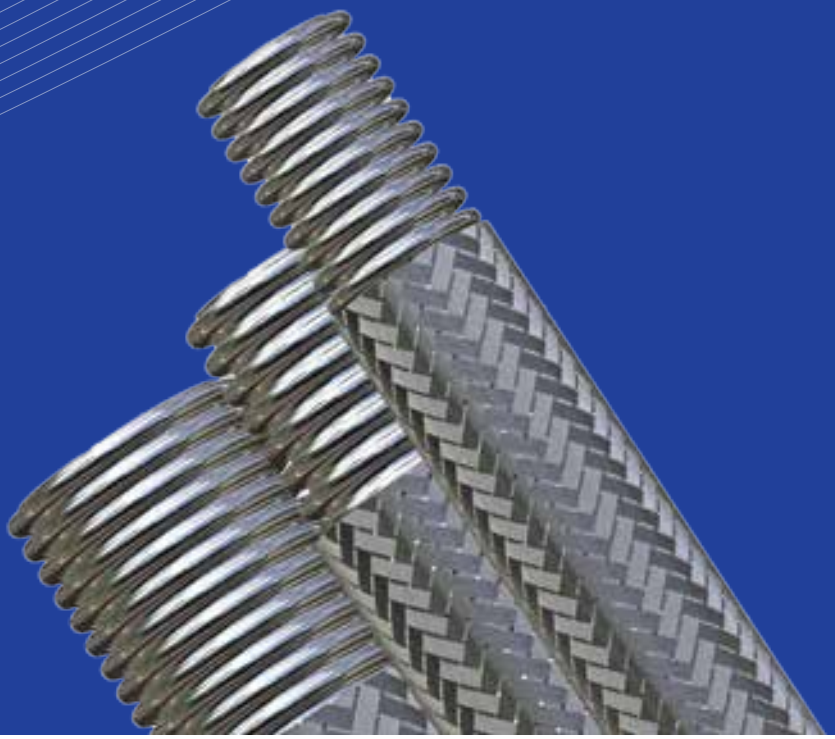
# ARSEN®

## FLEXIBLE METAL HOSES WITH BRAIDING



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# GENERAL EXPLANATIONS


*Flexible metal braided hoses and fittings can be used widely in systems like water, steam, hot oil and gas with their resistance to pressure and flexible structure.*

*They are utilized for conducting liquids, compensating the problems originated from installation, absorbing vibrations and expansions.*

*With their variety of fitting options produced for almost every type of connections, they can be used as a ready-to-install assembly part in every connection point.*

*Flexible metal hoses may be strengtened by double braiding in order to increase their resistance to pressure and environmental conditions. It is also possible to reinforce them by springs with different wire thicknesses or by stripwounds to lengthen their service life for more severe environmental conditions.*

*Hoses with braiding are widely used in areas like heating, ventilation, conditioning systems, iron and steel industry, chemical and petrochemical facilities, oil and gas refineries, chemistry and food industries, aircraft and ship construction facilities.*

| Material Specifications | |
|---|---|
| **Hose** | AISI 316L-304L-321 S.Steel |
| **Braid Wire** | AISI 304 Stainless Steel |
| **Connections** | Carbon Steel-Stainless Steel |

| Operating Conditions | |
|---|---|
| **Operating Pressure** | See. Table.3 |
| **Operating Temperature** | -200 +600 ºC |
| **Nominal Diameter** | DN6-300 / 1/4”-12” |

## Cycle Life In Flexible Metal Hoses

*Cycle life is the number that the hose reaches the point of initial position in a single direction motion. Several factors affecting cycle life are listed below.*

✧*Incorrect Installation* ✧*Angle of Motion* ✧*Temperature* ✧*Motion Frequency* ✧*Pressure*

## At Ordering Phase

*Diameter, length, connection type & material and environmental conditions should be indicated.*

# SPRING LOADED AND STRIPWOUND REINFORCED HOSES

*Flexible metal hoses can be produced reinforced with springs when required. Especially in moving systems, more force is applied to positions near connections due to bending torque. Reinforcement with a spring lengthens cycle life of hoses by minimizing these forces.*

*Additionally, hoses used in filling & emptying systems are exposed to impacts and heavy corrosion due to severe environmental conditions. Applying reinforcement protects hose life against external impacts, thus, increased durability also increases hose's life.*


## Standard Spring Wire Thickness Table

| DN | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wire Thickness | 1.5 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.5 | 2.5 | 2.5 | 3.0 | 3.0 | 3.0 |


*Stripwound (spiral) hoses are one of the optional accessories that may also be assembled to flexible metal hoses for protection purposes. These hoses may be produced using galvanized or stainless steel sheets.*

*They are adopted to metal hoses with braiding in order to lengthen their cycle life by reducing the force that occurs in positions near fittings to be safely used in devices with continuous movement such as pressers.*

## Stripwound Reinforced Hose Dimensions

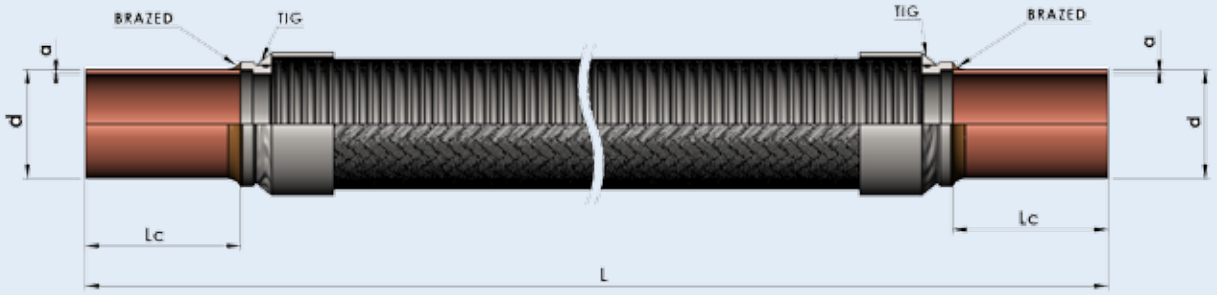
| DN | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 |
|---|---|---|---|---|---|---|---|---|
| Ferrule D. of Hose with Braiding | 37.0 | 47.0 | 56.0 | 67.0 | 87.0 | 108.0 | 130.0 | 160.0 |
| Stripwound Outer Diameter | 45.0 | 55.0 | 60.0 | 75.0 | 95.0 | 120.0 | 145.0 | 175.0 |

# VIBRATION HOSES


*Arsenflex vibration hoses are ideal for installations especially in refrigerating systems. They are used for absorbing vibrations caused by compressors, pumps and motors.*

*Hoses made of stainless steel are attached to copper pipes using silver welding. Indicated hose lengths are to meet vibration conditions (frequency and amplitude) related to regular compressor production standards.*

| Material Specifications | |
|---|---|
| **Hose** | AISI 316L-321-304 S.Steel |
| **Braid Wire** | AISI 304 Stainless Steel |
| **Connections** | Copper-Stainless Steel |

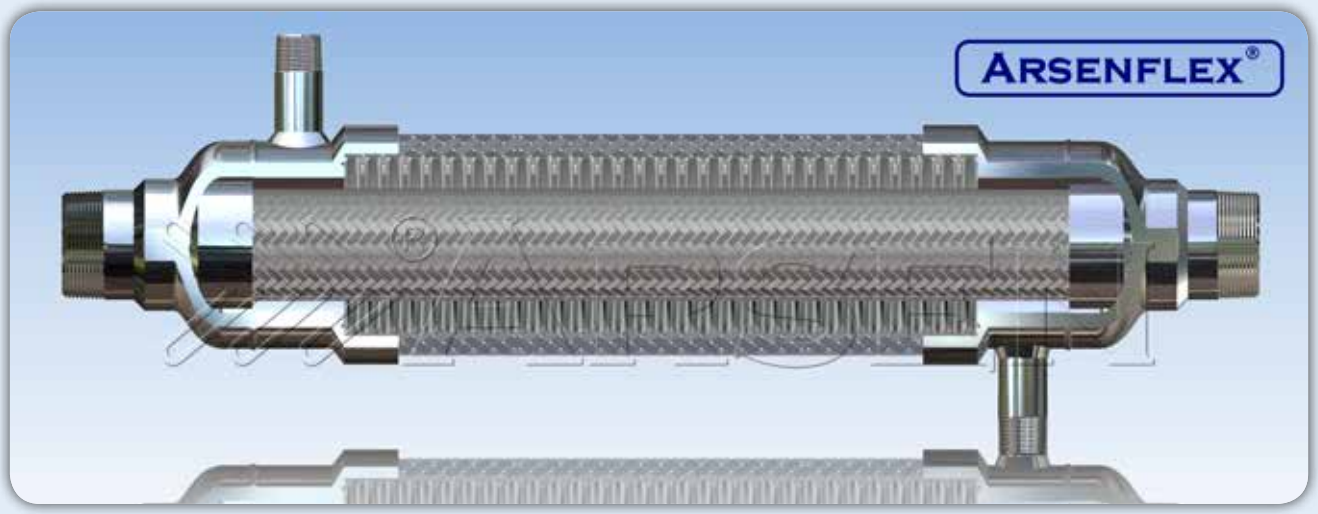



## Vibration Hoses Dimensions

| Item | mm | inch | Copper d | a | S.Steel | a | tol. (±) | Lc | L | tol. (±) |
|---|---|---|---|---|---|---|---|---|---|---|
| 01 | 10 | 3/8" | 10.0 | 1.0 | 13.5 | 1.6 | 0.3 | 25 | 200 | 5.0 |
| 02 | 12 | 1/2" | 12.0 | 1.0 | 17.2 | 1.6 | 0.3 | 30 | 250 | 5.0 |
| 03 | 16 | 5/8" | 16.0 | 1.0 | 21.3 | 1.6 | 0.3 | 30 | 250 | 5.0 |
| 04 | 20 | 3/4" | 20.0 | 1.0 | 26.9 | 1.6 | 0.3 | 35 | 280 | 5.0 |
| 05 | 25 | 1 | 28.0 | 1.5 | 33.7 | 2.0 | 0.3 | 40 | 330 | 5.0 |
| 06 | 32 | 1 1/4" | 35.0 | 1.5 | 42.4 | 2.0 | 0.3 | 50 | 360 | 5.0 |
| 07 | 40 | 1 1/2" | 40.0 | 1.5 | 48.3 | 2.0 | 0.3 | 55 | 450 | 5.0 |
| 08 | 50 | 2" | 50.0 | 2.0 | 60.3 | 2.6 | 0.3 | 60 | 500 | 5.0 |
| 09 | 65 | 2 1/2" | 65.0 | 2.0 | 76.1 | 2.6 | 0.4 | 65 | 600 | 8.0 |
| 10 | 80 | 3" | 80.0 | 2.0 | 88.9 | 2.6 | 0.4 | 80 | 700 | 9.0 |
| 11 | 100 | 4" | 100.0 | 2.5 | 114.3 | 3.2 | 0.4 | 100 | 800 | 10.0 |

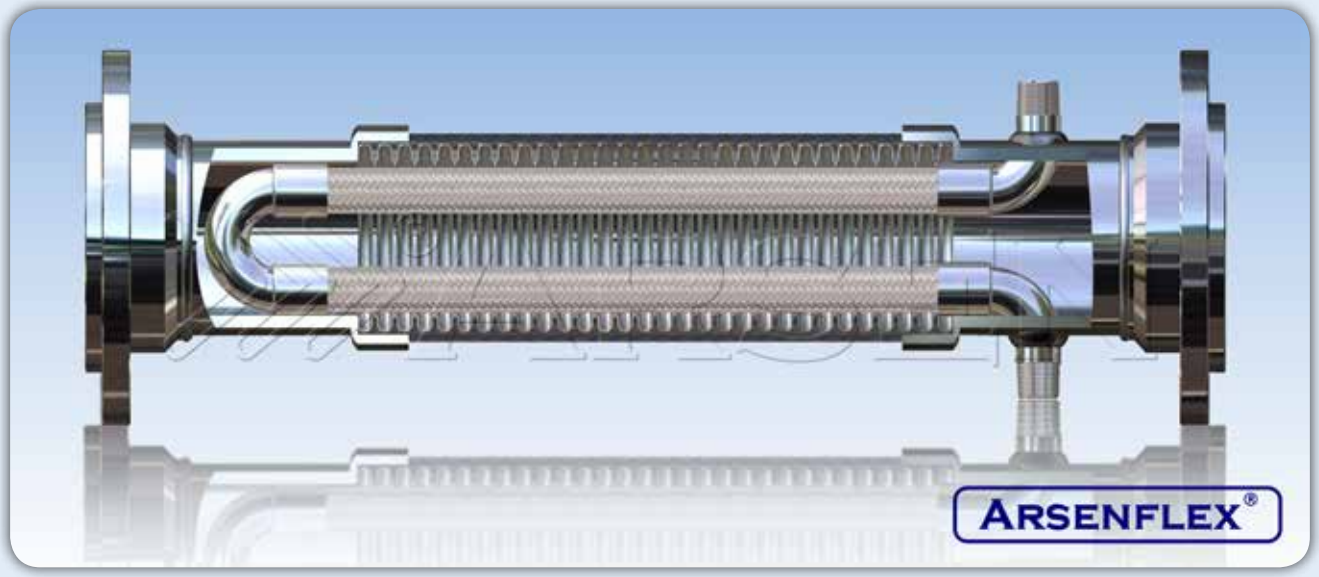
# JACKETED HOSES

## General Explanations




*In some cases, conveyer hose (inner) is enclosed or jacketed by another bigger diameter hose (picture above). Hoses are connected to each other with specially designed fittings in that case.*

*The aim here is to protect inner media (viscous materials, fuel oil, etc.) from freezing and help keeping high flow rate through inner hose.*




*In some other cases, a smaller diameter inner hose which conveys a high-temperature water or steam is assembled inside a bigger diameter outer hose in order to provide a high flow rate of main fluid inside outer hose (picture above).*

*Jacketed hoses are designed specifically to be used in such systems and may be manufactured in several diameters and dimensions.*

# TRANSFER HOSES


*Transfer hoses are used for conducting liquids or gases that requires leaktightness with their connections produced special to area of usage, conical threads for leaktightness, and springs that ensures minimum damage from frictions to ground.*


*Transfer hoses are offered with camlocks that provides quick connections.*

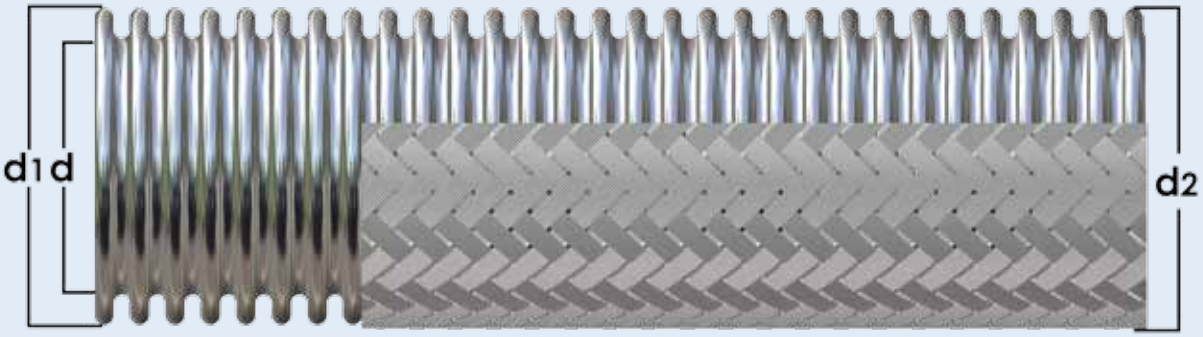
*They provide usability in camlock changes with their male and female threads to be adapted to B type and D type camlocks.*

*When requested, as opposite parts to camlocks, A type camlock for female outpu and F type camlock for male output, may also be offered with produced hoses.*

*Please consult for dimensions and details.*


| *Material Specifications* | |
|---|---|
| **Hose** | AISI 316L-321-304 Stainless Steel |
| **Braid Wire** | AISI 304 Stainless Steel |
| **Connections** | Carbon Steel / Stainless Steel |
| **Camlock Connections** | Stainless Steel / Aluminum / Brass |
| **Reinforcement Spring** | Stainless Steel |

# DIMENSIONS AND CALCULATIONS




## Dimensions and Operating Conditions

| DN | | Inner Dia. | Outer Diameter | | d d1 d2 | Without Braiding | | Single Braiding | | Double Braiding | | Bend Radius | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Single Braiding | | Double Braiding | |
| mm | inch | d (mm) | d1 (mm) | d2 (mm) | tol. (±) | 20 °C (bar) | kg/m | 20 °C (bar) | kg/m | 20 °C (bar) | kg/m | Static | Dynamic | Static | Dynamic |
| 6 | 1/4" | 6.1 | 9.6 | 10.7 | 0.20 | 24 | 0.07 | 198 | 0.15 | 297 | 0.24 | 25 | 80 | 35 | 100 |
| 8 | 5/16" | 8.2 | 12.1 | 13.6 | 0.20 | 17 | 0.08 | 176 | 0.20 | 264 | 0.33 | 35 | 125 | 45 | 145 |
| 10 | 3/8" | 10.1 | 14.3 | 15.6 | 0.20 | 12 | 0.10 | 131 | 0.21 | 196 | 0.34 | 40 | 130 | 50 | 150 |
| 12 | 1/2" | 12.2 | 16.8 | 18.3 | 0.20 | 9.0 | 0.11 | 93 | 0.22 | 140 | 0.35 | 45 | 140 | 55 | 160 |
| 16 | 5/8" | 16.2 | 21.8 | 23.8 | 0.20 | 7.0 | 0.17 | 85 | 0.36 | 128 | 0.58 | 60 | 160 | 70 | 190 |
| 20 | 3/4" | 20.3 | 26.6 | 28.4 | 0.20 | 4.0 | 0.22 | 76 | 0.45 | 115 | 0.71 | 70 | 170 | 80 | 200 |
| 25 | 1" | 25.4 | 32.2 | 34.3 | 0.30 | 3.0 | 0.35 | 60 | 0.65 | 90 | 1.05 | 85 | 190 | 100 | 230 |
| 32 | 11/4" | 34.3 | 41.1 | 42.9 | 0.30 | 2.5 | 0.48 | 54 | 0.93 | 80 | 1.45 | 105 | 260 | 120 | 310 |
| 40 | 11/2" | 40.0 | 49.6 | 54.0 | 0.30 | 2.5 | 0.60 | 42 | 1.25 | 63 | 2.00 | 130 | 300 | 160 | 360 |
| 50 | 2" | 50.5 | 60.5 | 62.4 | 0.40 | 1.6 | 0.70 | 35 | 1.40 | 52 | 2.20 | 160 | 320 | 200 | 380 |
| 65 | 21/2" | 65.5 | 80.0 | 82.0 | 0.60 | 1.5 | 1.05 | 26 | 2.00 | 42 | 3.00 | 200 | 440 | 250 | 520 |
| 80 | 3" | 80.4 | 96.0 | 98.0 | 0.60 | 1.5 | 1.10 | 18 | 2.20 | 29 | 3.35 | 220 | 550 | 270 | 640 |
| 100 | 4" | 100.5 | 117.0 | 119.0 | 0.85 | 1.2 | 1.40 | 16 | 3.00 | 25 | 4.65 | 230 | 660 | 300 | 760 |
| 125 | 5" | 125.2 | 149.5 | 152.0 | 0.85 | 0.9 | 2.65 | 16 | 4.95 | 25 | 7.35 | 280 | 760 | 340 | 900 |
| 150 | 6" | 150.6 | 175.5 | 178.0 | 1.50 | 0.9 | 3.25 | 12 | 5.80 | 19 | 8.50 | 320 | 920 | 400 | 1070 |
| 200 | 8" | 200.0 | 227.0 | 230.0 | 2.50 | 0.7 | 4.90 | 10 | 9.30 | 16 | 13.85 | 450 | 1150 | 550 | 1250 |
| 250 | 10" | 250.0 | 278.0 | 281.0 | 4.00 | 0.5 | 7.60 | 8 | 14.10 | 12 | 20.80 | 580 | 1330 | 680 | 1580 |
| 300 | 12" | 300.0 | 337.0 | 340.0 | 6.00 | 0.3 | 11.00 | 6 | 18.40 | 8 | 25.90 | 700 | 1500 | 800 | 1800 |

*Temperature is one of the factors that reduces the hose's resistance to pressure. Material's pressure resistance can be figured out by multiplying its operating temperature with the related temperature correction factor.*

## Temperature Correction Factor

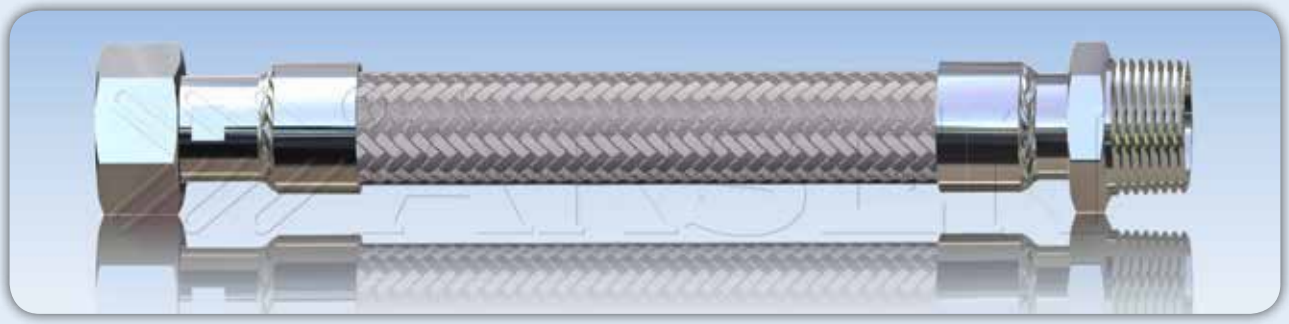
| Temperature (ºC ) | -200 | -150 | -100 | -50 | 0 | 20 | 50 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | 600 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Correction Factor | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.92 | 0.83 | 0.75 | 0.69 | 0.65 | 0.61 | 0.56 | 0.53 | 0.34 |

# CONNECTION TYPES AND SPECIFICATIONS

## *Threaded - Female / Male Hose Connections*

Male Side Threads: Conical thread acc. to ISO 7-1
Female Side Threads: Cyclindirical thread acc. to ISO 228-1
Connection type: Acc. to EN ISO 10806
Production: Acc. to EN ISO 10380

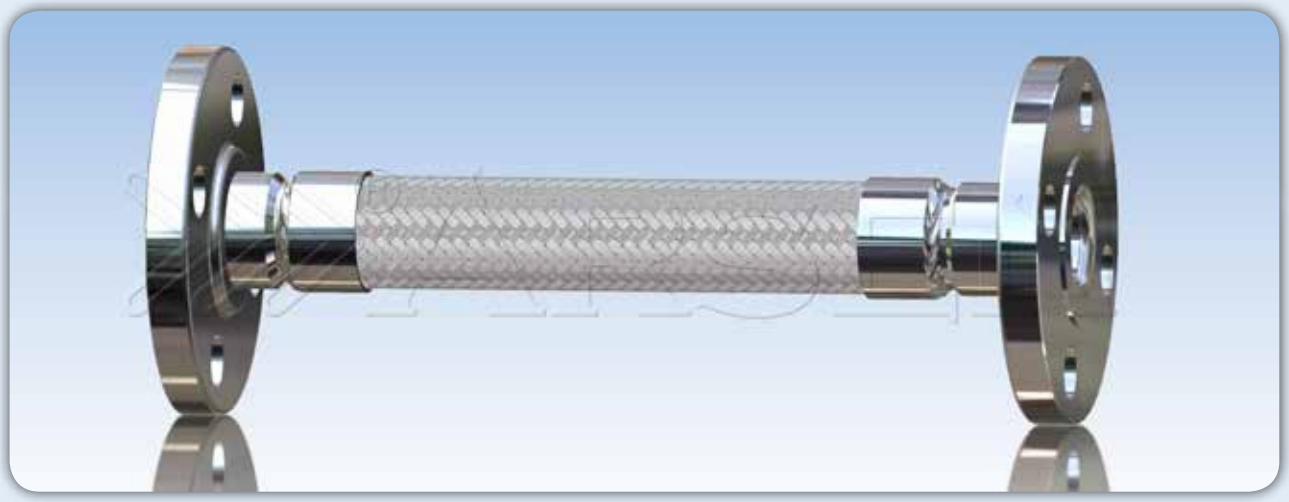
Connection Material:
St37 Carbon Steel
AISI 304 / 316 / 303 Stainless Steel



## *Floating / Fixed Flanged Hose Connections*

Flanges, DIN (PN6-320) and ANSI (150-2500lb)
Flange Norms: DIN 1092-1
Connection type: Acc. to EN ISO 10806
Production: Acc. to EN ISO 10380

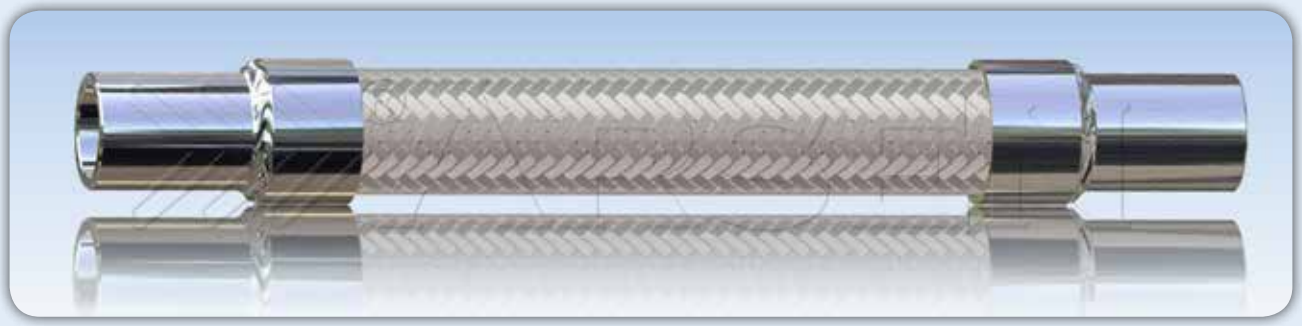
Connection Material:
St37 Carbon Steel / ASTM A105 D.Steel
AISI 304 / 316 Stainless Steel



## *Welding Neck/ Socketed Hose Connections*

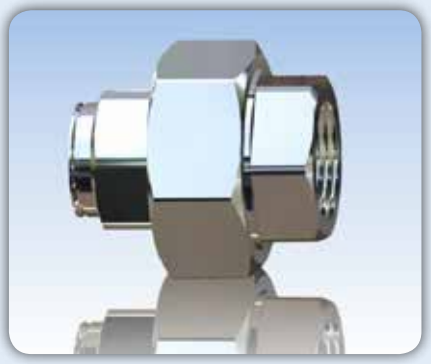
Pipes, seamed, seamless
Pipe Norms: DIN 2448/1629-DIN 2462/2463
Connection type: Acc. to EN ISO 10806
Production: Acc. to EN ISO 10380

Connection Material:
St37 Carbon Steel / St52 Steel Extrusion
AISI 304 / 316 Stainless Steel



# CONNECTION TYPES AND SPECIFICATIONS

## Female / Male Union Type Connections



Leaktightness: Conical Press

Inner Part: Carbon Steel / Stainless Steel

Hexagonal Nut and Threaded Part: Carbon Steel / Stainless Steel

Male Side Threads: Conical threads according to ISO 7-1

Female Side Threads: Cylindrical threads according to ISO 228-1

Connection to hose: According to EN ISO 10380

## Opposite Male Connections

Leaktightness: Gasket Press / Conical Press

Inner Part: Carbon Steel / Stainless Steel

Hexagonal Nut and Opposite Male: Carbon Steel / Stainless Steel

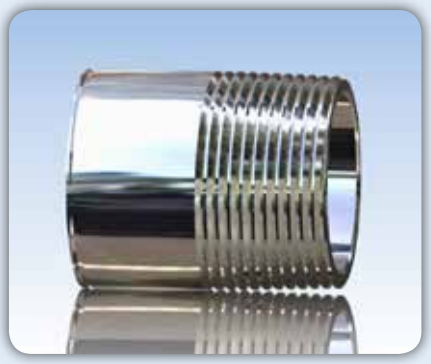
Male Side Threads: Conical threads according to ISO 7-1

Female Side Threads: Cylindrical threads according to ISO 228-1

Connection to hose: According to EN ISO 10380

Other Thread Standards: ASME B 1.20.1 / ISO 261

## Male Pipe Connections



Material: Carbon Steel / Stainless Steel

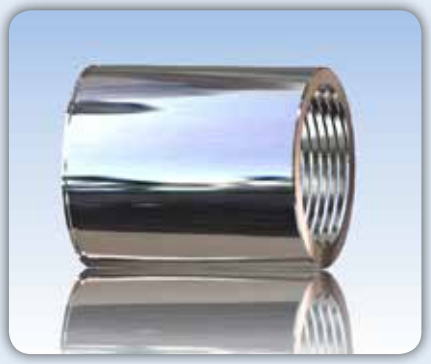
Pipe Norms: DIN 2448/1629-DIN 2462/2463

Threads: According to ISO 7-1

Other Thread Standards: ASME B 1.20.1 / ISO 261

Connection to hose: According to EN ISO 10380

## Coupling Connections



Material: Carbon Steel / Stainless Steel

Pipe Norms: DIN 2448/1629-DIN 2462/2463

Threads: According to ISO 7-1

Other Thread Standards: ASME B 1.20.1

Connection to hose: According to EN ISO 10380

# CONNECTION TYPES AND SPECIFICATIONS

## Female / Male 45°-90° Elbow Connections

Material: Carbon Steel / Stainless Steel

Type: Seamed / Seamless

Norms: DIN 2605 / ASTM A403 ANSI B 16.9

Male Side Threads: Conical threads according to ISO 7-1

Female Side Threads: Cylindrical threads according to ISO 228-1

Connection to hose: According to EN ISO 10380

## Special Fixed / Floated Flange Connections

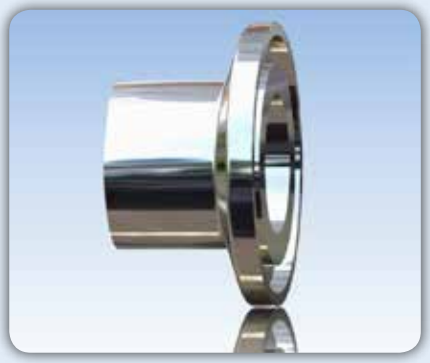
Flanges can be produced from carbon steel or stainless steel in compliance with related connection type. For continous and numbered orders, they may be produced casting floating flange type to be atteched to hose.

Collar Material: Carbon Steel / Stainless Steel

Flange Material: Carbon Steel / Stainless Steel / Sfero - Temper Casting

Connection to hose: According to EN ISO 10380

## Connections With Ferrules



Leaktightness : O-ring

Material: Carbon Steel / Stainless Steel

Norms: ISO 2852 / DIN 32676

Connection to hose: According to EN ISO 10380

## Female / Male Connections With Reducer

Material: Carbon Steel / Stainless Steel

Type: Seamed / Seamless

Norms: DIN 2616 / ASTM A403 ANSI B 16.9

Male Side Threads: Conical threads according to ISO 7-1

Female Side Threads: Cylindrical threads according to ISO 228-1

Connection to hose: According to EN ISO 10380

## *Offset Motion*

*Offset Motion occurs when one end of the hose assembly is deflected in a plane perpendicular to the longitudinal axis with the ends remaining parallel.*

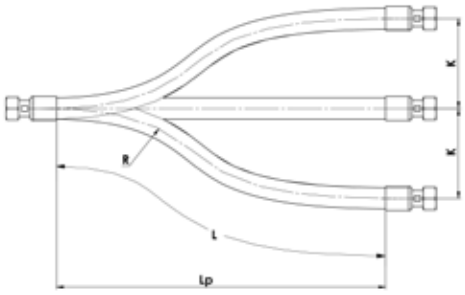
*- When the offset motion occurs to both sides of the hose centerline, use total travel in the formula: i.e 2 x "K"*

*- The offset distance "T" for constant flexing should never exceed 25 percent of the centerline bend radius "R"*

*- If the difference between "L" and "Lp" is significant, exercise care at installation to avoid stress on hose and braid at the maximum offset distance.*

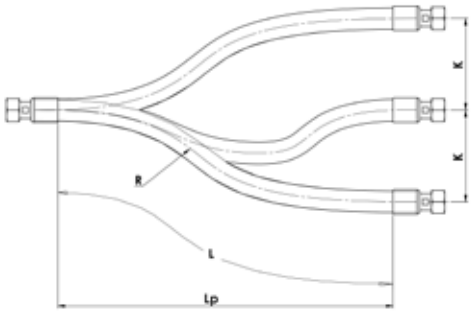
*Note: The appropriate formula must be used in order to calculate Needed Hose Length according to condition of the moving end.*

*a) Moving and is free to move out of line at neutral position.*




$$L = \sqrt{6RK + K^2} \qquad Lp = \sqrt{L^2 - K^2}$$

*b) Moving end is restricted to move only up and down when crossing the neutral position.*




$$L = \sqrt{20RK} \qquad Lp = \sqrt{L^2 - K^2}$$

*L = Needed Hose Length (mm)*

*Lp = Linear Hose Length (mm)*

*R = Bend Radius (mm)*

*K = Offset Distance (mm)*

## Vertical Motion

$$L = 4R + \frac{K}{2}$$

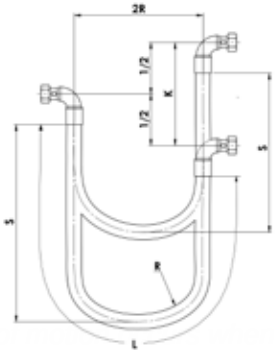
$$S = 1.43R + \frac{K}{2}$$

*L = Needed Hose Length (mm)*

*R = Bend Radius (mm)*

*K = Vertical Travel Distance (mm)*

*S = Volume Of Variation (mm)*



*This type he center line of a hose assembly is bent in a circular arc and moves in a vertical direction*

## Horizontal Motion

$$L = 4R + 1.57K$$

$$S = 1.43R + 0.785K$$

$$S2 = 1.43R$$

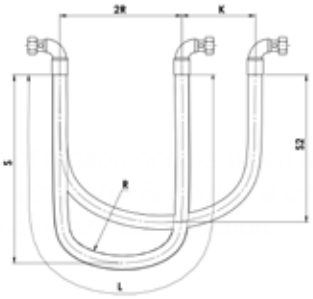
*L = Needed Hose Length (mm)*

*R = Bend Radius (mm)*

*K = Horizontal Travel Distance (mm)*

*S = Volume Of Variation (mm)*

*S = Variation After Motion (mm)*



*This typ e center line of a hos ular arc and moves i*

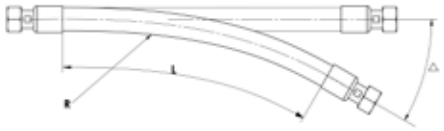
## Angular Motion

$$L = \frac{\pi R V}{180}$$

*L = Needed Hose Length (mm)*

*R = Bend Radius (mm)*

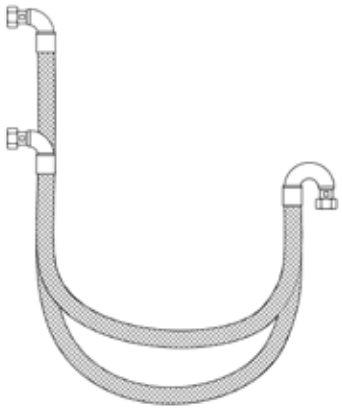
*Δ = Angle of Bend (degress)*

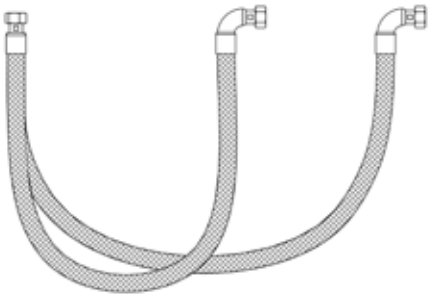


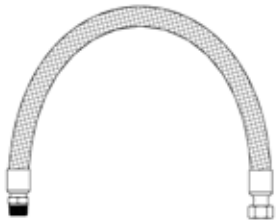
*Angular Motion occurs when one end of a hose assembly is deflected in a simple bend with the ends not remaining parallel.*

# INSTALLATION INSTRUCTIONS

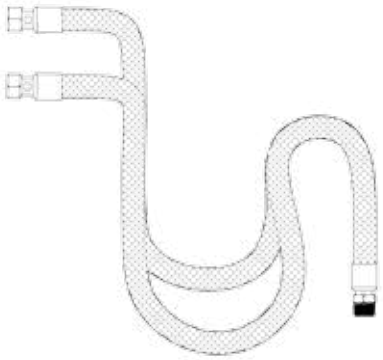
## Correct Installation Figures

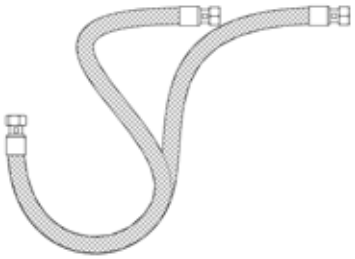


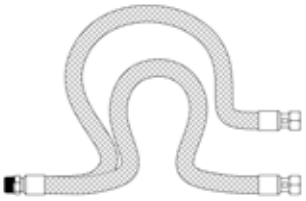


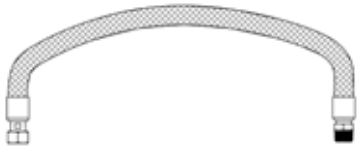


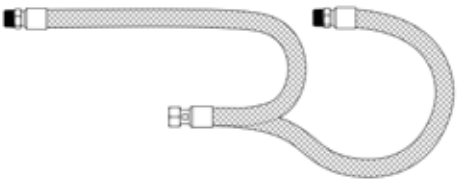
## Incorrect Installation Figures











*In figure above, some correct / incorrect installation options are shown. Incorrect installation is one of the biggest factors to shorten hose's cycle life.*

# INSTALLATION INSTRUCTIONS

## *Warnings For Installation*

*Hose assemblies should be protected from exterior mechanical impacts. Hoses should not be dragged on the floor and they must be kept away from sharp edges and corners. During installation, they should be kept away from contact to other hoses and materials.*

*During installation or if it is to be done after installation, they should be protected from welding clinkers. During welding, in order to prevent overheating of hoses and related parts and to protect welding itself, related measures should be taken. Additionally, hoses should be kept away from electric arc.*

*Metal hoses should be installed in compliance with minimum bend radius values given in the "Dimensions and Operating Conditions" table and should not be bended tighter than these values.*

*Examples given in previous pages about correct / incorrect installation figures should be used as guidelines and if connection needs 45° or 90° elbows, they should not be installed bended to make elbows near connection points.*

*In moving systems, the pipelines that hoses are connected should be inhibited to move out of the plane by static points or sliding brackets.*

*During installation care should be taken not to twist the hose. In order to protect hose from twisting, installation should be conducted according to explanations below:*

*- If fitting on side is floating type and the other is fixed, it is better to install floating type fitting first.*

*- For hose assemblies to be installed in order to absorb motion, install loosely opposite side connection first. Later, to make installation without twisting, repeat possible hose motion 2-3 times in relevant direction. Once sure, you can tighten this side too.*

*- Threads should be chosen to fit relevant opposite side connection and if leaktightness is to be provided by a gasket, a gasket suitable to material to be conveyed inside the hose should be used. In conical thread connections, teflon tape should be used instead of natural gas paste or ketene.*

*- For flanged connections, one connection side should be chosen floating type and installation should be started from the fixed side. Installation side flange and hose flange should be aligned carefully and the bolts should be tightened in diagonal pattern.*

*- In order to protect the hose from twisting, when installing female side connection, the nut should be tightened after fixing the connection from hexagonal surface using a second wrench.*

*- When welding hoses with welding necks, hoses should be protected by using wet tapes or thermal insulation and torch should be hold straight or angled to hose to be welded.*

*- If hoses are to in touch with ground or to be pulled or dragged, it is better to protect them using outer springs or stripwound hoses.*

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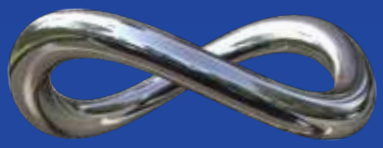

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