Convoluted Technologies

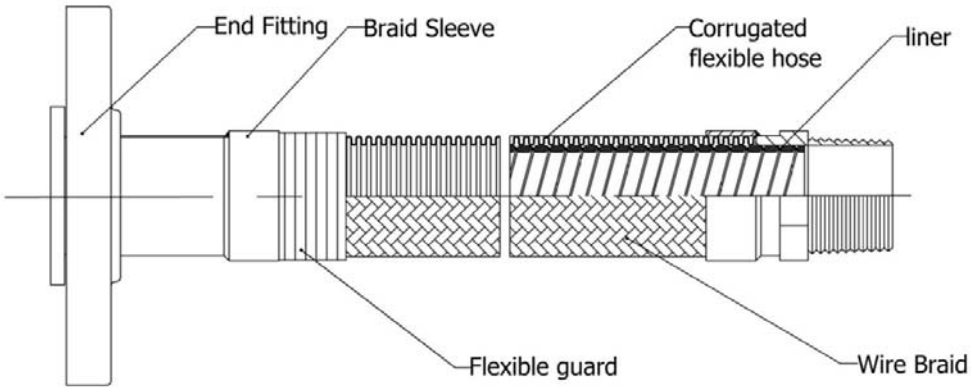
Convoluted Technologies is dedicated to supplying the industry with the high quality flexible metal hose assemblies and related products.
Our flexible hose manufacturing facilities, incorporating different rolling ,forming ,cutting ,etc… machinaries along with know how and sophisticated engineering solutions enable us to meet customers individual needs.
We can provide your needs for a long or short length, large or small diameter (8mm to 406mm), special material and fittings.

Introduction to Flexible Metal Hose

Convoluted Technologies flexible metal hose, is formed either by hydraulic or rubber forming system from 304 stainless steel material , fitted with a 304 stainless steel one, two or three braid layers.
Other grades of material are available on request too.
Components

The main components generally found in a metal hose assembly are :

A. Corrugated flexible hose
B. One or more layers of wire braid
C. Braid sleeves
D. Fitting(s)
E. Flexible guard
F. Liner



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Flexible hose selection Criteria

The selection of metal flexible hose for a particular application is influenced by the following six primary concerns :

- ***Temperature***
- ***Pressure***
- ***Media***
- ***Size***
- ***End Fittings***
- ***Motion***

To adopt the most suitable choice for a certain flexible hose application, all the relevant flexible hose operating factors against the specification of the various types of flexible metal hoses must be considered.

Temperature

As the working pressure, type of media passing through the flexible hose, and the nature of the application will effect the operating temperatures ,and as the physical properties of any material varies with temperature, by careful selection of material, it is possible to provide flexible metal hose for a wide range of operating temperatures.
The material type, end fitting , type of metal hose ,and method of fitting attachment can determines the operating temperature limits.

Pressure

The pressure capacity of flexible hoses vary according to ; the type and size of flexible hoses as well as their materials .
Under actual working conditions, pressure is affected by many other factors such as ; pulsating conditions , bending stresses and temperature

Media

Though the metal hoses are subjected to internal and external corrosion by the media passing through it and the outside environment , but The type of media is an important factor in the selection process.

Since metal hoses are manufactured of a thin-walled product, which is much thinner than the adjusant tubes, they wouldn't have the same total life as heavier walled tube or pipe of the same material , therefore the selection of a proper material is of a very high importance.

Size

The size of flexible metal hose is specified by the nominal diameter.

The existing piping will normally dictate the size of the metal hose for a particular application.

However, velocity , flow rate, and pressure drop factors may also effect the selection of the hose size.

End Fittings

The use of flexible metal hose is complimented by the extensive range of end fittings that are available. Such end fittings may be male or female pipe threads, unions, flanges, flared tube fittings or other specially designed connectors. End fittings are attached by ; welding ,silver brazing, soldering and occasionally by mechanical means ,depending on the type of hose and the alloy.

Motion

Flexible hoses are generally used in following bellow applications.

- **To overcome and correct problems of piping misalignments.**
- **To compensate the regular or constant movements.**
- **To absorb vibration.**
- **To provide flexibility in manual handling operations.**

In all types, careful hose selection, design of the assembly and installation are important for optimal service life.

The flexibility of a hose is determined by its mechanical design and the inherent flexibility of its material.

Technical Information (Definitions)

ABRASION
External damage to a hose assembly caused by its being rubbed on a foreign object.

ANCHOR
A restraint applied to eliminate motion and restrain forces.

ANGULAR DISPLACEMENT
Motion that occurs when the assembly is bent into a single curve .

ANNULAR
Used to describe a type of corrugated hose having many individual parallel convolutions located at right angle to the longitudinal axis of the hose .

ARMOR / CASING / GUARD
Flexible inter locked or square locked tubing placed over the entire length or in short lengths at the end of a metal hose to protect it from physical damage and to limit the bending radius.

ATTACHMENT
The method of fixing end fittings to flexible metal hose, i.e., welding, brazing, soldering ,swaging, bonding, or mechanical.

AXIAL MOVEMENT
Compression or elongation along the longitudinal axis.

BASKET WEAVE
A braid pattern in which the strands of wire alternately cross over and under two strands(two over-two under).

BEND RADIUS
The radius of the bent section of hose measured to the center line of the curved portion .

BEND RADIUS, DYNAMIC
The smallest centerline bend radius that a hose is rated to perform in dynamic applications.

BEND RADIUS, STATIC
The smallest centerline bend radius that a hose is rated to perform in static applications .

BRAID
A flexible wire sheath surrounding a metal hose that prevents the hose from elongation due to internal pressure. Braid is composed of a number of wires wrapped helically around the hose while at the same time going under and over each other in a basket weave fashion.

BRAID ANGLE
The acute angle formed by the braid strand sand the axis of the hose.

BRAID SLEEVE /RING /FERRULE / COLLAR
A ring made from tube or metal strip placed over the ends of a braided hose to contain the braid wires for attachment of fitting and ferrule, and to immobilize heat affected corrugations.

BRAID WEAR
Motion between the braid and corrugated hose which normally causes wear on the outside diameter of the corrugation and the inside diameter of the braid.

BRAIDED BRAID
In this braid, the strands of wire on each carrier of the braiding machine are braided together, and then braided in normal fashion, hence the term braided braid.

BRAZING
A process of joining metals using a nonferrous filler metal having a melting point that is lower than the “parent metals” to be joined.

BUTT WELD
A process in which the edges or ends of metal sections are butted together and joined by welding.

CONVOLUTION/CORRUGATION
The annular or helical formed profile of a corrugated metal hose that provides the ability of the hose to bend .

CORROSION

The chemical or electro-chemical attack of a media upon a hose assembly.

CYCLE-MOTION
The movement from normal to extreme position and return.

DEVELOPED LENGTH/OVERALL LENGTH
The length of a hose plus fittings required to meet the conditions of a specific application.

DIAMOND WEAVE
A braid pattern in which the strands alternately cross over one and under one of the strands (one over - one under). Also known as “plain weave.”

DYE PENETRANT INSPECTION/TEST
A non-destructive inspection method for detecting surface defects.

DOG-LEG ASSEMBLY
Two hose assemblies joined by a common elbow.

DUPLEX ASSEMBLY
An assembly consisting of two hose assemblies - one inside the other, and connected at the ends. Also known as “jacketed assemblies.”

EFFECTIVE THRUST AREA HOSE
The cross-sectional area described by the mean diameter of the hose.

ELASTIC/INTERMITTENT FLEXURE
The smallest radius that a given hose can be bent without permanent deformation to the metal in its flexing members (convolutions or corrugations).

EROSION
The wearing away of the inside or outside convolutions of a hose caused by the flow of the media conveyed, such as wet steam, abrasive particles, etc.

FATIGUE FAILURE
The number of mot in cycles completed by an assembly before failure.

FITTING/COUPLING

A loose term applied to the nipple, flange, union, etc., attached to the end of a metal hose.

FLOW RATE
Pertains to a volume of media being conveyed in a given time period, e.g., cubic feet per hour, pounds per second, gallons per minute, etc.

GALVANIC-CORROSION
Corrosion that occurs on the less noble of two dissimilar metals in direct contact with each other in an electrolyte, such as water, sodium chloride in solution, sulfuric acid, etc.

HELICAL
Used to describe a type of corrugated hose having one continuous convolution resembling a screw thread.

HELICAL WIRE ARMOR/SPRING GUARD
To provide additional protection against abrasion . Metal hoses can be supplied with an external round or oval section wire spiral.

INSIDE DIAMETER (I.D.)
The diameter inside of the hose corrugation.

LAP WELD (LW)
Type of weld in which the ends or edges of the metal overlap each other.

LINER
Flexible sleeve used to line the inside diameter of hose when conveying a high velocity media, also prevents erosion.

LIVE LENGTH
The amount of active (flexible) length of hose in an assembly. Does not include the length of fittings and ferrules.

LOOP INSTALLATION
The assembly is installed in a loop or “U” shape and is most often used when frequent and /or large amounts of motion are involved.

MEAN DIAMETER

The midpoint between the inside diameter and the outside diameter of a corrugated hose.

MECHANICAL FITTING/REUSABLE FITTING
A fitting attached to a hose which can be disassembled and used again.

MEDIUM, MEDIA
The substance(s) being conveyed through a system.

NOMINAL DIAMETER
Indicates the approximate inside diameter.

OFFSET-LATERAL, PARALLEL
The perpendicular distance between fitting axes when motion of the assembly occurs and fittings remain parallel.

OPERATING CONDITIONS
The pressure, temperature, motion, and environment to which a hose assembly is subjected.

OUTSIDE DIAMETER (O.D.)
The abbreviation for outside diameter.

PERCENT OF BRAID COVERAGE
The percent of the surface area of a hose that is covered by braid.

PITCH
The distance between the two peaks of adjacent corrugations or convolutions.

PLY, PLIES
The number of individual thicknesses of metal used in the construction of a wall of the convoluted hose.

PRESSURE
Usually expressed in pounds per square inch (psi).

PRESSURE, BURST (ACTUAL)

Failure of the hose determined by the laboratory test in which the braid fails in tensile, or the hose ruptures, or both, due to the internal pressure applied. This test is usually conducted at room temperature with the assembly in a straight line, but for special applications, can be conducted at elevated temperatures and various configurations.

PRESSURE, BURST (RATED)

A burst value which may be theoretical, or a percentage of the actual burst pressure developed by a laboratory test. It is expected that, in frequently, due to manufacturing limitations, an assembly may burst at this pressure, but would most often burst at a pressure greater than this.

PRESSURE, DEFORMATION

The pressure at which the convolutions of a hose become permanently deformed.

PRESSURE, MAXIMUM ALLOW ABLE WORKING

The maximum pressure at which a hose or hose assembly is designed to be used.

PRESSURE, MAXIMUM TEST

The maximum internal pressure which a hose can be subjected to without permanently deforming the corrugations.

PRESSURE, PULSATING

A rapid change in pressure above and below the normal base pressure, usually associated with reciprocating type pumps.
This pulsating pressure can cause excessive wear between the braid and the tops of the hose convolutions.

PRESSURE, SHOCK

A sudden increase of pressure in a hydraulic or pneumatic system which produces a shock wave. This shock can cause severe permanent deformation of the hose corrugations, as well as rapid failure due to metal fatigue.

PRESSURE, STATIC

A non-changing, constant pressure.

PRESSURE, WORKING

The pressure, usually internal but sometimes external, imposed on a hose during operating conditions.

PROFILE
Used in reference to the contour rolled in to the strip during the process of Manufacturing strip wound hose, or the finished shape of a corrugation/ convolution.

RANDOM MOTION
The uncontrolled motion of a metal hose ,such as occurs in manual handling.

SPLICE
A method of joining two sections of hose.

SQUIRM
A form of failure in which the hose is deformed into an “S” or “U” bend as the result of excessive internal pressure being applied to unbraided corrugated hose while its ends are restrained, or in a braided
corrugated hose which has been axially compressed.

STRESS CORROSION
A form of corrosion in stainless steel normally associated with chlorides.

TRAVELING LOOP
A general classification of bending where in the hose is installed to a U-shaped configuration.

TRAVELING LOOP, CLASS A LOOP
An application wherein the radius remains constant and one end of the hose moves parallel to the other end.

TRAVELING LOOP, CLASS B LOOP
A condition wherein a hose is installed in a U shaped configuration and the ends move perpendicular to each other so as to enlarge or decrease the width of the loop.

TORQUE (TORSION)

A force that produces, or tends to produce, rotation of or torsion about the longitudinal axis of a hose assembly while the other end is fixed.

VELOCITY RESONANCE

The vibration of convolutions due to the buffeting of a high velocity gas or liquid flow.

VIBRATION

Low amplitude motion occurring at high frequency.

WELDING

The process of localized joining of two or more metallic components by means of heating their surfaces to a state of fusion, or by fusion with the use of additional filler material.

S.T.A.M.P.E.D.

To properly design a metal hose assembly for a particular application, the following design parameters must be determined. To help remember them, they have been arranged to form the acronym "S.T.A.M.P.E.D."
Analyzing an Application:

1. Size – The diameter of the connections in which the assembly will be installed is needed to provide a proper fit. This information is required.

2. Temperature – As the temperature to which the assembly is exposed (internally and externally) increases, the strength of the assembly's components decreases. If you do not provide this information it will be assumed that the temperatures are 70ºF.

3. Application – This refers to the configuration in which the assembly is installed. This includes the dimensions into which the assembly must fit as well as the details of any movement that the assembly will experience. This is required since you cannot determine the proper length or proper hose type without it.

4. Media – Identify all chemicals to which the assembly will be exposed, both internally and externally. This is important since you must be sure that the assembly's components are chemically compatible with the media. If no media is given it will be assumed that both the media and environment are compatible with all of the available materials for each component.

5. Pressure – Identify the internal pressure to which the assembly will be exposed. Strip wound metal hose, by the nature of its construction, is not pressure tight. However, pressure and media in filtration through the strip wound wall can be minimized by the insertion of one of a variety of packing s into the wall during hose manufacturing. If no pressure is given it will be assumed that there is no pressure.

6. End Fittings – Identify the necessary fittings. This is required since fittings for the assembly must be chosen to properly fit the mating connections.

7. Dynamics – Identify the velocity of the media flowing through the assembly. Extremely high flow or abrasive media can cause premature failure. If no velocity is given, it will be assumed that the velocity is not fast enough to affect the assembly's performance.

In addition to the "STAMPED" parameters , there are other factors that should be considered :

- *Flow .very high velocities may require the use of a liner .*
- *Additional protections (i.e. guards and covers)*
- *Conformance to other standards.*
- *Physical space limitations .*
- *Enhanced cycle life requirements.*
- *Heat treatment.*
- *Special requests including hose constructions, attachment methods , fitting orientation , tolerances , testing , cleaning , packaging , or documentation .*

Special Assemblies

Jacketed or Duplex Hose *assemblies are a hose within a hose.*
Both inner and outer hoses act independently as separate pressure carriers. Vacuum Jacketed Hose Assemblies are typically found in cryogenic applications because of their insulation properties. Steam Jacketed Hose Assemblies are utilize d when the media is viscous and steam is used to help reduce viscosity and increase flow. Jacketed hoses are also used in applications where containment of the media is critical in case of rupture of the inner hose.

Pressure Loss and Flow Velocity Information

Pressure Loss

For the same flow characteristics, the pressure loss is higher in metal hoses than rigid piping, due to the profile of the corrugations. As a rough estimation, expect the pressure loss in corrugated hoses to be150 percent higher than in new, smooth steel pipes.

Flow Velocity Consideration

The flow velocity in corrugated metal hose should never exceed 150 ft./sec. for gas or 75 ft./sec. for liquids. When a hose is installed ina bent condition, the flow values should be reduced proportionally to the degree of the bend. Where the flow velocity exceeds these rates, an interlocked metal hose liner or larger hose I.D. is recommended.

Classification of Motion

Random Motion

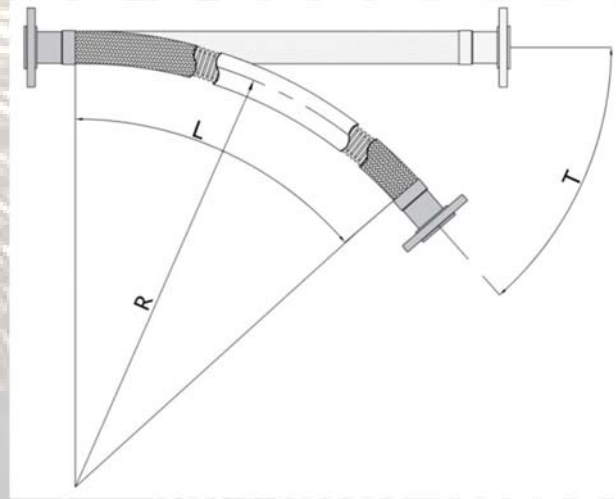
Such motion is non-predictable and occurs from the manual handling of a hose assembly. Care must be taken to prevent over-bending of the hose and to avoid external abrasion of the wire braid. An arm or covering of interlocked hose provides protection against these abuses.

Axial Motion

This type of motion occurs when there is extension or compression of the hose along its longitudinal axis. This class of motion is restricted to unbraided corrugated hose only and is accommodated by traveling loops (see pg. 18) or bellows specifically designed for this purpose.

Angular Motion

This type of motion occurs when one end of a hose assembly is deflected in a simple bend with the ends not remaining parallel.



To find the live hose length:
L = π RO/180 + 2(s)
L = Live Hose Length (inches)
π = 3.1416
R = Minimum Centerline Bend Radius — Dynamic (in.)
O = Angular Deflection (degrees
S = Outside Diameter of Hose

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. This movement can be due to a one-time (static)bend or movement which repeatedly occurs slowly over time (such as thermal expansion).

• The appropriate formula to use to calculate Live Hose Length depends on the condition of the moving end.

• When the offset motion occurs to both sides of the hose center line ,use total travel in the formula;
i.e., 2 x “T.”

• The offset distance “T” for constant flexing should never exceed25 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.

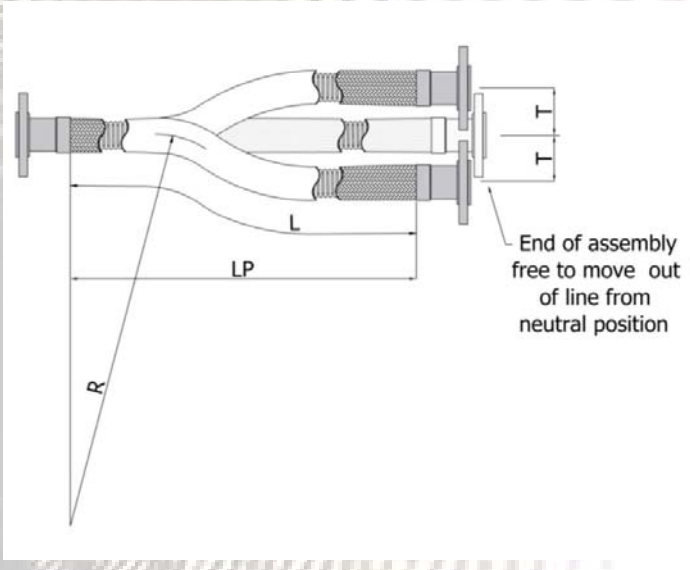
L = Live Hose Length (inches)
Lp = Projected Live Hose Length (inches)
R = Minimum Centerline Bend Radius — Dynamic (in.)
T = Offset Motion to One Side of Centerline (inches)

Minimum Bend Radius Occurs at Offset Position

Moving end is free to move “out of line” at neutral position.

To find the live hose length:

Formula: L = √6RT + T2
Lp = √L2 - T2
Tm = √9R2+ L2 - 3R
L = Live hose length (inches)
Lp = Projected live hose length (inches)
R = Minimum centerline bend radius (inches)
T = Offset motion to one side of centerline (inches)
Tm= Maximum centerline offset for a given L and R

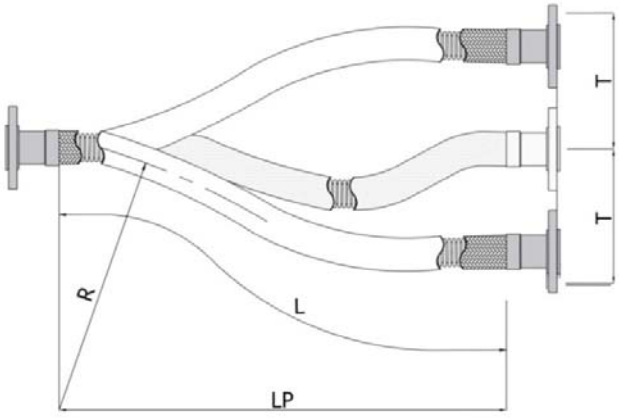


Minimum Bend Radius Occurs at In Line Position

The moving end of the hose is restricted to move only up and down in line as the hose crosses neutral position.

To find the live hose length:

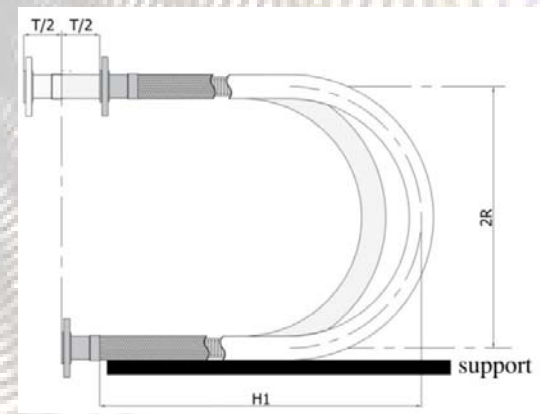
L = √20(RT)
Lp = √L2 - T2



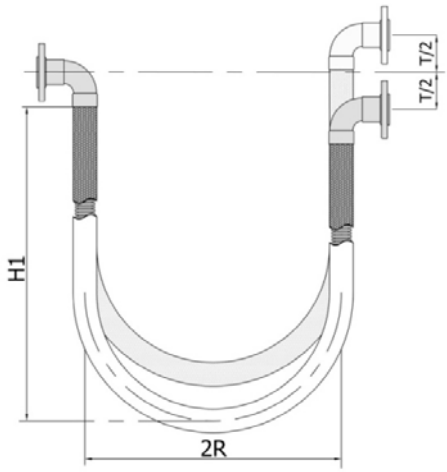
Constant Radius Traveling Loop – Class A

Travelling Loops *in a piping system is where axial movements must be accommodated or where the magnitude of the motion is in excess of the limits of an offset movement, the travelling loop configuration offers an ideal solution. In travelling loops, the centre line of a hose assembly is bent in a circular arc. Travelling loops accommodate movement in one of two ways.*
1. A constant radius travelling loop accommodates motion by varying the length of the arms of the assembly while the radius remains constant.
2. A variable radius travelling loop accommodate s motion by varying the bend radius of the hose assembly. Both types of travelling loops can be installed to absorb either horizontal or vertical movement. The constant radius travelling loop provides for greater movement while the variable radius travelling loop requires less installation space.

L = Live Hose Length (mm)
R = Minimum Dynamic Bend Radius for Constant Flexing (mm)
T = Total Travel (mm)
H1 = Hang Length of the Loop (mm)

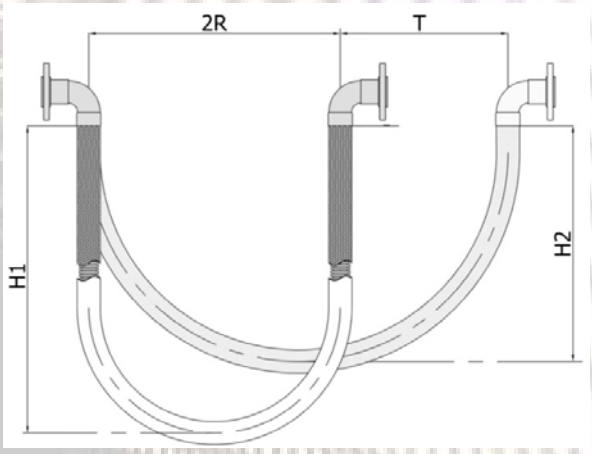


L = 4R + T/2
H 1 = 1.43R +T/2

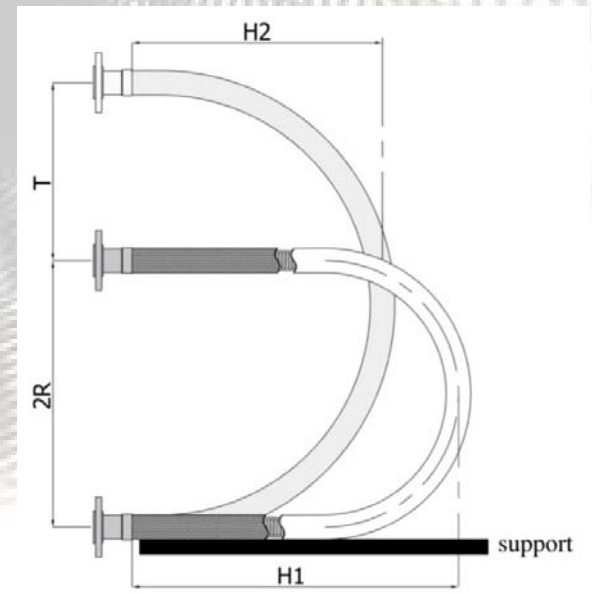


Variable Radius *Traveling Loop – Class B*

L = 4R + 1.57T
H1 = 1.43R +0.79T
H2 = 1.43R +0.5T



L = 4R + 1.57T
H1 = 1.43R +0.79T
H2 = 1.43R +0.5T



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Quality

Convoluted Technologies is dedicated to supplying the industry with the highest quality flexible metal hose assemblies. Whether you need a long or short length, large or small diameter, special materials, unique fittings or fast delivery, we can make it happen .Quality Assurance at Convoluted Technologies is of vital importance hence every stage of production is constantly monitored to ensure absolute quality.

Convoluted Technologies has complete in house testing facilities for various types of tests, as per international standards ISO 10380.

Dye Penetrant Inspection or Test:

A method for detecting surface irregularities such as cracks, voids, porosity, etc. The surface to be checked is coated with a red dye that will penetrate existing defects. Dye
is removed from the surface and a white developer is applied. If there is a defect in the surface being checked, the red dye remaining in it will cause the white developer to be stained, there fore locating the defective area.

Hydrostatic Pressure Test:

A method to detect any sign of leakage or any other mode of failure of the hose by applying 1.5 times the maximum working pressure stated in the technical data chart.

Pneumatic Leakage Test:

This test will find the smallest sign of leakage that does not show on the Hydraulic Pressure Test. The test has its restriction son the pressure due to the dangers involved with compressed gas. The pressure during this test will be10% of the working pressure or 200kPa, which ever is lower.

Cleaning:

The hose assemblies can be cleaned internally, dehydrated and capped before des patch.

Painting:

All mild steel fittings will be painted before des patch.

Special Requirements:

Marking:

Permanent marking on a metal hose assembly is commonly achieved in two ways:

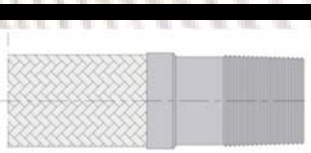
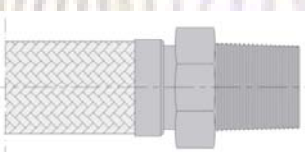
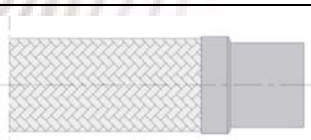
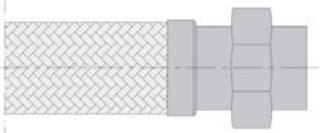
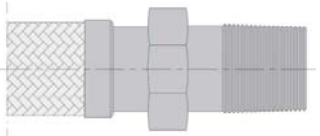
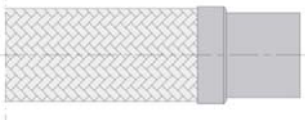
A. *Per-stamping the information in legible characters on a metal tag or band and affixing the tag / band to the assembly by a durable method ; or*
B. *Stamping or etching the information in legible characters directly onto the braid sleeve or fitting.*

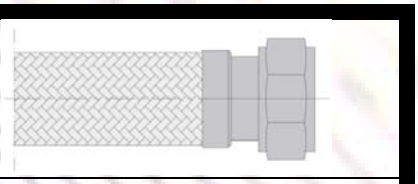
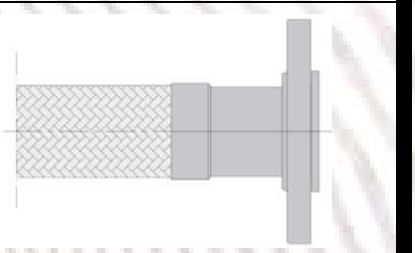
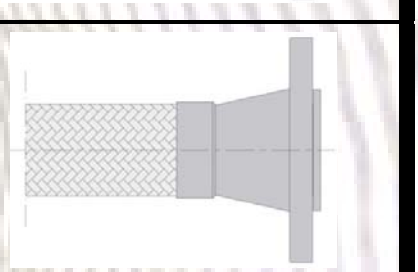
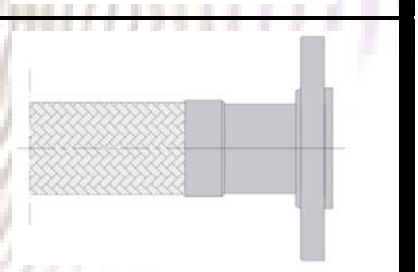
Packaging:

Hose assemblies shall be packaged in such a manner to prevent damage during shipping and handling .the assembly should be packed while it is clean and dry in a way to prevent internal contamination . the assembly should not be coiled tighter than its specified dynamic minimum bend radius . all containers , boxes , bending , and pallets shall be of sufficient size and strength to with stand the abuses of normal handling and transit.

FITTINGS

Many different fitting designs may be attached to the hose assembly .Selection of the proper material for the end fittings must be considered .Fitting materials such as carbon steel, malleable iron, stainless steel ,bronze or brass may or may not be the same as the hose assembly material .Correct attachment of the fittings is essential to the integrity of the assembly.

Fitting	Description	
Male Pipe (Solid)	Pipe thread — Sch 40 Std Weight Sch 80 Heavy Weight	
Hex Male Pipe (Solid)	Pipe thread — with integral or attached hex	
Female Pipe (Solid)	Female pipe thread — also may be supplied with hex	
Female Union	Female pipe thread with ground joint union as specified	
Male Union	Male pipe thread with ground joint union as specified	
Weld-Plain Pipe End (Solid) **Tube End (Solid)** **Tube End (Solid)**	Pipe tube end specified by Sch 40 or Heavy Weight Sch 80 Plain tube end specified by O.D. and wall thickness	
Fitting	**Description**	

Tube with Fittings (Swivel)	Tube flared with sleeve and nut for female JIC/SAE swivel fitting, As specified .Overall length is normally measured seat to seat.	
Flange Fixed	a) Forged steel — per ASTM specification from 125 lb. to 600 lb. b) Plate steel — where permissible cut and drilled to 150 lb. or 300 lb. dimensions	
Flange- Weld neck (Fixed)	Forged steel — per ASTM specification from 125 lb. to 600 lb	
Flange-Lap Joint (Floating)	a) Lap joint forges flange per ASTM specification from 125 lb. to 600 lb., must be used with MSS/ANSI "A" forged stub end Std or Extra Heavy b) Slip-on or plate flange for lighter weight schedule 10 stub ends	

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Karonsar Medium Pressure Hose Specification :

- **Hose manufactured in 304 stainless steel**
- **Braid manufactured in 304 stainless steel**

- **FHX0 = Unbraided Hose**
- **FHX1 = One layer Braid**
- **FHX2 = Two layers Braid**

Nominal Diameter		TYPE	Min. Bending Radius STATIC	Min. Bending Radius DYNAMIC	Max. operating pressure		weight
mm	in		mm	mm	Bar	PSI	Kg / m
6	¼"	FHX 0	15	105	12	174	0.1
		FHX 1	25		170	2465	0.18
		FHX 2			220	3190	0.25
8	5/16"	FHX 0	18	125	12	174	0.14
		FHX 1	32		140	2030	0.22
		FHX 2			210	3045	0.32
10	3/8"	FHX 0	20	145	8	116	0.17
		FHX 1	38		110	1595	0.29
		FHX 2			175	2537.5	0.4
12	1/2"	FHX 0	22	160	6	87	0.18
		FHX 1	45		75	1087.5	0.36
		FHX 2			101	1464.5	0.54
15	5/8"	FHX 0	28	190	5	72.5	0.28
		FHX 1	58		75	1087.5	0.43
		FHX 2			120	1740	0.63
20	3/4"	FHX 0	30	195	3.5	50.6	0.30
		FHX 1	70		65	942.5	0.58
		FHX 2			87	1261.5	0.80
25	1"	FHX 0	42	195	4	58	0.33
		FHX 1	85		50	725	0.69
		FHX 2			76	1102	1.1
32	1 1/4"	FHX 0	55	260	3	43.5	0.40
		FHX 1	105		40	580	0.9
		FHX 2			57	826.5	1.3
40	1 1/2"	FHX 0	70	300	2.4	34.8	0.65
		FHX 1	130		38	551	1.15
		FHX 2			55	797.5	1.66

Nominal Diameter		TYPE	Min. Bending Radius STATIC	Min. Bending Radius DYNAMIC	Max. operating pressure		weight
mm	in		mm	mm	Bar	PSI	Kg / m
50	2”	FHX 0	90	350	1	14.5	0.83
		FHX 1	160		32	464	1.5
		FHX 2			42	609	1.25
65	2 1/2”	FHX 0	110	400	1	14.5	1.95
		FHX 1	210		25	362.5	2.82
		FHX 2			45	652.5	3.6
80	3”	FHX 0	130	455	1	14.5	2.35
		FHX 1	220		22	319	3.40
		FHX 2			42	609	4.55
100	4”	FHX 0	200	550	0.6	8.7	3.00
		FHX 1	225		21	304.5	4.85
		FHX 2			33	478.5	6.85
125	5”	FHX 0	345	710	0.2	3	3.38
		FHX 1	350		11	159.5	5.3
		FHX 2			20	290	7.2
150	6”	FHX 0	405	870	0.2	3	5.25
		FHX 1	410		11	159.5	7.45
		FHX 2			20	290	9.65
200	8”	FHX 0	500	1100	0.15	2.2	6.85
		FHX 1	510		7	102	9.55
		FHX 2			10	145	12.9
250	10”	FHX 0	860	1750	0.15	2.2	8.85
		FHX 1	870		9.5	140	14.4
		FHX 2			17	250	19.9
300	12”	FHX 0	920	1850	0.15	2.2	10.6
		FHX 1	940		12	176.4	20.3
		FHX 2			21.5	316	30

Installation Instructions

Flexible metal hose is engineered to provide maximum service life when properly installed. Improper installation, incorrect flexing or careless handling in an application will reduce the effective service life of the hose and cause premature failure of an assembly. The following installation and handling precautions should be observed to achieve optimum performance from your flexible metal hose assemblies.

In plane traveling loop installation

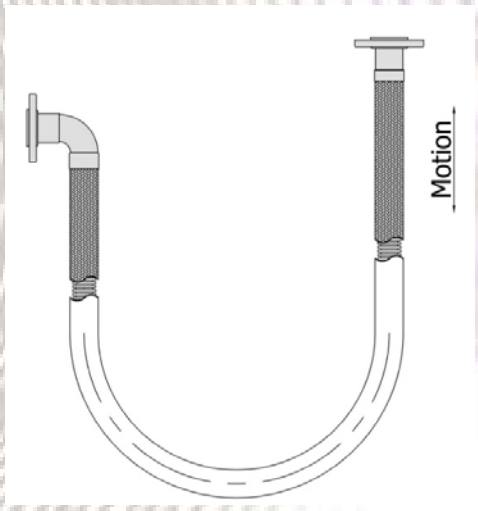
Avoid torque

Do not twist the hose assembly during installation when aligning the bolt holes in a flange or in making up pipe threads.

The utilization of rotating flanges on stub ends, pipe unions or female swivels will minim is e this condition.

It is recommended that two wrenches be used in making the union connection;

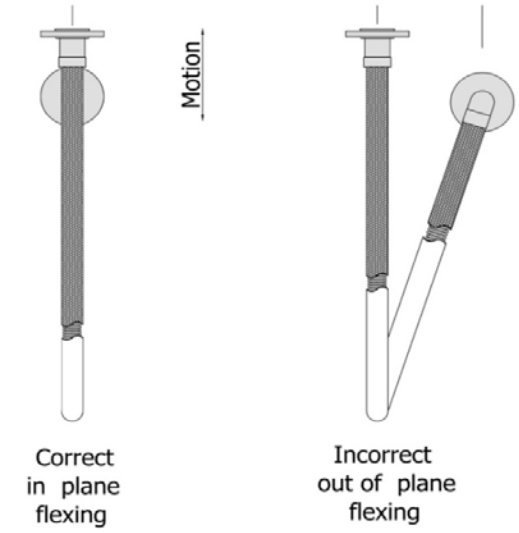
one to prevent the hose from twisting and the other to tighten the coupling.



In plane lateral offset installation.

Prevent out-of-plane flexing in an installation.

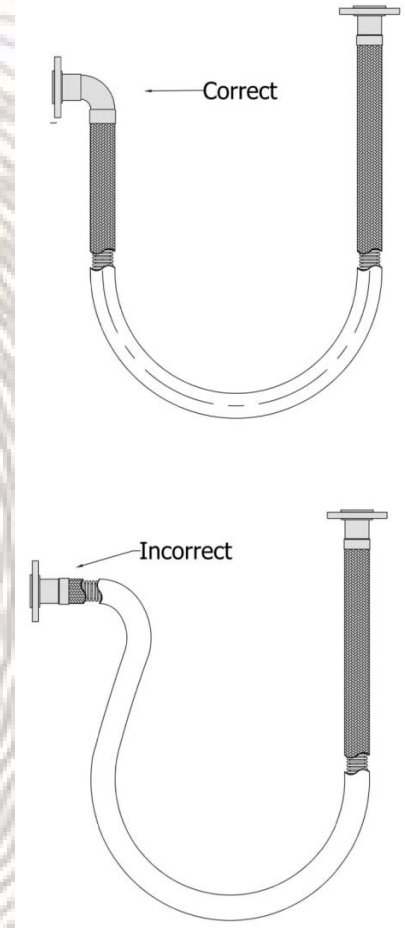
Always install the hose so that the flexing takes place in only one plane. This plane must be the plane in which the bending occurs.



Avoid over bending

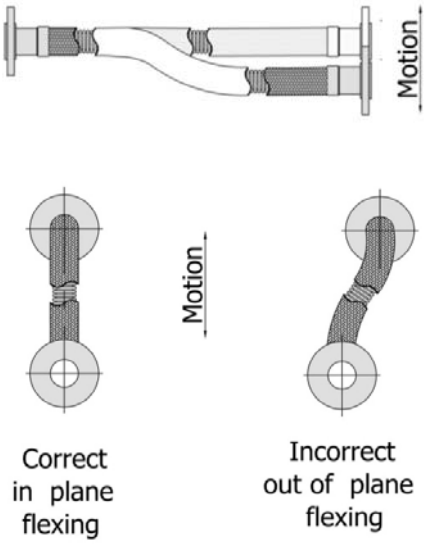
The repetitive bending of a hose to a \radius smaller than the Dynamic Bend Radius will result in premature hose failure.

Always provide sufficient length to prevent over bending and to eliminate strain on the hose.



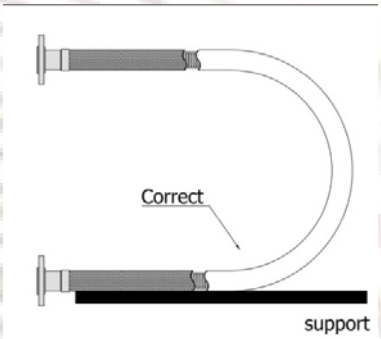
Avoid sharp bends.

Utilize sound geometric configurations that avoid sharp bends, especially near the end fittings of the assembly



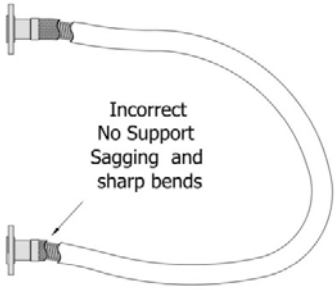
Provide support.

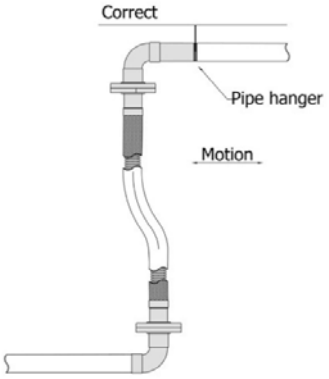
When installing the assembly in a horizontal loop, provide support for the arms to prevent the hose from sagging.

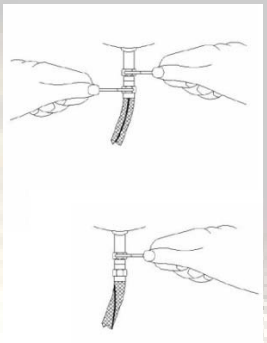


Handle with care.

Avoid careless handling of the hose assembly. Always lift or carry the metal hose to prevent abrasion damage particularly to braided corrugated hose. Store metal hose assemblies away from areas where it can be subjected to spillage, corrosive fumes, sprays or weld splatter, etc.



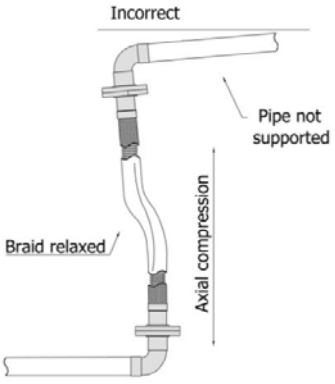




Do Not Torque Hose

Do not extend or compress axially.

A piping system which utilizes metal hose to absorb movement must be properly anchored and/or guided. Always support the piping to prevent excessive weight from compressing the hose and relaxing the braid tension.



Do…

• follow any printed instructions included with the flexible connector.
• follow industry–recommended practices and use care in handling and installing flexible connector.
• install flexible connectors so that the bend is as close to the center of the connector as possible.
• observe the minimum bend radius as specified by the connector manufacturer.
• trial-fit threaded connections by hand, unmake and then make permanent.
• use a flexible connector of proper length to suit the installation.
• only wrench on the fitting hex flats as provided.
• design the installation to allow for ground movement after installation, such as settling or frost heave.
• install the proper length connector to allow a 2" straight run of hose at each end fitting.
• use pipe wrenches on both mating hexes to avoid twisting the hose.
• keep hose free from all objects and debris.
• handle and store connectors carefully prior to installation.
• check for leaks before covering the installation.
• install in such a manner that the connector can be removed.
• make sure the pressure rating of connector is not exceeded.

Don't…

• apply a wrench to a hose, collar or assembly.
• twist hose assemblies during installation or when aligning the bolt holes in a flange or when making up pipe threads.
• "pre–flex" a flexible connector to limber it up. Over– bending could cause damage and result in leakage.
• over–bend a flexible connector. A 45°–90° bend should be sufficient to install any flexible connector.
• install a flexible connector with the bend next to the end fittings. This could cause damage and result in leakage.
• lay the flexible connector on rocks or objects which could puncture the hose and cause leakage.
• attempt to stretch or compress a flexible connector to fit an installation.
• restrict flexibility by allowing connector to come into contact with other components or equipment during installation.