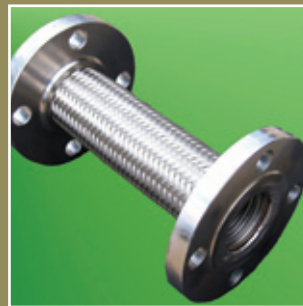




02



STAINLESS STEEL CORRUGATED HOSE & STRIPWOUND

Product Guide



COMPANY PROFILE

2.02 | Pacific Hose Flex

Our office and factory is situated in South East Queensland, Australia.

With expertise of over 25 years our management staff have diversified their engineering skills to industrial hose products, hose fittings and expansion joints.

Today we have a knowledgeable and professional hose and expansion joint team, with many years of engineering, manufacturing and sales experience.

Our assembly, quality control and service rates amongst the highest in our industry.

Pacific Hose Flex products are distributed nationally and internationally and can be found in underground mines, power stations, marine, food and chemical industries, steel works, automobiles, instrumentation equipment, armed forces and an almost endless number of fluid and air conveyance applications.

For further information contact our sales team on:

Phone: (617) 55934292

Fax: (617) 55934298

Web Address: <http://www.hoseflex.com.au>

Email: phf@hoseflex.com



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PRODUCT RANGE

2.03 | Complete Range of Pacific Hose Flex

01

Teflon Hose®



02

Stainless Steel Interlock Hose
Stainless Steel Hose



03

Expansion Joints:
Rubber
Teflon®
Stainless



04

Composite Hose
Ducting Hose
Rubber Hose



05

Fittings



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STAINLESS STEEL HOSE

2.04 | Metallic Convoluted Hose

These are the factors that should alert you to consider using metallic hose:

Temperature Extremes - If either the temperature of the media going through the hose or the surrounding atmospheric temperature is very cold or hot, metal may be the only material that will withstand the temperature extremes.

Chemical Compatibility - Metal hose can handle a wider variety of chemicals than most of the other hose types. If the hose will be exposed to aggressive chemicals (either internally or externally), metallic hose should be considered.

Permeation Concerns - Non-metal hose is susceptible to having gases permeate through the hose wall and into the atmosphere. Metal hose, on the other hand, does not allow permeation. If containing the gases inside the hose is important, a gas approved metal hose may be required.

Potential for Catastrophic Failure - When a metal hose fails, it initially develops small holes or cracks. Other hose types tend to develop larger cracks or come apart completely. If a sudden failure of the hose can be catastrophic, a metal hose may help minimize the effects of a failure by leaking product at a slower rate.

Abrasion and Overbending Concerns - To prevent abrasion and overbending, a metal hose can be used as a protective cover over wires or even other hoses.

Fire Safety - Other hose types will melt when exposed to fire while metal hose maintains its integrity up to 700 Degrees Celsius

Achieving Full Vacuum - Under full vacuum, metal hose maintains its shape while other hose types may collapse.

Flexibility in Fitting Configuration - Virtually any type of fitting can be attached to metal hose while other hose types require special tails and clamping methods.

Types of Metal Hose:

Corrugated Metal Hose - Corrugated metal hose handles high pressures making it excellent for gas and liquid transfers.





STAINLESS STEEL HOSE

2.05 | Specifications Sheet

Stainless Steel Annular Pressure Hose

NOMINAL BORE		WORKING PRESSURE			TEST PRESSURE			MIN. BEND RADIUS	
Inches	mms	SS1 PSI	SS2 PSI	SS1 Kgs/Cms ²	SS1 PSI	SS2 PSI	SS1 Kgs/Cms ²	Inches	mms
½"	6	2500	3750	176	3750	5625	264	5	127
¾"	10	1625	2438	114	2438	3657	172	6	152
½"	13	1550	2325	109	2325	3488	164	7	178
¾"	19	950	1425	67	1425	2138	100	8	203
1"	25	800	1200	56	1200	1800	85	9	229
1 ½"	32	650	975	46	975	1463	69	10.5	267
1 ¾"	38	500	750	35	750	1125	53	11.5	292
2"	51	475	713	33	712	1068	50	12.5	318
2 ½"	62.5	390	585	27	585	878	40.5	14	357
3"	75.5	350	525	24	525	788	36	20	508
4"	103.0	215	325	15	320	480	22.5	24	610
5"	126.0	200	300	14	300	450	21.0	30	750
6"	152.0	130	195	9	195	293	13.5	36	900
8"	202.0	90	135	6	135	203	9.0	42	1050

Stainless Steel Omega Style Flexible Hose

Nominal Dia		Inner Dia	Outer Dia		Min Bend Radius		Working Pressure (PSI)		Weight (kg/m)	
mms	inches	mms	Main Body S50	Single Braid S51	Static State	Dynamic State	Single Braid S51	Double Braid S52	Main Body S50	Single Braid S51
14	½"	14	20	22	65	120	1,087.50	1,812.50	0.21	0.40
16	¾"	16	23	25	80	150	928.00	1,450.00	0.26	0.50
20	¾"	20	28	30	100	180	725.00	1,160.00	0.35	0.60
25	1"	25	35	37	120	280	580.00	1,087.50	0.47	0.85
32	1 ¼"	32	43	45	140	340	507.50	928.00	0.51	0.96
40	1 ½"	40	51	53	180	450	435.00	812.00	0.70	1.18
50	2"	50	62	64	220	550	362.50	580.00	0.85	1.75
65	2 ½"	65	79	82	280	650	290.00	580.00	1.41	2.70
80	3"	80	97	100	350	800	290.00	464.00	1.62	3.12
100	4"	100	122	125	400	1000	232.00	362.50	2.00	3.70
125	5"	125	151	155	500	1200	218.50	362.50	2.80	5.00
150	6"	150	180	184	600	1500	218.50	362.50	3.80	6.60
175	7"	175	210	215	700	1750	174.00	290.00	5.80	9.70
200	8"	200	240	245	800	2000	174.00	290.00	6.70	12
250	10"	250	298	303	1000	2200	145.00	232.00	10.60	18.1
300	12"	300	360	365	1200	2500	145.00	232.00	17.10	31.4
350	14"	250	410	415	1400	3000	116.00	174.00	20.00	36.3
400	16"	400	460	465	1600	3500	87.00	145.00	22.80	41.1
450	18"	450	520	525	1800	4000				
500	20"	500	570	575	2000	2500				
600	24"	600	670	675	2400	5500				

Monel Corrugated hose

Nominal Dia ID	Braid Layers	Nominal O.D (inches)	Max pressure @70°F (PSIG) ^a			Bend Radius (inches)		Weight Per Foot (lb.)
			Working Pressure	Test	Nominal Burst	Dynamic	Static	
¼"	0	0.50	144	216	-	5.00	1.00	0.09
	1	0.58	1,882	2,822	7,527			
	2	0.66	3,010	4,515	12,043			
½"	0	0.82	64	96	-	8.00	1.50	0.39
	1	0.90	701	1,051	2,805			
	2	0.98	1,121	1,793	4,483			
¾"	0	1.21	56	84	-	8.00	2.00	0.48
	1	1.29	542	814	2,171			
	2	1.38	867	1,301	3,469			
1"	0	1.50	32	48	-	9.00	3.00	0.79
	1	1.58	464	696	1,857			
	2	1.66	742	1,114	2,970			
1 ½"	0	2.19	13	24	-	12.00	4.00	0.84
	1	2.27	330	495	1,322			
	2	2.35	528	792	2,112			
2"	0	2.51	12	18	-	15.00	5.00	1.04
	1	2.59	316	474	1,266			
	2	2.67	506	758	2,022			
3"	0	3.78	8	12	-	22.00	9.00	1.21
	1	3.88	197	295	788			
	2	3.98	314	471	1,258			

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STAINLESS STEEL HOSE

Corrugated Stainless Steel Metallic Hose

Application

The Stainless steel corrugated hose is especially designed to achieve several objectives in pipe work design. These include, absorption or vibration, operate under vacuum, handle temperature extremes, suppress rigid pipe noise transmitted, accommodate reciprocating and flexing movement, operate effectively under high pressures and adjust or correct for misalignment.

Composition

Stainless steel corrugated hose is a general purpose industrial hose and is available in different grades of stainless steel including 304, 316, 321 & Monel.

Corrugation Design

The corrugated hose is manufactured from a cylindrical, thin walled tube formed from rolled strip and welded at the seam. Impressed into this tube is a corrugated annular profile. Annular corrugation means each convolution is perpendicular to the centre line of the hose. This gives a distinct advantage of movement with each corrugation being relatively independent of movement from each other. When the corrugations are close spaced, the hose is referred to as 'closed pitch' hose. Conversely, when the corrugations are more widely spaced, the hose is referred to as 'open pitch'.

When needing greater flexibility Omega style hose is ideal. It has a higher flexing cycle life because of the increase in the number of convolutions per metre without thinning the wall of the hose. The corrugations have the tendency to spring back to their original position when the displacement forces are removed.



2.07 | Stainless Steel Hose Design

Flexibility

The flexibility of the corrugated hose is the result of the bending of the metal corrugations. Service life varies depending upon the severity of the flexing, temperature, corrosive conditions, pressure and vibration to which the hose is subjected.

Unless restrained, corrugated hose will elongate when subjected to increased internal pressure. Restraint is provided by a braided covering, consisting of a tubular sheath of woven metal wires fitted tightly over the corrugated hose and secured at each end. Bending and flexibility of the corrugated hose is not appreciably affected by the wire braid covering.



Braid

Stainless steel wire braid (SS1) on the hose assembly provides the hose with a higher internal pressure capability by acting as a restraint against hose elongation, and acts to dampen vibration without significant loss of flexibility.

A second layer of braid (SS2) may be used to increase pressure rating. The test pressure is not to be exceeded or it may incur permanent corrugation deformation.

Unbraided hose is satisfactory for vacuum and low pressure applications and for protection against vermin and abrasion.



2.08 | Pump Connector & Seismic Joints

Vibration Eliminator / Pump Connector

Pump Connectors are flexible metal assemblies, primarily designed to isolate vibration from pumps on both the suction and discharge sides of the pump. They help to prevent damage caused by vibration, expansion and contraction. They accept thermal expansion and reduce piping stress due to minor misalignment. Constructed of stainless steel annular corrugated metal and surrounded with a woven braid of high tensile stainless steel, these assemblies are flexible and are most suitable to withstand high pressure and temperatures.



Seismic Joints and Expansion Loops

Flexible loop applications that include thermal expansion and contraction, and/or building expansion and contraction, (singularly or in combination with seismic considerations), are engineered by the system designer to account for the cumulative movement(s) of each individual system.

Piping used in applications and locations subject to seismic conditions have their own set of unexpected random movements. The random motion common to earthquakes requires that seismic expansion joints be capable of movement in any direction. Of the 6 possible directions, axial movement of the hose in only two of them compared to four in an "L" shaped assembly. Seismic expansion joints orientation can be changed relative to the piping, further minimizing the likelihood of compressive movement.



Significant cost and safety benefits not found in Pacific Hose Flex seismic expansion joints.

- It is an inexpensive alternative to dual-tied bellows expansion joints and especially ball joints.
- During an earthquake, it protects equipment by allowing boilers, chillers, fan-coil units and other systems to move independently of the building.
- Installed at the connection also prevents nozzles from cracking or shearing off.
- A break in the gas pipework could start a fire, which can of course be devastating. This Australian Gas Approval (AGA) -certified seismic expansion joint will compensate for the movement that occurs during any seismic activity such as an earthquake.

2.09 | Jacketed Hose, Pressure Loss & Vibration Information

Jacketed Hose

Jacketed hose assemblies are made up of two flexible hose units, one inside another. Both inner and outer hoses act independently as separate pressure carriers. The outer hose surrounds the product chamber to keep the products warm or cold.

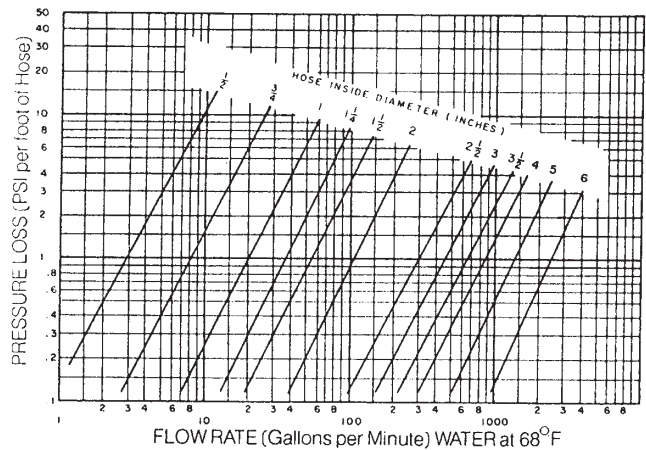
The media typically is steam, hot oil or hot water to raise the temperature of the fluid moved in the internal hose. Also cold products such as liquid helium or nitrogen can be used to lower the temperature of the fluid within the internal hose.



Pressure loss

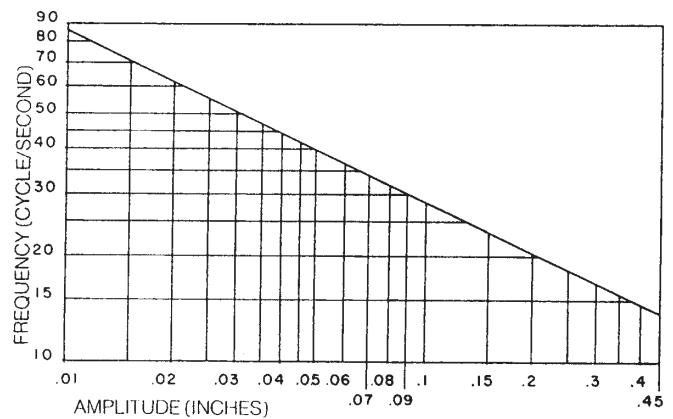
When planning piping systems, the pressure loss of the medium is important, in addition to the hose pressure resistance and flexibility. At equal flow rates the pressure loss is higher in metal hose rather than rigid piping. This is caused by the corrugations. It can be assumed that the pressure loss in corrugated hoses is 100% higher than in new welded steel pipes and in stripwound or metal interlock hoses it is 20% higher.

Therefore in the case of corrugated hoses an increase in diameter of 15% and a stripwound or metal interlock hoses 4% is sufficient to reduce the pressure loss to the same value as new steel pipe.



Vibration information and graph

The inherent flexibility of corrugated hose plus the dampening effect of the wire braid combine to create the excellent vibration isolation qualities of corrugated metal hose. The graph below defines the combination of amplitudes and frequencies considered to be normal industrial vibration.



2.10 | Temperature Capability

Temperature rating

The Stainless steel corrugated hose is suitable for temperatures up to 600 deg c or in cryogenic application down to - 200 deg c. The stainless steel hose will convey most liquid and gas up to the working pressure stated as per the temperature correction chart below. The hose provides a long service life, high physical strength with excellent corrosion characteristics with resistance to fire, penetration and damage resistance.



Temperature Correction factor

The recommended maximum working pressure rating of stainless steel hose is at a temperature of 20 deg Celsius. Where hoses are required to operate at a temperature above 20deg Celsius, a correction factor should be applied to the specified working pressure of the selected hose. The correction factor is given in table 2.

Table 2

Temp. (C)	Corr. Factor
-200	1.0
-150	1.0
-100	1.0
-50	1.0
0	1.0
20	1.0
50	0.95
100	0.83
150	0.75
200	0.69
250	0.65
300	0.61
350	0.58
400	0.56
450	0.54
500	0.53
550	0.52
600	0.34
650	0.19
700	0.10

Cover/Armour

To protect the Stainless steel hose from unusual external abuse you can use different armours and covers such as: stainless steel interlock, heat shrink, lay-flat, scuff guarding, fire sleeve, fibre glass tape, PVC, rubber and also wire spring-guard.

Fibre glass tape and sleeve cover



Wire spring guard



Scuff guard



Stainless steel interlock cover



Layflat cover



PVC covering



2.11 | Testing and Cleaning

Flow Velocity Consideration

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

Liners

The most common liner used in a corrugated hose is a metal interlock hose. The liner will allow a smooth flow rate whilst maintaining limited flexibility. The interlock will partially reduce the bend radius and inside diameter of the corrugated hose. The smooth liners reduce associated noise.

Service Life

The Stainless steel corrugated hose is engineered to provide maximum service life when properly installed. Incorrect 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 service life can be affected by many external factors, the environment surrounding the assembly as well as the media being transferred will together determine a general guide to the service life.

Pressure/Testing

The nominal pressure rating of a corrugated stainless hose varies according to type, material and size. The pressure can be affected by factors such as temperature, pulsation or shock conditions and bending stresses. To avoid distortion of the convolutions of the hose, the maximum test pressure quoted in the literature must not be exceeded. If requested all hoses can be tested to 1½ times the customers stated working pressure, provided that this does not exceed the stated maximum test pressure.

Cleaning

Pacific Hoseflex can clean their manufactured assemblies for gas, air and oxygen use. The different hose assemblies range from stainless steel corrugated hose to Teflon hoses. The Vapour Cleaning Tank cleans the assemblies when they are lowered into the vapour zone, the vapour condenses on the cold work and "washes" the grease and oil away. This process is enhanced by the effect of the higher temperature. When the temperature of the work attains that of the vapour, there is no further condensation, and the cleaning action ceases.

Approvals

If required your hoses can be manufactured for use with gas. We are accredited to Gas Approval Standard AG 216 and our Stainless steel corrugated hose will be manufactured on request to standard ISO 9001:2000 and also to International Standard ISO10380



2.12 | Calculating hose length

1

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.

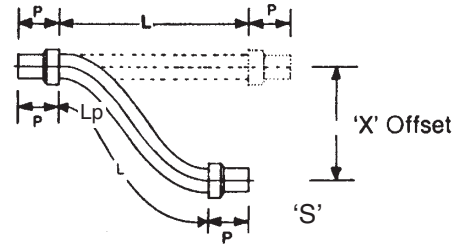
Formula: $L = \sqrt{6RS + S^2}$ $L_p = \sqrt{L^2 - S^2}$

L- Live Hose Length (inches)
 Lp- Projected Live Hose Length (inches)
 R- Minimum Centreline Bend Radius for constant flexing (inches)
 S- Offset Motion to one side of Centreline (inches)

Note 1: When the offset motion occurs to both sides of the hose centreline, use total travel in the formula; i.e. 2 times "S"

Note 2: The offset distance "S" for constant flexing should never exceed 25 percent of the centerline bend radius "R"

Note 3: 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.



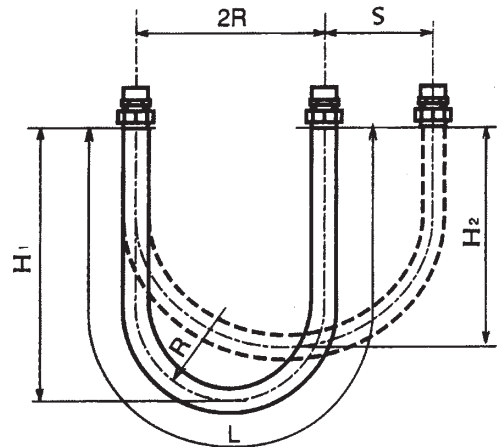
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Horizontal movable pipe system

$$L = 4R + 1.57S$$

$$H = 1.43R + 0.785S$$

$$H_2 = 1.43R$$



3

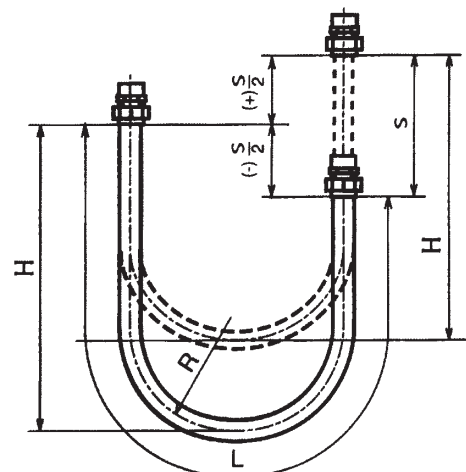
Vertical movable pipe system

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

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

Illustration of mark

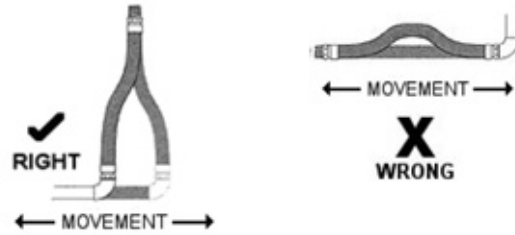
- S: Volume of Variation
- L: Length of Flexible hose
- θ : Angle of Variation
- π : Pi 3.142
- R: Min Centre line bend radius for constant flex - see Table 1
- Lp: Project live hose length



2.13 | Installation Precautions

Do not compress or extend axially.

Corrugated metal hose installed in-line with the longitudinal axis of the piping should not be subjected to axial movement.



Do not torque during installation.

Metal hose assemblies should not be used to compensate for bolt hole misalignment. Floating flanges will help to minimize twisting of the metal hose. Pipe unions will help to reduce twisting during connection to the piping. The use of two wrenches will help to keep the hose from twisting when tightening the pipe union.



Do not allow hose movement in multiple planes.

Flexing a metal hose in two separate planes of movement will torque the hose assembly. Always install the metal hose assembly so that flexing occurs in one plane only and this is the same plane in which bending occurs.



Avoid sharp bends.

Use elbows to avoid severe bends near the end of the metal hose assembly.



Maintain minimum centreline bend radius

The minimum centreline bend radius for dynamic flexing should never be less than the values in the product specification tables.



2.14 | Stripwound Stainless & Galvanised Metal Hose

Stripwound hose is manufactured from a helically wound profiled strip, with the strip edges being completely interlocked. The diameter of the hose remains constant when hose is cut. The hose is available with or without a packing groove.

Individual strips are connected together by overlapping and flexibility is obtained by the adjacent turns sliding on each other. When compared to other types of flexible hose, the Stripwound product is known for its strength, durability and ability to accept both axial and lateral movements. The packed hose has a continuous filament of thread, rubber or metal constructing the locking section.



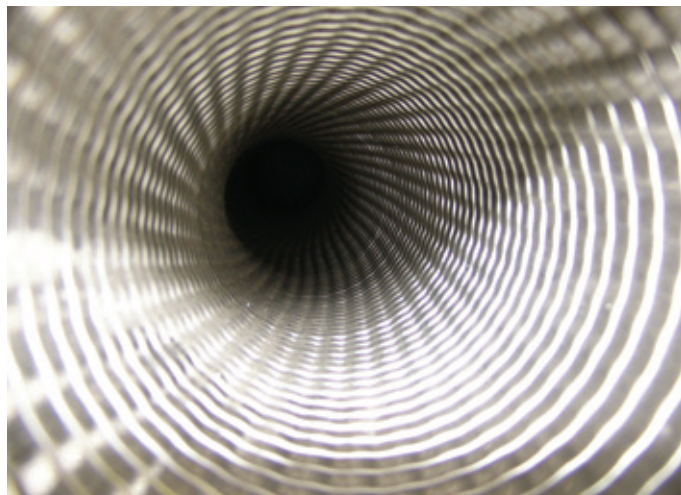
Packed



Unpacked

Galvanised strip wound offers significantly lower initial cost for applications where performance of stainless steel is not required however the Stainless steel offers longer service life and freedom from corrosion. The superior visual appearance and higher operating temperature capability of stainless steel may also be important in certain applications. Particularly suitable for absorbing vibration and thermal expansion in engine exhaust systems for both commercial and industrial applications. Also to accommodate bends and offsets in solid fuel burning installations or in other ducting applications.

Hose assemblies are available in various standard lengths, or prepared to the customer's specific requirements. Hoses are supplied in mid position unless otherwise specified. Hoses without end fittings may be attached directly to manifolds by clamping. End fittings may be attached by welding or brazing using a suitable filler rod.



2.15 | Stripwound Stainless & Galvanised Metal Hose

Light weight Engine Exhaust

Typical applications include commercial vehicle, passenger vehicle plus plant and portable generator set exhaust systems. This is a general purpose flexible metallic light weight conduit designed for a variety of installations requiring motion, vibration and bending.

ID (mm)	OD (mm)	Bend radius (mm)
19	22.0	140
25	28.0	152
32	36.0	160
38	41.3	166
41	44.3	180
44	47.3	190
48	51.3	195
51	54.3	205
57	60.3	235
63	66.3	260
70	73.3	285
76	79.3	205

ID (mm)	OD (mm)	Bend radius (mm)
90	94.2	250
102	106.2	370
114	118.2	490
127	131.2	515
140	144.2	600
152	156.2	655
178	183.0	740
203	208.0	800
230	234.0	950
254	259.0	1100
305	310.0	1400
355	360.0	1500

Flexible Electrical Conduit

These products are designed to provide shielding for electrical cables. It gives additional protection against crushing, incandescent projection of rubber hose, electrical cables, heat insulation, and exposure to water, oils and other fluids. On request the hose is available in a PVC cover.

I.D (mm)	O.D (mm)	Bend radius (mm)
6.4	11.7	25
10.0	14.7	25
12.5	18.0	38
16.0	21.0	50
21.0	26.5	64
26.5	33.0	75
35.0	42.0	89
40.5	48.0	114
51.5	60.0	140
78.5	88.0	254
101.0	114.0	305

2.16 | Stripwound Metal Hose

Material handling stainless steel lined interlock

The interlock is specially wound into a double interlock hose from two separate metal strips. The double interlock hose is manufactured for the purpose of producing a liner to create a moderately smooth inner bore.

The inner will provide a higher flow rate giving the hose a variety of advantages such as nil air loss from its tighter construction, elimination of materials degradation and contamination experienced with other hoses, as well as a longer service life due to greater abrasion resistance.

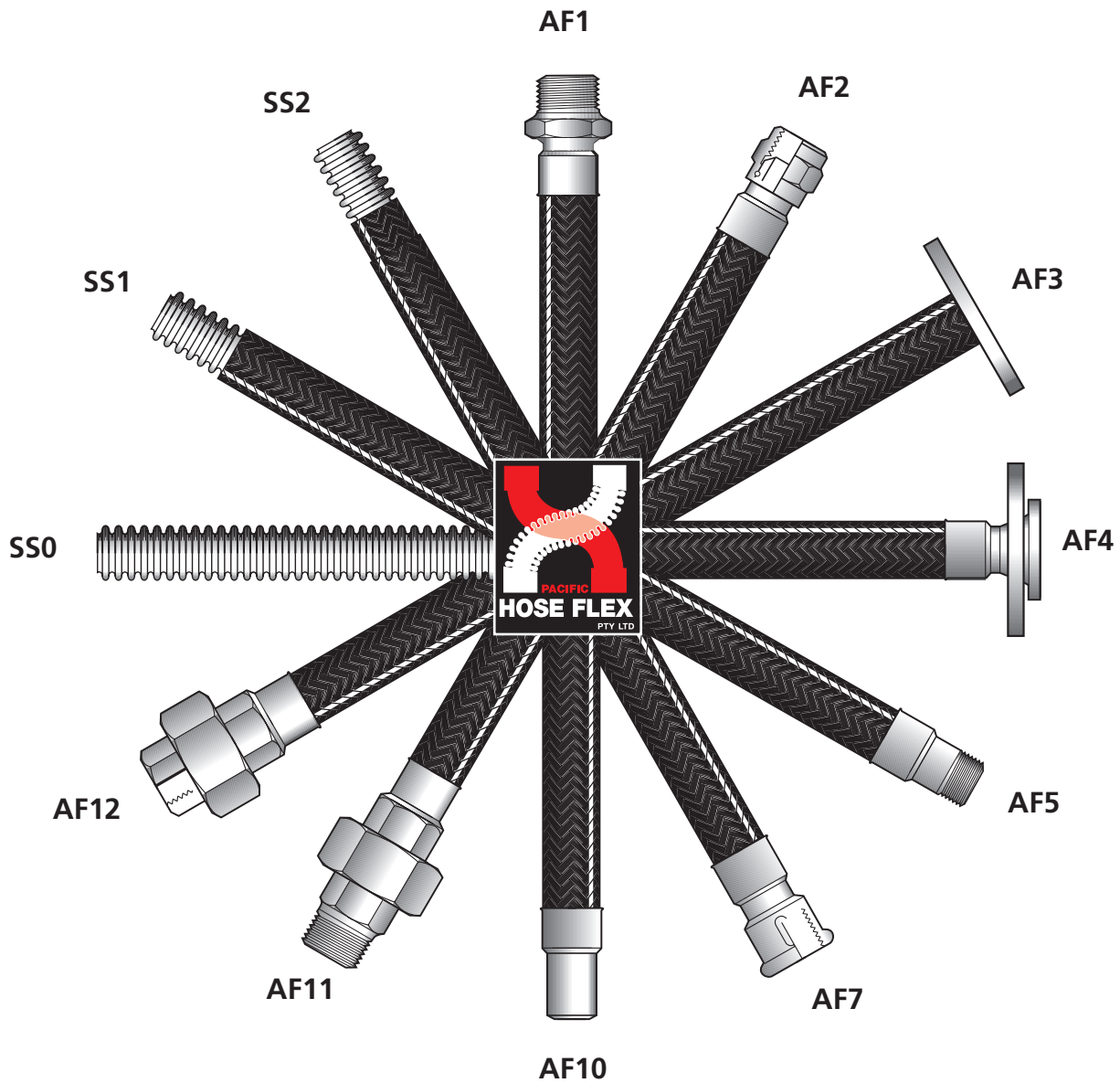
Available in stainless steel or galvanised steel, this range of hoses are normally of the lock or interlock type and are designed for applications where a high resistance to wear and mechanical damage is required. They offer superior abrasion resistance compared to rubber hose, especially at high temperatures.

Applications may include large volume transfer of dry bulk materials, difficult to fluidize materials in industrial plants, ships, barges, silos, elevators, trucks and rail units. Uses include pneumatic transfer of bulk materials in powder, pellet, granules, flake or pebble form such as chemicals, feed, flour, grain, plastics, sugar, cement, pebble, lime and sintered iron ore.



I.D (mm)	O.D (mm)	Bend radius (mm)
32	36	203
38	42	255
44	48	305
51	55	355
57	61	368
63	67	381
76	81	406
90	95	432
102	107	457
114	119	508
127	132	559
140	145	584
152	158	635
200	210	900
250	261	1200

2.18 | Stainless Steel Hose Fittings



AF1 - Fixed Hex Male
AF2 - Swivel Female
AF3 - Fixed Flange
AF4 - Swivel Flange
AF5 - Toe Nipple
AF7 - Fixed Female Socket
AF10 - Welded Pipe End
AF11 - Male Union
AF12 - Female Union

SS0 - Convoluted hose
SS1 - Convoluted hose + one braid
SS2 - Convoluted hose + double braid



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