.5
GY-EXTREMEFLEX-051	50.8	61.8	5.5	17	68	0.9	51	1.43	30.5
GY-EXTREMEFLEX-063	63.5	76.1	6.3	13	52	0.9	64	2.10	30.5
GY-EXTREMEFLEX-076	76.2	88.8	6.3	13	52	0.9	76	2.51	30.5
GY-EXTREMEFLEX-102	101.6	115.7	7.05	10	40	0.9	101	3.60	30.5

Note: colour marked codes - used most often.

EXTREMEFLEX hose DN51 with CAMLOCK couplings in AISI 316 stainless steel assembled with two T-bolt clamps in stainless steel. The outstanding flexibility of EXTREMEFLEX hose allows for easy manual handling as well as routing it to fit into tight spaces in industrial equipment.

Hoses for fuel and oil loading/unloading

★ ★ ★ ★ ★

OIL STREAM STAR D

Multipurpose delivery hose for conveying, loading/unloading fuels and oils, 50% aromatics

Inner layer: black NBR rubber
Reinforcement: synthetic cord
Outer layer: black NBR rubber
Work. temp.: from -30°C to +80°C

Delivery hose designed to transfer liquid petrochemical products containing up to 50% aromatic hydrocarbons, fuels, petrol, diesel, heating oil, lubricating oils, etc.
Black, smooth NBR rubber inner layer. Synthetic cord reinforcement. **It has copper wires to ensure electrical continuity between the fittings of a hose assembly - provided it is correctly connected to these fittings.** The outer layer of black NBR rubber is resistant to oil and weather conditions.
With relatively low weight and flexible design, it is an easy-to-handle, multipurpose and versatile hose used for transferring fuel or other compatible media in typical operating conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
SO-STREAMSTAR-D-025	25	35	5	10	30	0.58	60 / 120
SO-STREAMSTAR-D-032	32	42	5	10	30	0.72	60 / 120
SO-STREAMSTAR-D-038	38	48.5	5.25	10	30	0.91	60 / 120
SO-STREAMSTAR-D-051	51	61.5	5.25	10	30	1.18	60 / 120
SO-STREAMSTAR-D-076	76	91	7.5	10	30	2.86	60 / 120
SO-STREAMSTAR-D-102	102	117	7.5	10	30	3.18	60 / 120

★ ★ ★ ★ ★

OIL STREAM STAR SD

Multipurpose suction-delivery hose for conveying, loading/unloading fuels and oils, 50% aromatics

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helices
Outer layer: black NBR rubber
Work. temp.: from -35°C to +80°C

Suction-delivery hose designed to transfer liquid petrochemical products containing up to 50% aromatic hydrocarbons, fuels, petrol, diesel, heating oil, lubricating oils, etc.
The inner layer is made of black, smooth, **antistatic (static dissipative $10^4\ \Omega < R < 10^9\ \Omega$)** NBR rubber. Synthetic cord and steel helices reinforcement. The outer layer of black NBR rubber is resistant to oil and weather conditions.
With relatively low weight and flexible design, it is an easy-to-handle, multipurpose and versatile hose used for transferring fuel or other compatible media in typical operating conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius	weight [kg/m]	coil length [m]
SO-STREAMSTAR-SD-013	13	24	5.5	10	30	0.9	60	0.47	60 / 120
SO-STREAMSTAR-SD-019	19	29	5	10	30	0.9	80	0.57	60 / 120
SO-STREAMSTAR-SD-025	25	35	5	10	30	0.9	105	0.78	60 / 120
SO-STREAMSTAR-SD-032	32	42	5	10	30	0.9	135	0.95	60 / 120
SO-STREAMSTAR-SD-038	38	49	5.5	10	30	0.9	165	1.17	60 / 120
SO-STREAMSTAR-SD-051	51	62	5.5	10	30	0.9	230	1.51	60 / 120
SO-STREAMSTAR-SD-063	63.5	75.5	6	10	30	0.9	290	2.31	60 / 120
SO-STREAMSTAR-SD-076	76	89	6.5	10	30	0.9	360	2.86	60 / 120
SO-STREAMSTAR-SD-102	102	118	8	10	30	0.9	515	4.72	60 / 120
SO-STREAMSTAR-SD-110	110	126	8	10	30	0.9	560	5.10	60
SO-STREAMSTAR-SD-125	125	146	10.5	10	30	0.9	630	7.61	60
SO-STREAMSTAR-SD-152	152	174	11	10	30	0.9	760	10.65	60

Hoses for fuel and oil loading/unloading

★ ★ ★ ★ ★

OIL STAR SD

Multipurpose suction-delivery hose for transferring, loading/unloading fuels and oils, 50% aromatics

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black SBR/NBR rubber
Work. temp.: from -30°C to +85°C (to +100ºC for oil)

Suction-delivery hose designed to transfer fuels and liquid petrochemical products containing up to 50% aromatic compounds, e.g.: petrol, diesel or mineral oil. Can be used on tank trucks, storage tanks, loading stations, industrial equipment. The hose is widely used in the industry and transport in standard working conditions.
The inner layer is made of black, smooth, antistatic (R <10^6 Ω/m) NBR rubber. Synthetic cord and steel helix reinforcement. **It has two copper wires to ensure electrical continuity between the fittings of a hose assembly - provided it is correctly connected to these fittings.** The outer layer is made of black SBR/NBR rubber, antistatic (R <10^6 Ω/m), resistant to abrasion, oil, ozone and atmospheric conditions.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
SO-OILSTAR-SD-019	19	29	5	10	30	0.9	76	0.55	40
SO-OILSTAR-SD-025	25	35	5	10	30	0.9	100	0.65	40
SO-OILSTAR-SD-032	32	42	5	10	30	0.9	128	0.91	40
SO-OILSTAR-SD-038	38	48	5	10	30	0.9	152	1.06	40
SO-OILSTAR-SD-040	40	50	5	10	30	0.9	160	1.21	40
SO-OILSTAR-SD-045	45	55	5	10	30	0.9	180	1.34	40
SO-OILSTAR-SD-051	51	61	5	10	30	0.9	204	1.47	40
SO-OILSTAR-SD-060	60	72	6	10	30	0.9	240	2.11	40
SO-OILSTAR-SD-063	63	75	6	10	30	0.9	252	2.16	40
SO-OILSTAR-SD-076	76	88	6	10	30	0.9	304	2.71	40
SO-OILSTAR-SD-080	80	92	6	10	30	0.9	320	3.57	40
SO-OILSTAR-SD-090	90	104	7	10	30	0.9	400	3.98	40
SO-OILSTAR-SD-102	102	116	7	10	30	0.9	408	3.97	40
SO-OILSTAR-SD-110	110	124	7	10	30	0.9	440	5.02	40
SO-OILSTAR-SD-125	125	142	8.5	10	30	0.9	500	6.69	40
SO-OILSTAR-SD-152	152	172	10	10	30	0.9	760	8.74	40

Note: colour marked codes - used most often.

OIL STAR SD hoses:

- DN19 with 3/4” BSPT male thread hydraulic fitting (TI- ZBZ130-12-12) and a zinc-plated steel ferrule (TI-L-33-12);
- DN38 hose with CAMLOCK 1.1/2” coupling type ERS (AISI 316 steel) and a ferrule in AISI 304 steel (TI-LDR-050-24-SS);
- DN76 hose with CAMLOCK 3” coupling type E (aluminium, AC-E-300-AX) assembled with two heavy-duty T-bolt clamps in zinc-plated steel (AB-HDC-086-091-W1).

Hoses for fuel and oil loading/unloading

GENOVA® GLOBAL

Robust delivery hose for petrol and oil, for heavy-duty operating conditions, antistatic

Inner layer: black, smooth NBR rubber
Reinforcement: synthetic cord
Outer layer: black, synthetic rubber
Work. temp.: from -30°C to +90°C (with peaks up to +110°C)

Robust, delivery hose designed for unleaded petrol, diesel oil and liquid fuels **with an aromatic content up to 50%**. Used in the industry and transport for conveying, loading and unloading petrochemical products, in road tankers, road and rail fuel unloading/unloading terminals.
The inner layer is made of black, smooth, **antistatic (R ≤ 10^6 Ω)** NBR (NBR1) rubber. Reinforcement with layers of high-strength cord. **It has two copper wires to ensure electrical continuity between the fittings of a hose assembly - provided it is correctly connected to these fittings.** The outer layer is made of black, **antistatic (R <10^6** Ω/m) rubber, resistant to abrasion, oil, ozone and atmospheric conditions. **Resistance through the hose wall R ≤ 10^9 Ω (type M/T).** Complies with EN12115:11 (16 bar), EN 1761(10 bar), ISO 2929 (10 bar), TRbF.
With excellent resistance to petrochemicals, robust construction and antistatic properties of both inner and outer layers, as well as embedded antistatic wires, this hose is ideal for demanding applications, also in **potentially explosive atmosphere.** In each case, however, the use in the potentially explosive atmosphere (ATEX) should be preceded by a risk analysis carried out by a specialist.
A version without wires (type Ω/T) available upon request.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
GENOVA GLOBAL „M/T" – antistatic conductive rubber (inner and outer layer) + 2 copper wires							
IV-GENOVA-EN-019	19	30	5.5	16	64	0.50	60 / 120
IV-GENOVA-EN-025	25	37	6	16	64	0.66	60 / 120
IV-GENOVA-EN-032	32	45	6.5	16	64	0.88	60 / 120
IV-GENOVA-EN-038	38	51	6.5	16	64	1.03	60 / 120
IV-GENOVA-EN-040	40	53	6.5	16	64	1.08	60 / 120
IV-GENOVA-EN-050	50	66	8	16	64	1.71	60 / 120
IV-GENOVA-EN-063	63.5	79.5	8	16	64	2.08	60 / 120
IV-GENOVA-EN-075	75	91	8	16	64	2.41	60 / 120
IV-GENOVA-EN-080	80	96	8	16	64	2.56	60 / 120
IV-GENOVA-EN-100	100	116	8	16	64	2.94	60 / 120

Note: colour marked codes - used most often.

GENOVA GLOBAL hose DN25 with 1" BSP male thread coupling in AISI 316 stainless steel assembled with an aluminium safety clamp.

Hoses for fuel and oil loading/unloading

GENOVA LL® GLOBAL

Robust suction-delivery hose for petrol and oil, for heavy-duty operating conditions, antistatic

Inner layer: black, smooth NBR rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black, synthetic rubber
Work. temp.: from -30°C to +90°C (with peaks up to +110°C)

Robust, suction-delivery hose designed for unleaded petrol, diesel oil and liquid fuels **with an aromatic content up to 50%**. Used in the industry and transport for conveying, loading and unloading petrochemical products, in road tankers, road and rail fuel loading/unloading terminals.
The inner layer is made of black, smooth, **antistatic (R ≤ 10^6 Ω)** NBR (NBR1) rubber. Reinforcement with layers of high-strength cord and steel helix. **It has two copper wires to ensure electrical continuity between the fittings of a hose assembly - provided they are correctly connected to these fittings.** The outer layer is made of black, **antistatic (R ≤ 10^6 Ω)** synthetic rubber, self-extinguishing, resistant to abrasion, oil, ozone and atmospheric conditions. **Resistance through the hose wall R ≤ 10^9 Ω (type M/T).** Complies with EN12115:11 (16 bar), EN 1761(10 bar), ISO 2929 (10 bar), TRbF. Approved for use in potentially explosive areas, Ex zones (ATEX).
With excellent resistance to petrochemicals, robust construction and antistatic properties of both inner and outer layers, as well as embedded antistatic wires, this hose is ideal for demanding applications, also in **potentially explosive atmosphere.** In each case, however, the use in the potentially explosive atmosphere (ATEX) should be preceded by a risk analysis carried out by a specialist.
A version without wires (type Ω/T) available upon request.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
GENOVA LL GLOBAL „M/T" – antistatic conductive rubber (inner and outer layer) + 2 copper wires									
IV-GENOVA-LL-EN-019	19	32	6.5	16	64	0.9	114	0.76	60 / 120
IV-GENOVA-LL-EN-025	25	38	6.5	16	64	0.9	150	0.93	60 / 120
IV-GENOVA-LL-EN-032	32	45	6.5	16	64	0.9	176	1.13	60 / 120
IV-GENOVA-LL-EN-038	38	52	7	16	64	0.9	228	1.42	60 / 120
IV-GENOVA-LL-EN-050	50	65.5	7.75	16	64	0.9	275	2.02	60 / 120
IV-GENOVA-LL-EN-063	63.5	78.5	7.5	16	64	0.9	286	2.56	60 / 120
IV-GENOVA-LL-EN-075	75	90	7.5	16	64	0.9	338	3.06	60 / 120
IV-GENOVA-LL-EN-080	80	95.5	7.75	16	64	0.9	360	3.27	60 / 120
IV-GENOVA-LL-EN-100	100	116	8	16	64	0.9	450	4.37	60 / 120

Note: colour marked codes - used most often.

1. GENOVA LL GLOBAL hose DN25 with CAMLOCK coupling type CRS 1" in AISI 316 stainless steel assembled with a ferrule (TI-LR-040-16-SS) in AISI 304 stainless steel.
2. GENOVA LL EN hose DN19 with CAMLOCK coupling type E 3/4" in AISI 316 stainless steel assembled with two worm drive clamps in stainless steel.
3. GENOVA LL GLOBAL hose DN75 with BSP 3" male thread fitting in AISI 316 stainless steel (GD-VSLB-080-075-SS) assembled with a safety clamp in AISI 316 stainless steel (RS-636075008020).

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Liquid asphalt loading/unloading hoses

Asphalt, bitumen, tar – black, brownish black, depending on temperature solid or semi-liquid, viscous substances, which are a mixture of hydrocarbons of natural or artificial origin.
Asphalt can be found in natural deposits, but most of it is manufactured from petroleum - it is the heaviest fraction in a crude oil distillation process. The ingredients of asphalt are infusible, hard asphaltenes dispersed in resins and oils that give asphalt its flexibility, liquidity and malleability. **Bitumen** is a more general term often used interchangeably for asphalt. **Tar** is an artificial product obtained from hard coal, brown coal (lignite), bituminous shale or from wood. It is more liquid than asphalt, may contain more chemically aggressive ingredients, and is more harmful to health and the environment.
Because of their **water resistance**, asphalt, bitumen, or tar are used as sealants, insulators and binding agents (adhesives) - primarily in the construction and road-building industries. Asphalt is produced in petroleum refineries and then transported by road tankers, rail tankers or special vessels in liquid state, heated to about 160ºC÷180ºC to other plants for further processing. Most asphalt is used for road construction, paving.
Asphalt is transported by tanker trucks to asphalt mixing plants, where dry and hot mineral aggregate (sand, grit or gravel) is mixed with hot, liquid asphalt and fillers in special machines (batch mixers). A ready-made, mineral-asphalt mixture is loaded on trucks and transported to the construction site.

Hoses for liquid asphalt loading/unloading

Unloading hot asphalt from a tanker truck, e.g. in an asphalt mixing plant (stationary or mobile), is carried out using flexible hoses: with gravity, pumps or overpressure in the tank of the truck. Different types of hoses e.g.: rubber, steel, composite, can be used for loading/unloading. The internal diameters of these hoses are usually DN50, 63, 76 and 102 mm. Characteristics of rubber hoses for asphalt handling:

- Inner layer resistant to high temperature 180ºC ÷ 200ºC and chemically resistant to aggressive components of bituminous mass (asphalt), including hot aromatic hydrocarbons. Therefore, special types of synthetic rubber are used for the inner layer: high-temperature types of NBR or CR rubber, polyacrylic rubber (ACM) and their compound. The relevant oil, temperature, ozone and ageing resistance requirements apply to the outer layer.
- Apart from hoses of classic construction with steel or textile cord (braid) reinforcement and a steel helix between the smooth inner and outer layer, there are also semi-corrugated hoses with the inner helix of flat or oval wire visible between the corrugations of the inner layer.
- Working pressure of asphalt loading/unloading hoses from a couple to several bar.
- Safety factor (burst pressure / max. working pressure) minimum 4:1 or higher (6:1 according to EN 13482).
- Resistance to vacuum (e.g. 0,85 bar according to EN 13482).
- Apart from hoses according to the manufacturer's standard, hoses according to EN 13482 standard are used.

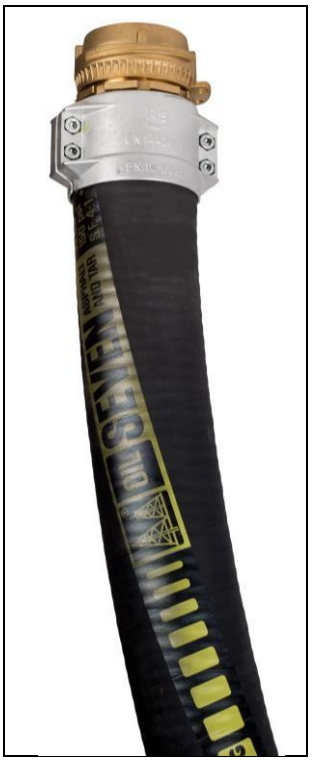
Hoses for liquid asphalt or bitumen emulsion spraying

Hoses for spraying liquid asphalt or bitumen emulsion are used for road surface construction. These are delivery hoses with diameters, typically 19 or 25 mm, with steel or textile reinforcement, with similar characteristics but with much greater flexibility that is required for manual handling.

SAFETY PRECAUTIONS FOR HANDLING HOT ASPHALT HOSES

Hot, liquid asphalt is extremely dangerous. Hose working parameters and safety precautions must be closely observed.
The hoses must be inspected regularly! Personnel handling the hoses must be properly trained and experienced.

- Do not use the hose for asphalt at a temperature higher than specified. Even short periods of operation at the higher temperatures shorten the service life of the hose and significantly increase the handling hazards.
- Hot asphalt hoses should not be bent directly at the fittings. The hot asphalt hoses should be bent in the middle of their length, applying gentler curves than with standard loading/unloading hoses such as fuel hoses.
- When still hot, the asphalt hoses should not be capped. Cooling creates vacuum and temperature differences, which can lead to the separation of the hose layers. Capping of the hose can be done after it has cooled to an ambient temperature.
- Do not heat the hose using, e.g. burners, to clean it. With a properly conducted loading/unloading operation, the asphalt remains liquid allowing the hose to be thoroughly drained before disconnection.
- However, if cleaning the hose (fittings) is to be carried out, it can be done on the hose that is still hot, using diesel fuel and a paintbrush/brush.
- Pay special attention to the inspection of the hose (complete hose assembly) before and after use: the fittings and their fastenings should be intact, there should be no crushed sections, kinks, ovalization, cover abrasion, exposed reinforcement of the hose. Each hose showing these signs should be withdrawn from service immediately or fixed by shortening performed by a specialist service, and pressure tested before use.
- The inspection of the hose should be carried out by experienced and trained personnel. The complete hose assemblies should be regularly inspected, also pressure tested, every six months.



Liquid asphalt loading/unloading hoses

SEVEN CORD

Liquid asphalt delivery hose

Inner layer: black polyacrylic compound
Reinforcement: steel wire cord
Outer layer: black synthetic rubber
Work. temp.: from -15°C to +200°C

Robust, delivery hose designed for conveying, loading and unloading hot liquid asphalt, tar, bituminous products. Used for road/rail tanker loading/unloading and in asphalt mixing plants.
The inner layer is made of black, smooth, polyacrylic rubber compound that is resistant to asphalt and high temperatures. Reinforced with steel wire cord layers. The outer layer is made of black, smooth, synthetic rubber resistant to weather conditions, ozone, abrasion, asphalt and oils.
Note: Hot, liquid asphalt is extremely dangerous. Hose working parameters and safety precautions must be closely observed. The hoses must be inspected regularly! Personnel handling the hoses must be properly trained and experienced.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-SEVENCORD-13	13	25	6	10	40	104	0.55	60 / 120
IV-SEVENCORD-16	16	28	6	10	40	128	0.63	60 / 120
IV-SEVENCORD-19	19	31	6	10	40	152	0.72	60 / 120
IV-SEVENCORD-25	25	39	7	10	40	200	1.23	60 / 120
IV-SEVENCORD-32	32	45	6.5	10	40	256	1.19	60 / 120
IV-SEVENCORD-40	40	54	7	10	40	300	1.53	60 / 120
IV-SEVENCORD-51	51	65	7	10	40	408	1.89	60 / 120

SEVEN

Suction - delivery hose for liquid asphalt

Inner layer: black polyacrylic compound
Reinforcement: steel wire cord, steel helix
Outer layer: black synthetic rubber
Work. temp.: from -15°C to +200°C

Robust, suction-delivery hose designed for conveying, loading and unloading hot liquid asphalt, tar, bituminous products. Used for loading and unloading road tankers, rail tankers, in asphalt mixing plants and in ports.
The inner layer is made of black, smooth, polyacrylic rubber compound that is resistant to asphalt and high temperatures. Reinforced with steel wire cord layers and steel helix. The outer layer is made of black, smooth, synthetic rubber resistant to weather conditions, ozone, abrasion, asphalt and oils.
Note: Hot, liquid asphalt is extremely dangerous. Hose working parameters and safety precautions must be closely observed. The hoses must be inspected regularly! Personnel handling the hoses must be properly trained and experienced.

code	I.D. [mm]	O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
IV-SEVEN-013	13	26.5	6.75	10	40	72	0.84	60
IV-SEVEN-019	19	32	6.5	10	40	105	1.08	60
IV-SEVEN-025	25	40	7.5	10	40	138	1.43	60
IV-SEVEN-032	32	48	8	10	40	176	1.95	60
IV-SEVEN-038	38	53.5	7.75	10	40	210	2.19	60
IV-SEVEN-051	51	69.5	9.25	10	40	280	3.26	60
IV-SEVEN-063	63.5	82	9.25	10	40	345	4.04	60
IV-SEVEN-076	76	95.5	9.75	10	40	456	5.28	60
IV-SEVEN-090	90	109.5	9.75	10	40	540	6.15	60
IV-SEVEN-102	102	125	11.5	10	40	606	8.08	60
IV-SEVEN-127	127	151	12	10	40	742	13.17	60
IV-SEVEN-152	152	179.5	13.75	10	40	861	18.90	60

Note: colour marked codes - used most often.

Hoses for loading and unloading petroleum and drill cuttings.

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RIG STAR D

Delivery hose for crude oil, drilling fluid and drill cuttings

Inner layer: black NBR rubber
Reinforcement: synthetic cord
Outer layer: black CR rubber
Work. temp.: from -30°C to +85°C

Robust, delivery hose designed for conveying, loading and unloading crude oil, petrochemical products and drillings mixed with crude oil (up to 50% aromatic compounds). Can be also used for cement, barite, seawater and brine. Black, smooth, antistatic NBR rubber inner layer. Reinforced with layers of high-strength synthetic cord. It has a copper wire to ensure electrical continuity between the fittings of a hose assembly. The outer layer of CR chloroprene rubber is resistant to flame, abrasion, ozone, seawater and weather. It is a specialized OFFSHORE hose to be used on oil rigs. Widely used on oil platforms in the North Sea. It is also suitable for onshore applications.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D.		O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	bend radius [mm]	breaking load [kG]	weight [kg/m]	coil length [m]
	[inch]	[mm]								
SO-RIGSTAR-D-051	2”	51	65	7.0	20	60	408	216	1.56	60
SO-RIGSTAR-D-076	3”	76	90	7.0	20	60	608	418	2.44	60
SO-RIGSTAR-D-102	4”	102	118	8.0	20	60	816	704	3.57	60
SO-RIGSTAR-D-127	5”	127	145	9.0	20	60	1016	1109	5.83	60

Note: colour marked codes - used most often.

RIGSTAR D hose DN76 with BSP 3” male thread fitting (GD-VSLB- 080-075-SS, AISI 316 stainless steel) and TANK WAGEN VK 3” coupling in AISI 316 stainless steel. The fitting is assembled with an aluminium safety clamp (TI-SC-075-080-AL). The solution for onshore, loading/unloading and industrial applications, not recommended for marine loading/unloading hoses and other *offshore* applications.

RIGSTAR D hose DN76 internally swaged with BSP 3” male thread fitting (TM-KZBP-075) and a ferrule (type TM- W-…), in zinc-plated steel. The internal swaging system provides a full diameter flow through the fitting (equal to the inside diameter of the hose) and is commonly used for offshore loading/unloading hoses. For more information on internal swaging see INDUSTRIAL FITTINGS section.

Hoses for loading and unloading petroleum and drill cuttings.

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RIG STAR SD

Suction - delivery hose for crude oil, drilling fluid and drill cuttings

Inner layer: black NBR rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black CR rubber
Work. temp.: from -30°C to +85°C

Robust, suction-delivery hose designed for conveying, loading/unloading crude oil, petrochemical products and drill cuttings mixed with crude oil (with aromatic content up to 50%). Can be also used for cement, barite, seawater and brine. Black, smooth, antistatic NBR rubber inner layer. Reinforced with high-strength synthetic cord layers and a steel helix. It has a copper wire to ensure electrical continuity between the fittings of a hose. The outer layer of CR chloroprene rubber, is resistant to flame, abrasion, ozone, seawater and weather. Elongation <10% at 20 bar pressure. Designed as a specialized OFFSHORE hose for use on oil rigs. Widely used on oil platforms in the North Sea. It is also suitable for onshore applications.
Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D.		O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	breaking load [kG]	weight [kg/m]	coil length [m]
	[inch]	[mm]									
SO-RIGSTAR-SD-051	2”	51	65	7.0	20	60	0.9	204	247	2.07	60
SO-RIGSTAR-SD-076	3”	76	92	8.0	20	60	0.9	304	471	3.31	60
SO-RIGSTAR-SD-102	4”	102	118	8.0	20	60	0.9	408	770	4.66	60
SO-RIGSTAR-SD-127	5”	127	147	10.0	20	60	0.9	508	1180	7.00	60

Note: colour marked codes - used most often.

RIGSTAR SD hose DN51 with BSP 2” male thread fitting (GD- VSLB-050-050-SS, AISI 316 stainless steel) and a ferrule (TI-LDR-068-32-SS) in AISI 304 stainless steel. The fitting can be also assembled with an aluminium or stainless steel safety clamp. The solution for onshore, industrial applications, not recommended for marine loading/unloading hoses and other *offshore* applications.

RIGSTAR SD hose DN102 internally swaged with BSP 4” male thread fitting (TM-KZBP-100) and a ferrule (type TM- W), in zinc-plated steel. The internal swaging system provides a full diameter flow through the fitting (equal to the inside diameter of the hose) and is commonly used for offshore loading/unloading hoses. The ferrule painted with polyurethane paint is not subject to external crimping. For more information on internal swaging see INDUSTRIAL FITTINGS section.

Hoses for loading and unloading petroleum and drill cuttings.

FUEL SOFTWALL

Delivery hose for crude oil, drilling fluid and drill cuttings

Inner layer: black NBR / PVC rubber
Reinforcement: synthetic cord
Outer layer: black CR rubber
Work. temp.: from -20°C to +90°C

Robust delivery hose designed for conveying, loading and unloading petroleum, petrochemical products and drill cuttings mixed with petroleum (up to 50% aromatic compounds).
Black, smooth NBR/ PVC rubber compound inner layer. Reinforced with layers of high-strength synthetic cord. **It has copper wires to ensure electrical continuity between the fittings of a hose assembly - provided they are correctly attached to these fittings.** The outer layer of CR chloroprene rubber is resistant to flame, oil, seawater, abrasion and weather conditions.
It is a specialized OFFSHORE hose to be used on oil rigs. Widely used on North Sea oil rigs, also perfect for onshore applications.
Versions available to special order: with higher working pressure (20 bar, 27 bar), with specific tensile breaking strength (2T for 2", 4T for 3" and 7T for 4", 5" and 6") and with ABS (*American Bureau of Shipping*) type approval for a complete hose assembly.

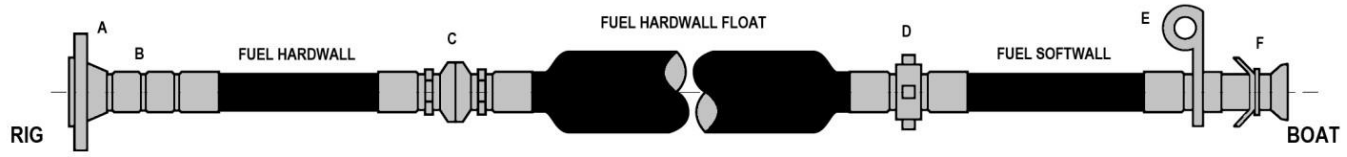
Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D.		O.D. [mm]	wall thickness [mm]	working pressur e [bar]	burst pressure [bar]	weight [kg/m]	coil length [m]
	[inch]	[mm]						
IV-FUEL-SW-051	2"	51	66	7.5	17	52	1.64	60 / 120
IV-FUEL-SW-076	3"	76	92	8	17	52	2.52	60 / 120
IV-FUEL-SW-102	4"	102	119	8.5	17	52	3.52	60 / 120
IV-FUEL-SW-127	5"	127	146	9.5	17	52	4.82	60 / 120
IV-FUEL-SW-152	6"	152	174.5	11.25	17	52	6.69	60 / 120
IV-FUEL-SW-203	8"	203	225.5	11.25	17	52	8.79	60

Note: colour marked codes - used most often.

FUEL SOFTWALL hose DN102 with 4" NPT male thread carbon steel fitting, mounted by internal swaging (internal swaging system). The system ensures a full diameter flow through the fitting (102 mm). The ferrule painted with polyurethane paint is not subject to crimping from the outside. The NPT fitting has a space for attaching a HOOKIE HOOK hose lifter and securing it with a retaining clamp. A HAMMER LUG union or dry disconnect coupling will be screwed onto NPT thread.

Example schematics of FUEL hoses used between a RIG and a BOAT:



A - flange; B - swivel coupling; C - emergency coupling; D - HAMMER LUG union; E - HOOKIE HOOK hose lifter; F- dry disconnect coupling. FUEL HARDWALL FLOAT hose - see chapter „Floating hoses" in INDUSTRIAL HOSES section.

Hoses for loading and unloading petroleum and drill cuttings.

FUEL HARDWALL®

Suction - delivery hose for crude oil, drilling fluid and drill cuttings

Inner layer: black NBR / PCV rubber
Reinforcement: synthetic cord, steel helix
Outer layer: black CR rubber
Work. temp.: from -20°C to +90°C

Robust, suction-delivery hose designed for conveying, loading/unloading crude oil, petrochemical products and drill cuttings mixed with crude oil (with an aromatic content up to 50%).
Black, smooth NBR/ PVC rubber compound inner layer. Reinforced with high-strength synthetic cord layers and a steel helix. **It has copper wires to ensure electrical continuity between the fittings of a hose assembly - provided they are correctly connected to these fittings.** The outer layer of CR chloroprene rubber is resistant to flame, oil, seawater, abrasion and weather conditions.
Designed as a specialized OFFSHORE hose for use on oil rigs. Widely used on North Sea oil rigs, also perfect for onshore applications.
Versions available to special order: with higher working pressure (20 / 27 / 30 / 35 bar), with specific tensile breaking strength (max. up to 2T for 2”, 4T for 3” and 7T for 4”, 5” and 6”) and with ABS (American Bureau of Shipping) type approval for a complete hose assembly.

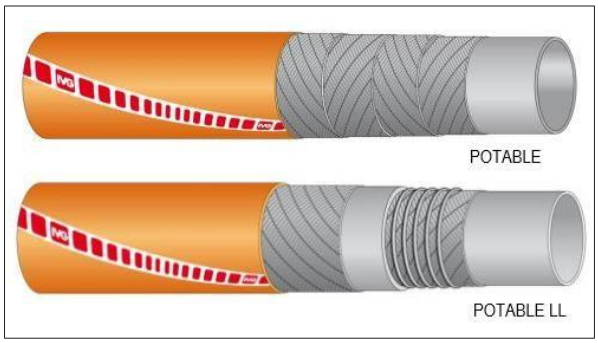
Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

code	I.D.		O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius	weight [kg/m]	coil length [m]
	[inch]	[mm]								
IV-FUEL-HW-051	2”	51	66.5	7.75	17	52	0.9	255	2.07	60 / 120
IV-FUEL-HW-076	3”	76	94	9.0	20	60	0.9	380	3.50	60 / 120
IV-FUEL-HW-102	4”	102	120.5	9.25	17	52	0.9	560	5.18	60 / 120
IV-FUEL-HW-127	5”	127	151	12.0	17	52	0.9	700	8.01	60
IV-FUEL-HW-152	6”	152	181.5	14.75	17	52	0.9	910	12.05	60
IV-FUEL-HW-203	8”	203	238	17.5	17	52	0.9	1320	22.46	60

Note: colour marked codes - used most often.

FUEL HARDWALL hose DN152, length 8 m, with carbon steel NPT 6” male tapered thread fittings at both ends. The fittings crimped with carbon steel ferrules - external crimping. HAMMER LUG union 6” Fig. 100 male part with a female thread nut is mounted at one end of the hose, and HAMMER LUG union 6” Fig. 100 female part at the other end. The complete hose assembly will be used for drilling mud in a land-based application.

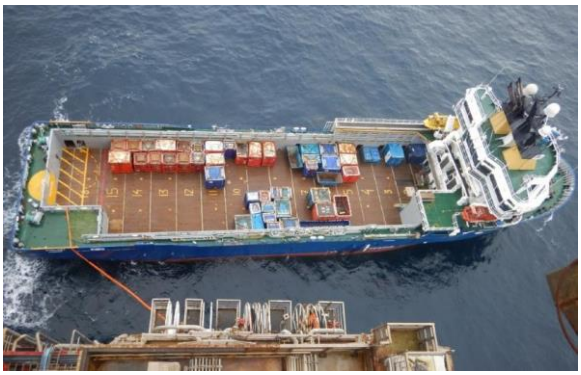
Rig supply hoses



POTABLE / POTABLE LL

Hose for loading and unloading drinking water to oil rig

Inner layer: white IIR rubber
Reinforcement: synthetic cord (POTABLE)
cord and steel helix (POTABLE LL)
Outer layer: orange EPDM rubber
Work. temp.: from -40°C to +100°C



Robust, delivery hose (POTABLE) or suction – delivery hose (POTABLE LL) designed for the supply of potable water from a vessel (PSV- *Platform Supply Vessel*) to an oil rig. It is common on North Sea oil rigs.

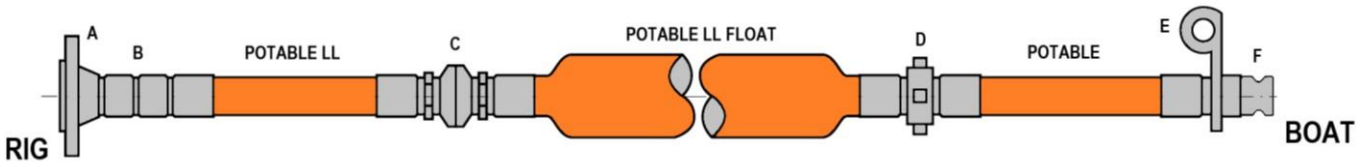
The inner layer is made of white, smooth, food-grade IIR butyl rubber. Meets European requirements 1935/2004/EC and 2023/2006/EC (GMP). Free of phthalates, bisphenol A (BPA-free) and polycyclic aromatic hydrocarbons (PAH-free), according to ZEK 01.4-08 cat.1. The inner layer complies with FDA 21 CFR 177.2600 for hydrated substances, BfR XXI cat. 2. Reinforced with synthetic cords, and for a suction-delivery version (POTABLE LL) additionally with a steel helix. The outer layer of orange EPDM synthetic rubber is resistant to weather conditions, ozone and seawater.

Versions with ABS type approval (*American Bureau of Shipping Type Approval*) with specified tensile breaking load (2T for 2", 4T for 3" and 7T for 4"), 20 bar working pressure and safety factor 4:1 are available to special request.

Chemical resistance check: IIR chemical resistance chart of the manufacturer (available at Tubes International, initial selection), confirmation of resistance and conditions of use by Tubes International.

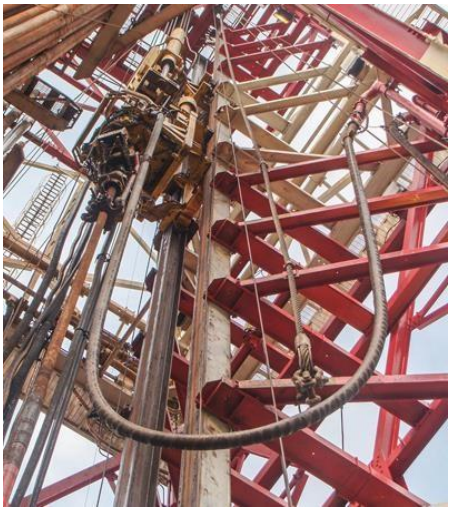
code	I.D.		O.D. [mm]	wall thickness [mm]	working pressure [bar]	burst pressure [bar]	vacuum [bar]	bend radius [mm]	weight [kg/m]	coil length [m]
	[inch]	[mm]								
POTABLE (delivery hose, without helix)										
IV-POTABLE-051	2"	51	69	9	20	60	-	-	2.20	60
IV-POTABLE-076	3"	76	95	9.5	20	60	-	-	3.31	60
IV-POTABLE-102	4"	102	122	10	20	60	-	-	4.42	60
IV-POTABLE-127	5"	127	152	12.5	20	60	-	-	7.05	60
POTABLE LL (suction-delivery hose, with helix)										
IV-POTABLE-LL-051	2"	51	69	9	17	51	0.9	281	2.45	60
IV-POTABLE-LL-076	3"	76	94.5	9.25	17	51	0.9	418	3.66	60
IV-POTABLE-LL-102	4"	102	122	10	17	51	0.9	561	5.49	60
IV-POTABLE-LL-127	5"	127	153.5	13.25	17	51	0.9	700	9.75	60

Example schematics of POTABLE hoses used between a RIG and a BOAT:



A - flange; B - swivel coupling; C - emergency coupling; D - HAMMER LUG union; E - HOOKIE HOOK hose lifter; F- CAMLOCK coupling. POTABLE LL FLOAT hose - see chapter „Floating hoses" in INDUSTRIAL HOSES section.

Drilling hoses



Oil extraction, onshore and offshore, requires a huge number of hoses for a variety of media, working pressures and applications. Many types of general-purpose industrial and hydraulic hoses are used on offshore drilling rigs and onshore oil fields. However, the main operations of drilling, removing drill cuttings, well bore protection, transfer of crude oil, gas, fluids and slurries, cement, etc. that run under very high pressure require the use of specialized flexible hose assemblies designed specifically for crude oil extraction applications. API (*American Petroleum Institute*) standards are commonly recognized and required for these applications. The confirmation of the certification of a complete hose assembly and its fabrication by the manufacturer under the conditions of a API-required quality system, is **API Monogram** (certificate number) marking**.**
The most commonly used complete hose assemblies for drilling equipment according to API (*American Petroleum Institute*) classification:

- **API 7K (FSL0)** – **CEMENT** type hoses designed to transfer cement under high pressure (e.g. 10000 psi – 690 bar). Used for cementing operations (stabilizing and sealing a well). Large diameters, from 2" - 51 mm to 4" - 102 mm.
- **API 7K (FSL1 and FSL2)** – designed to transfer drilling mud – GRADE D (working pressure 5000 psi – 345 bar) and GRADE E (working pressure 7500 psi – 517 bar). This group includes such hoses as **MUD / ROTARY DRILLING** designed to transfer drilling mud between a standpipe and a swivel, and e.g. **MUD / VIBRATOR** hoses designed to transfer drilling mud between a mud pump and a mud

  Note: FSL0, FSL1, FSL2 stand for *Flexible Specification Level*, defined by API 7K standard, which must be confirmed by independent tests as follows: FSL0 (CEMENT hoses): deformation under pressure, bending, low-temperature bending, hydrostatic pressure test, burst pressure test. Drilling mud hoses according to FSL1 additionally require a low frequency pressure pulsation test at a max. working temperature (1000 pressure cycles up to working pressure, max. 5 min per cycle). Drilling mud hoses according to FSL2 additionally require a high frequency pressure pulsation test at a max. working temperature (10000 pressure cycles up to working pressure, max. 10 sec. per cycle).

- **API 16C** – designed for BOP's (*Blow-Out-Preventer*), for controlling well pressure and preventing unexpected pressure kicks. This group includes **CHOKE AND KILL** hoses (API 16C FSL3, working pressure from 5000 psi – 345 bar to 15000 psi -1034 bar). Large diameters, from 2" - 51 mm to 4" - 102 mm.

  Note: FSL0, FSL1, FSL2, FSL3 designate specific *Flexible Specification Levels* defined in API 16C standard. These levels must be confirmed through independent tests, including bending, hydrostatic pressure test, burst pressure test, exposure to decompression gas, 704ºC fire test for 30 min. without leakage, exposure to increasing high temperature – in their combinations relevant to each FSL requirement according to API 16C.
- **API 17K** – designed for offshore applications outside drilling rig, including risers (*riser tensioners*), jumpers (*topside jumper, subsea production jumper*) and for natural gas transfer, low-sulphur fluid and crude oil transfer. This group includes **FLOWLINE** hoses (working pressure from 3000 psi - 207 bar to 5000 psi - 345 bar). Large diameters, from 2" - 51 mm to 8" - 203 mm.
- **API 16D** – **FLAMEGUARD hydraulic hoses** for BOP blow-out-preventer control (working pressure 5000 psi – 345 bar). Small diameters from 3/8" - 10 mm to 2" - 51 mm.

All hoses for drilling applications are supplied as ready-made, pressure-tested hose assemblies complete with fittings. The hoses are usually fitted with:
- HAMMER LUG unions (fig. 602, 1002, 1003, 1502, 2002, 2202);
- API HUB fittings, type API 16BX;
- API 6A flanges, type 6B, 6BX;
- API LPT (NPT) thread fittings;
- hydraulic fittings and quick release couplings (API 16D, FLAMEGUARD).

For drilling hose couplings see INDUSTRIAL FITTINGS section, chapters „HAMMER LUG – unions and fittings" and „Couplings for oil and gas industry, other".
Couplings (fittings) can be attached to hoses by crimping (a fitting inserted into a hose is crimped with a ferrule) or by vulcanising the fitting into a properly prepared hose end. The vulcanized fittings have many advantages, while crimped fittings are cheaper and readily available:

vulcanized couplings (API 7K, API 16C, API 17K)	crimped couplings (API 7K, API 16D)
	
full flow – the bore diameter of a fitting is equal to a hose diameter	flow restricted by the contraction of a fitting inner diameter
shorter fitting length - shorter rigid section at hose ends, smooth transition in stiffness at the edge of a hose tail	longer fitting length - longer rigid section at hose ends, sharp transition in stiffness at the edge of a hose tail
all layers of wire reinforcement connected to the fitting	only the outer side of wire reinforcement connected to the fitting
chemical and mechanical bond between rubber and metal obtained by vulcanisation of liquid rubber - better tightness	mechanical connection through stress created by crimping, which undergoes slackening (relaxation) at elevated temperatures
higher working pressure range	lower working pressure range
higher pressure resistance	lower pressure resistance
longer hose assembly service life	shorter hose assembly service life
longer delivery time	shorter delivery time
higher cost	lower cost

Drilling hoses

CEMENT (API 7K FSL0)

Hose for high pressure cementing of oil wells

Inner layer: black CR rubber
Reinforcement: layers of high-strength steel wire braids
Outer layer: black CR rubber
Work. temp.: from -25°C to +100°C

Hose designed primarily to transfer cement at high pressure in well bore cementing operations (stabilisation and sealing). Used on offshore and onshore drilling rigs between a cement pump and a cementing head.
The inner layer is made of black, smooth CR rubber resistant to abrasion, temperature, diluted acids and bases. **Reinforcement with layers of high-strength steel wire spiral braids** ensures a safety factor of 2.25. The outer layer is made of black chloroprene-based rubber compound resistant to fire, abrasion, ozone, ageing, UV radiation and oil - designed for the marine environment.
Fire resistance rating of standard hoses: SR6A (+704°C – 5 min.)
Options available to special order:

- hoses with an extra fireproof layer (SR6B: +704°C – 30 min. according to API 16C);
- electrically heated hoses for low temperature conditions;
- hoses with external protection covers adapted to operating conditions (stripwound stainless steel hose cover, stainless steel helix in the outer layer, PE polyethylene protective spiral, etc.).

Offered as ready-made, pressure-tested hose assemblies certified to API 7K, with fittings to customer specifications (HAMMER LUG, API flanges, NPT thread) **vulcanized to the hose or with crimped fittings**:

Chemical resistance check: CR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

(hose type)	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		test pressure		burst pressure		safety factor	bend radius * [mm]	weight [kg/m]	length max. [m]
	[inch]	[mm]			[bar]	[psi]	[bar]	[psi]	[bar]	[psi]				
SNG-SZ-51x69	2”	51	103	26	690	10000	1034	15000	1551	22500	2.25	1200	19	70
SNG-SZ-64x69	2.1/2”	64	125.5	30.75	690	10000	1034	15000	1551	22500	2.25	1300	29	70
SNG-SZ-76x69	3”	76	152	38	690	10000	1034	15000	1551	22500	2.25	1400	45	70
SNG-SZ-102x69	4”	102	163	30.5	690	10000	1034	15000	1551	22500	2.25	1500	41	70
SNG-SZ-51x103.4	2”	51	116	32.5	1034	15000	1552	22500	2327	33750	2.25	1400	27	70
SNG-SZ-64x103.4	2.1/2”	64	150	43	1034	15000	1552	22500	2327	33750	2.25	1500	48	70
SNG-SZ-76x103.4	3”	76	168	46	1034	15000	1552	22500	2327	33750	2.25	1600	59	70

* - minimum operating bend radius – measured to the centreline of the hose

Drilling hoses

MUD (API 7K FSL2)

High pressure drilling mud hose

Inner layer: black NBR rubber
Reinforcement: layers of high-strength steel wire braids
Outer layer: black CR rubber
Work. temp.: from -25°C to +100°C

Sturdy and flexible hose designed for conveying crude oil, bentonite drilling mud, drill cuttings. Widely used for flexible connections between a swivel and a standpipe (ROTARY DRILLING) and at mud pump inlet/outlet (VIBRATOR).
The inner layer is made of black, smooth NBR rubber resistant to oil, temperature, diluted acids and bases. **Reinforcement with layers of high-strength steel wire spiral braids** ensures a safety factor of 2.5. The outer layer is made of black chloroprene-based rubber compound resistant to fire, abrasion, ozone, ageing, UV radiation and oil - designed for the marine environment.
Fire resistance rating of standard hoses: SR6A (+704°C – 5 min.)
Options available to special order:

- hoses with an extra fireproof layer (SR6B: +704°C – 30 min. according to API 16C);
- electrically heated hoses for low temperature conditions;
- hoses with external protection covers adapted to operating conditions (stripwound stainless steel hose cover, stainless steel helix in the outer layer, PE polyethylene protective spiral, etc.).

Offered as ready-made, pressure-tested hose assemblies certified to API 7K, with fittings to customer specifications (HAMMER LUG, API flanges, NPT thread) **vulcanized to the hose or with crimped fittings**:

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

(hose type)	API grade	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		test pressure		burst pressure		safety factor	bend radius * [mm]	weight [kg/m]	length max. [m]
		[inch]	[mm]			[bar]	[psi]	[bar]	[psi]	[bar]	[psi]				
NJG-SZ-51x34.5	D	2”	51	91	20	345	5000	517	7500	862	12500	2.5	900	11.24	70
NJG-SZ-64x34.5		2.1/2”	64	103	19.5	345	5000	517	7500	862	12500	2.5	900	13	70
NJG-SZ-76x34.5		3”	76	120	22	345	5000	517	7500	862	12500	2.5	1200	18	70
NJG-SZ-76x34.5		3.1/2”	89	134	22.5	345	5000	517	7500	862	12500	2.5	1300	21	70
NJG-SZ-102x34.5		4”	102	160	29	345	5000	517	7500	862	12500	2.5	1400	35	70
NJG-SZ-127x34.5		5”	127	191	32	345	5000	517	7500	862	12500	2.5	1500	51	70
NJG-SZ-152x34.5		6”	152	224	36	345	5000	517	7500	862	12500	2.5	1800	57	70
NJG-SZ-51x51.7	E	2”	51	103	26	517	7500	776	11250	1293	18750	2.5	1200	19	70
NJG-SZ-64x51.7		2.1/2”	64	124	30	517	7500	776	11250	1293	18750	2.5	1200	28	70
NJG-SZ-76x51.7		3”	76	138	31	517	7500	776	11250	1293	18750	2.5	1300	31	70
NJG-SZ-89x51.7		3.1/2”	89	151	31	517	7500	776	11250	1293	18750	2.5	1400	38	70
NJG-SZ-102x51.7		4”	102	168	33	517	7500	776	11250	1293	18750	2.5	1500	44	70
NJG-SZ-127x51.7		5”	127	204	38.5	517	7500	776	11250	1293	18750	2.5	1600	64	70
NJG-SZ-152x51.7		6”	152	248	48	517	7500	776	11250	1293	18750	2.5	1800	92	70

* - minimum operating bend radius – measured to the centreline of the hose

Drilling hoses

CHOKE AND KILL (API 16C FSL3)

High pressure drilling mud and cement hose for BOP blow-out-preventers

Inner layer: polyamide (PA), resistant to H_2S
Reinforcement: layers of high-strength steel wire braids
Outer layer: black CR rubber
Work. temp.: from -25°C to +100°C (survival temperature +177°C: min. 1 h)

Robust and flexible hose designed for blow-out-preventers (BOP), i.e. systems used to monitor and eliminate uncontrolled and rapid increase in well bore pressure. CHOKE hose allows drilling mud to be pumped into the well bore bypassing the normal circuit and, during an emergency, is used to feed the mud at high pressure to push gas back into the rock formation. KILL hose allows high pressure cement to be pumped to plug the well bore. The polyamide inner layer and HNBR rubber layer are resistant to hydrogen sulphide **(H_2S, *sour service*)**, oil, corrosion, gas permeation and temperature. **Reinforcement with layers of high-strength steel wire spiral braids** provides a safety factor of 2.25. The fireproof layer made of glass fibre provides SR6B protection grade (+704°C – 30 min.) in accordance with API 16C. The outer layer is made of black chloroprene-based rubber compound resistant to fire, abrasion, ozone, ageing, UV radiation and oil - designed for the marine environment.
In addition to standard hoses, CHOKE AND KILL hoses are available as **ROUGH BORE version with an internal stainless steel carcass** with a higher operating temperature (from -25°C to + 130°C):

STANDARD version

ROUGH BORE version

Options available to special order:
- electrically heated hoses for use at low temperatures;
- hoses with external protection covers adapted to operating conditions (stripwound stainless steel hose cover, stainless steel helix in the outer layer, PE polyethylene protective spiral, etc.).

Offered as ready-made, pressure-tested hose assemblies certified to API 16C, with fittings to customer specifications (HAMMER LUG, API flanges, NPT thread) **vulcanized to the hose.** Fittings suitable for ***sour service*** **(for hydrogen sulphide) according to NACE MR0175 / ISO 15156.**

Chemical resistance check: confirmation of resistance and conditions of use by Tubes International.

CHOKE AND KILL version STANDARD:

(hose type)	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		test pressure		burst pressure		safety factor	bend radius * [mm]	weight [kg/m]	length max. [m]
	[inch]	[mm]			[bar]	[psi]	[bar]	[psi]	[bar]	[psi]				
JYG-SZ-51x34.5	2”	51	130	39.5	345	5000	517	7500	776	11250	2.25	900	27.5	70
JYG-SZ-51x69	2”	51	135	42	690	10000	1034	15000	1551	22500	2.25	1000	30.2	70
JYG-SZ-51x103.4	2”	51	149	49	1034	15000	1552	22500	2327	33750	2.25	1300	44.8	70
JYG-SZ-63x34.5	2.1/2”	64	136	36	345	5000	517	7500	776	11250	2.25	1000	34	70
JYG-SZ-63x69	2.1/2”	64	160	48	690	10000	1034	15000	1551	22500	2.25	1100	36	70
JYG-SZ-63x103.4	2.1/2”	64	178	57	1034	15000	1552	22500	2327	33750	2.25	1400	53	70
JYG-SZ-76x34.5	3”	76	154	39	345	5000	517	7500	776	11250	2.25	1200	38	70
JYG-SZ-76x69	3”	76	160	42	690	10000	1034	15000	1551	22500	2.25	1500	39.6	70
JYG-SZ-76x103.4	3”	76	193	58.5	1034	15000	1552	22500	2327	33750	2.25	1700	59.7	70

* - minimum operating bend radius – measured to the centreline of the hose

Drilling hoses

FLOWLINE (API 17K)

High pressure single carcass hose

Inner layer: stripwound stainless steel hose, polyamide (PA) or HNBR,
Reinforcement: layers of high-strength steel wire braids
Outer layer: black CR rubber
Work. temp.: from -25°C to +100°C

Robust and flexible, high-pressure hose complying with API 17K standard for Bonded Flexible Pipes, Bonded Flexible Hoses. Hoses to API 17K requirements are used in many different parts of subsea oil and gas production facilities, submerged in water as deep as several thousand meters, connecting extraction equipment on the seabed to each other or to a production unit floating on the surface. Because of these applications, the hoses must have a multi-year service life. API 17K hoses can also be used for demanding loading/unloading applications.
FLOWLINE high-pressure hoses are designed for high-pressure transfer or feeding of low sulphur fluid, sour fluid, fluid with up to 30% aromatic hydrocarbons, transfer of crude oil and gas. They are used in risers, jumpers, flow lines, offshore loading and discharge lines.
ROUGH BORE hose construction, internally reinforced with a stainless steel stripwound hose carcass (1). The polyamide sealing layer or HNBR rubber layer (2) are resistant to hydrogen sulphide, oil, corrosion, gas permeation and temperature. Reinforcement with layers of high-strength steel wire spiral braids (3) ensures a safety factor of 2.25. Fire-resistant layers (4) made of glass fibre. The outer layer (5) is made of black chloroprene-based rubber compound resistant to fire, abrasion, ozone, ageing, UV radiation and oil - designed for the marine environment.

Maximum hydrogen sulphide (H2S) content: up to 3000 ppm at +60°C, up to 1000 ppm at +100°C.
Options available to special order:

- hoses with external protection covers adapted to operating conditions (stripwound stainless steel hose cover, stainless steel helix in the outer layer, PE polyethylene protective spiral, etc.).

Offered as ready-made, pressure-tested hose assemblies certified to API 17K, with fittings to customer specifications (HAMMER LUG, API flanges, NPT thread) **vulcanized to the hose.** Fittings suitable for ***sour service*** **(for hydrogen sulphide) according to NACE MR0175 / ISO 15156.**

Chemical resistance check: confirmation of resistance and conditions of use by Tubes International.

(hose type)	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		test pressure		burst pressure		safety factor	bend radius * [mm]	weight [kg/m]	length max. [m]
	[inch]	[mm]			[bar]	[psi]	[bar]	[psi]	[bar]	[psi]				
KRG-SZ-51x21	2”	51	128	38.5	207	3000	310.5	4500	465	6750	2.25	1000	28	70
KRG-SZ-51x34.5	2”	51	136	42.5	345	5000	517.5	7500	776	11250	2.25	1100	32	70
KRG-SZ-76x21	3”	76	153	38.5	207	3000	310.5	4500	465	6750	2.25	1300	32	70
KRG-SZ-76x34.5	3”	76	163	43.5	345	5000	517.5	7500	776	11250	2.25	1400	41	70
KRG-SZ-102x21	4”	102	198	48	207	3000	310.5	4500	465	6750	2.25	1500	66	70
KRG-SZ-102x34.5	4”	102	212	55	345	5000	517.5	7500	776	11250	2.25	1600	71	70
KRG-SZ-127x21	5”	127	223	48	207	3000	310.5	4500	465	6750	2.25	1700	80	70
KRG-SZ-127x34.5	5”	127	237	55	345	5000	517.5	7500	776	11250	2.25	1800	90	70
KRG-SZ-152x21	6”	152	249	48.5	207	3000	310.5	4500	465	6750	2.25	2000	95	70
KRG-SZ-152x34.5	6”	152	265	56.5	345	5000	517.5	7500	776	11250	2.25	2100	106	70
KRG-SZ-203x21	8”	203	315	56	207	3000	310.5	4500	465	6750	2.25	2400	118	70
KRG-SZ-203x34.5	8”	203	322	59.5	345	5000	517.5	7500	776	11250	2.25	2500	126	70

* - minimum operating bend radius – measured to the centreline of the hose

Fire-resistant drilling hoses

FLAMEGUARD 5000 (API 16D)

Fire-resistant hydraulic BOP hose

Inner layer: black NBR rubber
Reinforcement: steel wire spiral braid layers
Outer layer: red CR rubber / glass fibre
Work. temp.: from -40°C to +121°C

Fire-resistant hydraulic hose used primarily to control the valves of a blow-out-preventer (BOP).
Used in offshore and onshore drilling equipment.
The inner layer is made of black, smooth NBR rubber, resistant to oil, seawater, high temperature, diluted acids and bases. Reinforcement with layers of steel wire spiral braids. Fire-resistant glass fabric is underneath the outer layer. The outer layer of red CR chloroprene rubber is resistant to fire, abrasion, ozone, ageing and oil.
Fire resistance as per API 16D: it can be directly exposed to a flame for more than 5 minutes at a temperature of +704°C to ensure system operability in emergency situations.
Besides STANDARD version (red rubber outer layer), ARMOURED version is available with an external carcass made of stainless steel stripwound hose.

STANDARD version

ARMOURED version

Offered as ready-made hose assemblies with hydraulic fittings and HAMMER LUG unions. Often used with hydraulic quick release couplings. For the quick release couplings for BOP systems see „Hydraulic quick release couplings" chapter in HIGH PRESSURE HYDRAULICS / HIGH PRESSURE section.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

FLAMEGUARD 5000, STANDARD version:

(hose type)	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		burst pressure		safety factor	bend radius [mm]	weight [kg/m]	length max. [m]
	[inch]	[mm]			[bar]	[psi]	[bar]	[psi]				
BH506	3/8"	10	26	8	345	5000	1380	20000	4.0	152	1.3	100
BH508	1/2"	12.5	30	8.75	345	5000	1380	20000	4.0	229	1.5	100
BH5012	3/4"	19	39	10	345	5000	1380	20000	4.0	305	2.0	100
BH5016	1"	25	45	10	345	5000	1380	20000	4.0	381	3.1	100
BH5020	1.1/4"	32	58	13	345	5000	1380	20000	4.0	457	4.9	60
BH5024	1.1/2"	38	63	12.5	345	5000	1380	20000	4.0	559	5.8	60
BH5032	2"	51	80	14.5	345	5000	1380	20000	4.0	686	8.4	40

Fire-resistant drilling hoses

FLAMEGUARD 300

Fire-resistant hose for seawater and petrochemical products

Inner layer: black NBR rubber
Reinforcement: steel cord (for hoses in diameters 6”÷10” additional steel helix)
Outer layer: red CR rubber / glass fibre
Work. temp.: from -30°C to +100°C

A hose designed primarily for seawater in fire protection systems on offshore drilling rigs. It can also be used for transferring fuel (oil, petrol, etc. with up to 50% aromatic hydrocarbons), drilling mud, air and other industrial applications.

The inner layer is made of black, smooth NBR rubber, resistant to oil, seawater, high temperature, diluted acids and bases. Reinforcement with layers of high-strength synthetic cord, and from 6” diameter, with an extra steel wire helix. **It has a copper wire to ensure electrical continuity between the fittings of a hose assembly.** Fire-resistant glass fabric is underneath the outer layer. The outer layer of red CR chloroprene rubber is resistant to fire, abrasion, ozone, ageing and oil.

The fire resistance of the hose complies with ISO 15540 and ISO 15541 - the survival time of the outer layer of this hose is at least 30 minutes at a temperature of + 800°C (direct exposure to flames) to ensure full system operability and the ability for the operator to escape in emergency situations.

Offered as ready-made hose assemblies with fittings to customer specifications. Hose assemblies with ABS type approval are available.

Chemical resistance check: NBR chemical resistance chart (initial selection), confirmation of resistance and conditions of use by Tubes International.

(hose type)	I.D.		O.D. [mm]	wall thickness [mm]	working pressure		burst pressure		safety factor	bend radius [mm]	weight [kg/m]	length max. [m]
	[inch]	[mm]			[bar]	[psi]	[bar]	[psi]				
NHG2024	1.1/2”	38	74	18	21	305	104	1520	5	300	3.6	70
NHG2032	2”	51	79	14	21	305	104	1520	5	310	4.5	70
NHG2048	3”	76	105	14.5	21	305	104	1520	5	500	6.3	70
NHG2064	4”	102	134	16	21	305	104	1520	5	600	9.3	70
NHG2080	5”	127	158	15.5	21	305	104	1520	5	1100	12.8	70
NHG2096	6”	152	190	19	21	305	104	1520	5	1300	17.5	70
NHG20128	8”	203	243	20	21	305	104	1520	5	1500	27.3	70
NHG20160	10”	254	305	25.5	21	305	104	1520	5	1600	32.0	70