METAL HOSE

Hose Information

Parflex Metal Hoses

The Superior Product

Parflex metal hose assemblies are designed for applications where chemicals and temperature extremes, either from media or atmosphere, are present. Factory welded and ready to install, these Parflex metal hose assemblies are leak-free, full vacuum hose solutions.

The 9A and 9M Parflex Metal Hose products are constructed with a hydroformed corrugated stainless steel core tube. Hydroforming, which utilizes high pressure water to form the corrugations, minimizes residual stress in the metal and maintains a consistent tube wall thickness throughout the hose.

Any hose assembly is only as good as its weakest link. In the case of a metal hose assembly, the weakest link can be the welding process. The proprietary methods of seam and butt welding, as well as fitting attachment, utilized in Parflex assemblies are second to none and yield a consistent, reliable, leak-free connection.

Product Features

- Excellent chemical resistance
- Operates in high temperatures
- Sizes 1/4" I.D. up to 6" I.D. (for sizes over 2" I.D., contact Customer Service)
- Hydroformed design yields a uniform wall thickness, promoting even distribution of stress during flexing and reduces concentrated residual stress
- Full Vacuum - Maintains its shape under full vacuum, other hose types collapse
- Fire safety – Maintains its integrity up to 1200°F
- Zero permeation
- Leak-free fitting weld connection

9A - Standard

Features:

- Hydroforming process maintains a more consistent tube wall thickness throughout the hose and maintains a smoother finish than competitive mechanical forming methods
- The brightly annealed tube material used in hydroforming minimizes the risk of Corrosion Crevice Cracking (CCR) failure and increases chemical resistance
- High percentage of braid coverage yields better cycle life and protection against tube damage

Applications/Markets

- Abrasion and over bending – as a protective cover over wires or other hoses to prevent these problems
- Chemical transfer
- Diesel engine exhaust
- Hot oil and lube lines
- Loading/unloading of light oils, gas, and chemicals
- Petrochemical
- Power Gen
  - Connections for the fuel rail to the combustion cans on gas turbine fuel lines
  - Pump connections
- Pulp & Paper
- Solvent and steam lines

9A General Purpose Hose
Metal Hose Size and Performance Specifications

Inside Diameter (in.)	Number of Braids (#)	Outside Diameter (in.)	Min. Bend Radius (in.)	Working Pressure (psi)	Burst Pressure (psi)	Weight per Foot (lbs.)
	0	0.41		90		0.04
1/4	1	0.47	4.5	1800	7233	0.11
	2	0.53		2700	9100	0.18
	0	0.65		70		0.10
3/8	1	0.71	5.0	1558	6230	0.20
	2	0.77		2336	9345	0.30
	0	0.77		70		0.11
1/2	1	0.83	5.5	1186	4743	0.22
	2	0.89		1779	7115	0.33
	0	0.96		57		0.17
5/8	1	1.02	7.0	1205	4820	0.33
	2	1.08		1808	7230	0.49
	0	1.16		43		0.19
3/4	1	1.22	8.0	898	3591	0.37
	2	1.28		1347	5387	0.55
	0	1.47		43		0.26
1	1	1.53	9.0	718	2872	0.50
	2	1.59		1077	4308	0.74
	0	1.75		43		0.29
1-1/4	1	1.83	10.0	645	2581	0.61
	2	1.91		968	3872	0.93
	0	2.08		28		0.47
1-1/2	1	2.16	11.0	531	2125	0.85
	2	2.24		797	3188	1.23
	0	2.61		14		0.59
2	1	2.69	13.0	449	1797	1.11
	2	2.77		674	2696	1.63
2-1/2 - 6	Contact Customer Service for assistance.					

Construction

Tube: 300 series SS, Annular profile

Reinforcement: 300 series SS braid: 0, 1 or 2 layers

Operating Parameters

Temperature Range:
-380°F to +1200°F (-228°C to +648°C)
For carbon steel fittings:
-70°F to +900°F (-57°C to +482°C)

Working Pressure
Vacuum (30in/Hg) to 2700 psi depending on assembly specifications

Notes

Hoses greater than 2" I.D. available - Contact the Parflex Division

STAMPED (Hose Selection Criteria) - pg 15

For ordering information, consult "How to Build Parflex Metal Hose Assembly Part Numbers" - pg 5

Hose Information

9M - Ultra Flexible

Features:

- Compressed corrugations for increased flexibility
- Hydroforming process maintains a more consistent tube wall thickness throughout the hose and maintains a smoother finish than competitive mechanical forming methods
- The brightly annealed tube material used in hydroforming minimizes the risk of Corrosion Crevice Cracking (CCR) failure and increases chemical resistance
- High percentage of braid coverage yields better cycle life and protection against tube damage

Applications/Markets

- Abrasion and over bending – as a protective cover over wires or other hoses to prevent these problems
- Chemical transfer
- Diesel engine exhaust
- Hot oil and lube lines
- Loading/unloading of light oils, gas, and chemicals
- Petrochemical
- Power Gen
  - Connections for the fuel rail to the combustion cans on gas turbine fuel lines
  - Pump connections
- Pulp & Paper
- Solvent and steam lines

9M Flexible Metal Hose
Metal Hose Size and Performance Specifications

Inside Diameter (in.)	Number of Braids (#)	Outside Diameter (in.)	Min. Bend Radius (in.)	Working Pressure (psi)	Burst Pressure (psi)	Weight per Foot (lbs.)
	0	0.42		90		0.07
1/4	1	0.48	3.7	1800	7233	0.14
	2	0.54		2700	9100	0.21
	0	0.65		70		0.20
3/8	1	0.71	4.0	1558	6230	0.30
	2	0.77		2336	9345	0.40
	0	0.77		70		0.22
1/2	1	0.83	4.4	1186	4743	0.33
	2	0.89		1779	7115	0.44
	0	0.96		57		0.31
5/8	1	1.02	5.6	1205	4820	0.47
	2	1.08		1808	7230	0.63
	0	1.16		43		0.33
3/4	1	1.22	6.4	898	3591	0.51
	2	1.28		1347	5387	0.69
	0	1.47		43		0.45
1	1	1.53	7.1	718	2872	0.69
	2	1.63		1077	4308	0.93
	0	1.75		43		0.56
1-1/4	1	1.83	7.9	645	2581	0.88
	2	1.91		968	3872	1.20
	0	2.08		28		0.82
1-1/2	1	2.16	8.7	531	2125	1.20
	2	2.24		797	3188	1.58
	0	2.61		14		0.95
2	1	2.69	10.3	449	1797	1.47
	2	2.77		674	2696	1.99
2-1/2 - 6	Contact Customer Service for assistance.					

Construction

Tube: 300 series SS, Annular profile

Reinforcement: 300 series SS braid: 0, 1 or 2 layers

Operating Parameters

Temperature Range:
-380°F to +1200°F (-228°C to +648°C)
For carbon steel fittings:
-70°F to +900°F (-57°C to +482°C)

Working Pressure
Vacuum (30in/Hg) to 2700 psi depending on assembly specifications

Notes

Hoses greater than 2" I.D. available - Contact the Parflex Division

STAMPED (Hose Selection Criteria) - pg 15

For ordering information, consult "How to Build Parflex Metal Hose Assembly Part Numbers" - pg 5

9H - High Pressure

Features:

- Specially designed to maintain extreme pressure and flexibility
- Helical construction is self-draining
- High percentage of braid coverage yields better cycle life and protection against tube damage

Applications/Markets

- Abrasion and over bending – as a protective cover over wires or other hoses to prevent these problems
- Chemical transfer
- Diesel engine exhaust
- Hot oil and lube lines
- Loading/unloading of light oils, gas, and chemicals
- Petrochemical
- Power Gen
  - Connections for the fuel rail to the combustion cans on gas turbine fuel lines
  - Pump connections
- Pulp & Paper
- Solvent and steam lines

9H High Pressure Metal Hose
Metal Hose Size and Performance Specifications

Inside Diameter (in.)	Number of Braids (#)	Outside Diameter (in.)	Min. Bend Radius (in.)	Working Pressure (psi)	Burst Pressure (psi)	Weight per Foot (lbs.)
1/4	1	0.52	5.0	4600	18400	0.21
	2	0.62		5800	23200	0.32
5/16	1	0.62	5.1	4000	16000	0.29
	2	0.74		4800	19200	0.45
3/8	1	0.70	5.5	3800	15200	0.36
	2	0.82		4000	16000	0.57
1/2	1	0.82	5.7	2600	10400	0.43
	2	0.94		3700	14800	0.69
5/8	1	0.97	6.1	2400	9600	0.51
	2	1.09		2700	10800	0.82
3/4	1	1.19	6.5	2000	8000	0.64
	2	1.31		2200	8800	1.03
1	1	1.39	7.9	1500	6000	0.78
	2	1.51		2000	8000	1.25
1-1/4	1	1.75	9.4	1100	4400	1.15
	2	1.87		1600	6400	1.70
1-1/2	1	2.07	12.2	1000	4000	1.45
	2	2.19		1500	6000	2.16

Construction

Tube: 316 SS, Helical Profile

Reinforcement: 304 SS Braid
- 1 or 2 layers

Operating Parameters

Temperature Range:
-380°F to +1200°F (-228°C to +648°C)
For carbon steel fittings:
-70°F to +900°F (-57°C to +482°C)

Working Pressure
Vacuum (30in/Hg) to 5800 psi depending on assembly specifications

Notes

STAMPED (Hose Selection Criteria) - pg 15

For ordering information, consult "How to Build Parflex Metal Hose Assembly Part Numbers" - pg 5

Hose Information

How to Build Parflex Metal Hose Assembly Part Numbers

9A	1	TU	01	06	06	06	C	-	30

9A – Hose Series

9A – General Purpose

9M – Flexible

9H – High Pressure

1 – Code

0 – No braid, 321 SS Tube

1 – 304 SS Single braid, 321 SS Tube

2 – 304 SS Double braid, 321 SS Tube

3 – No braid, 316 SS Tube

4 – 304 SS Single braid, 316 SS Tube

5 – 304 SS Double braid, 316 SS Tube

6 – 316 SS Single braid, 321 SS Tube

7 – 316 SS Double braid, 321 SS Tube

8 – 316 SS Single braid, 316 SS Tube

9 – 316 SS Double braid, 316 SS Tube

Only 9A & 9M products are available in the complete range of product options.

9H hose is only available in codes 4 & 5 (1 or 2 304 SS braids, and 316 SS tube)

TU-01* – First and Second End Connection**

01 – Male Pipe Thread (with hex) - NPTF
MT – Male Pipe Toe (no hex) - NPT
02 – Female Pipe Thread - NPT
03 – Male JIC 37° Flare
06 – Female JIC 37° Flare Swivel
07 – Female Pipe Swivel
U7 – Female Pipe Union - NPT
TU – Universal Tube Stub
JC – Female Oring Face Seal (ORFS) Swivel
AL – A-lok® Compression
HV – Male VacuSeal™
P6 – CPI™ Compression
Q1 – UltraSeal™ Swivel
VH – Female VacuSeal™
9K – Raised Face Weld Neck 150lb Fixed Flange
9Y – Raised Face Weld Neck 300lb Fixed Flange
4K – Schedule 40 Type A Stub with 150lb Lap Joint Flange
1Y – Schedule 40 Type A Stub with 300lb Lap Joint Flange
8K – Raised Face 150lb Fixed Slip-on Flange
8Y – Raised Face 300lb Fixed Slip-on Flange

06 – First End Size

-4	=	1/4
-6	=	3/8
-8	=	1/2
-10	=	5/8
-12	=	3/4
-16	=	1
-20	=	1-1/4
-24	=	1-1/2
-32	=	2
-40	=	2-1/2

06 – Second End Size

-4	=	1/4
-6	=	3/8
-8	=	1/2
-10	=	5/8
-12	=	3/4
-16	=	1
-20	=	1-1/4
-24	=	1-1/2
-32	=	2
-40	=	2-1/2

06 – Hose Size

-4	=	1/4
-6	=	3/8
-8	=	1/2
-10	=	5/8
-12	=	3/4
-16	=	1
-20	=	1-1/4
-24	=	1-1/2
-32	=	2
-40	=	2-1/2

C – Fitting Material

Steel – No Material Designation

Stainless Steel = C

316 Stainless Steel = K

304 SS is standard material. 316 SS is available upon request.

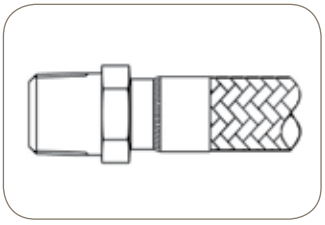
30 – Overall Length

Expressed in inches

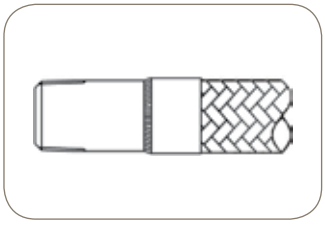
* Always Alpha Numeric TU01, not 01TU.

** Not all fitting configurations are available in full array of sizes.

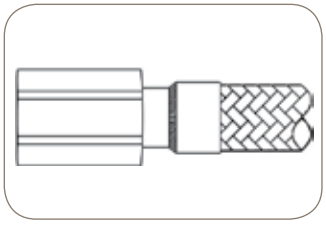
Fitting Information



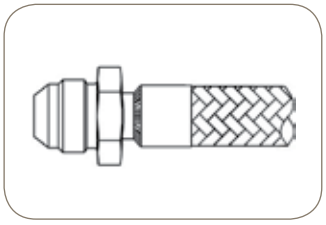
01 - Male Pipe Thread
(with hex) - NPTF



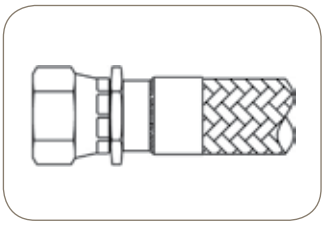
MT - Male Pipe Toe
(no hex) - NPT



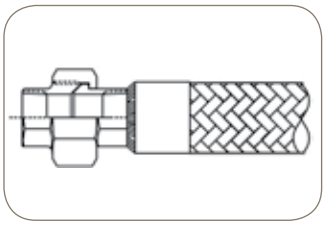
02 - Female Pipe Thread
NPT



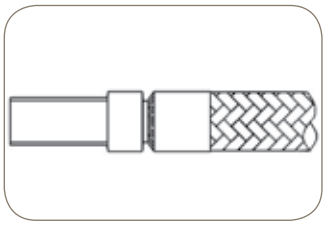
03 - Male JIC 37° Flare



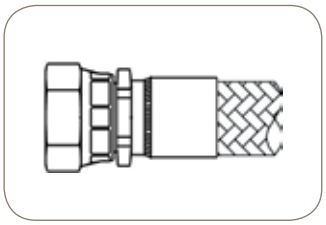
*06 - Female JIC 37°
Flare Swivel



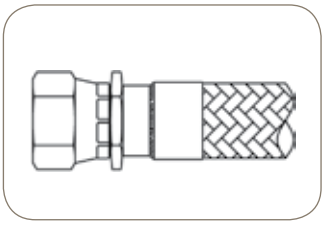
U7 - Female Pipe Union
NPT



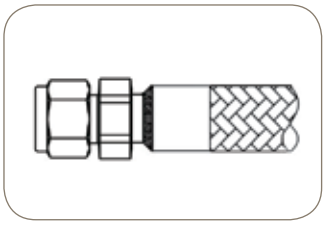
TU - Universal Tube Stub



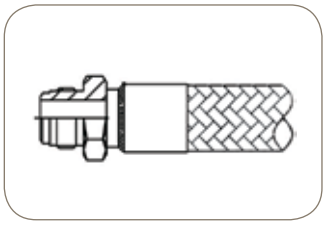
JC - Female Oring Face Seal
(ORFS) Swivel



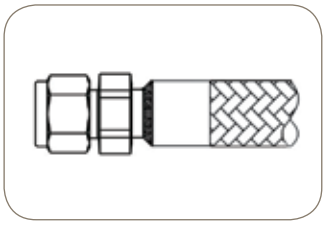
07 - Female Pipe Swivel



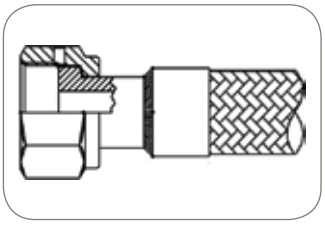
AL - A-lok® Compression



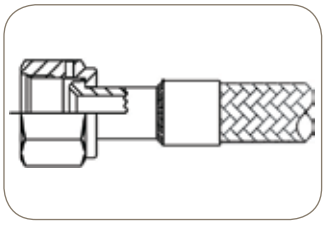
HV - Male VacuSeal™



P6 - CPI™ Compression



Q1 - UltraSeal™ Swivel



VH - Female VacuSeal™

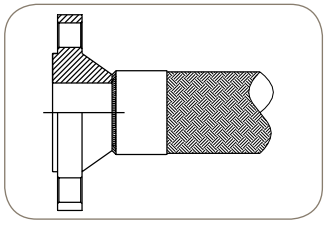
*06-Female JIC swivel connections are available with and without the back-up hex. End users must specify fitting preference at the time of quote.

Drawings are for illustration purposes only.

All Instrumentation connections (A-lok®, CPI™, UltraSeal™, VacuSeal™) are Genuine Parker Instrumentation products. For specific information regarding these products, consult Parker Catalog 4200-CPI.

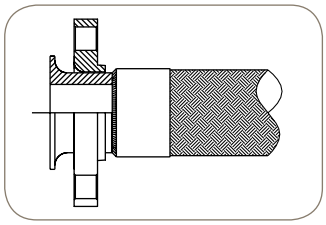
End user must ensure that the selected fittings are chemically compatible with and are able to withstand the pressure and temperatures of the fluid media, the surrounding environment and application. Reference Safety Bulletin 4400-B.1.

Flange Information



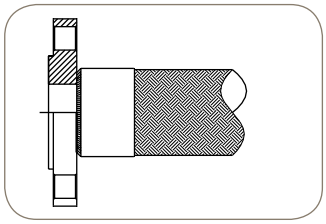
9K - Raised Face Weld Neck 150lb Fixed Flange

9Y - Raised Face Weld Neck 300lb Fixed Flange



4K - Schedule 40 Type A Stub with 150lb Lap Joint Flange

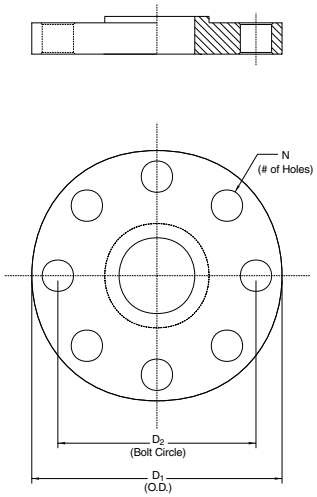
1Y - Schedule 40 Type A Stub with 300lb Lap Joint Flange



8K - Raised Face 150lb Fixed Slip-on Flange

8Y -Raised Face 300lb Fixed Slip-on Flange

Flange Identification for Parflex Metal Hose Assemblies

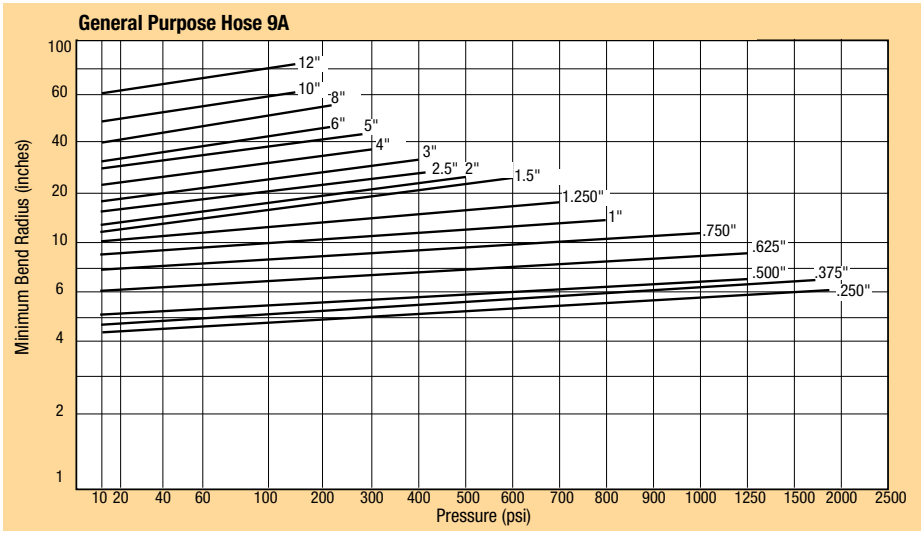


Class	Nominal Size	D_1	D_2	N
150	1/2"	3.50	2.38	4
150	3/4"	3.88	2.75	4
150	1"	4.25	3.12	4
150	1 1/4"	4.62	3.50	4
150	1 1/2"	5.00	3.88	4
150	2"	6.00	4.75	4
150	2 1/2"	7.00	5.50	4
300	1/2"	3.75	2.62	4
300	3/4"	4.62	3.25	4
300	1"	4.88	3.50	4
300	1 1/4"	5.25	3.88	4
300	1 1/2"	6.12	4.50	4
300	2"	6.50	5.00	8
300	2 1/2"	7.50	5.88	8

Drawings are for illustration purposes only. All flanges meet ANSI B16.5 specifications.

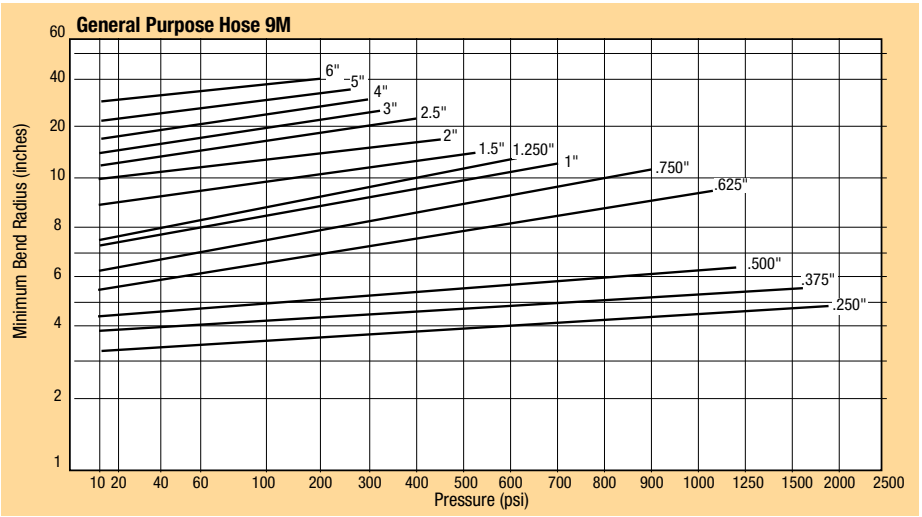
No hose assembly shall contain two fixed flanges to eliminate hose twisting. Combinations shall be either; 2 floating flange connections or 1 fixed and 1 floating connection.

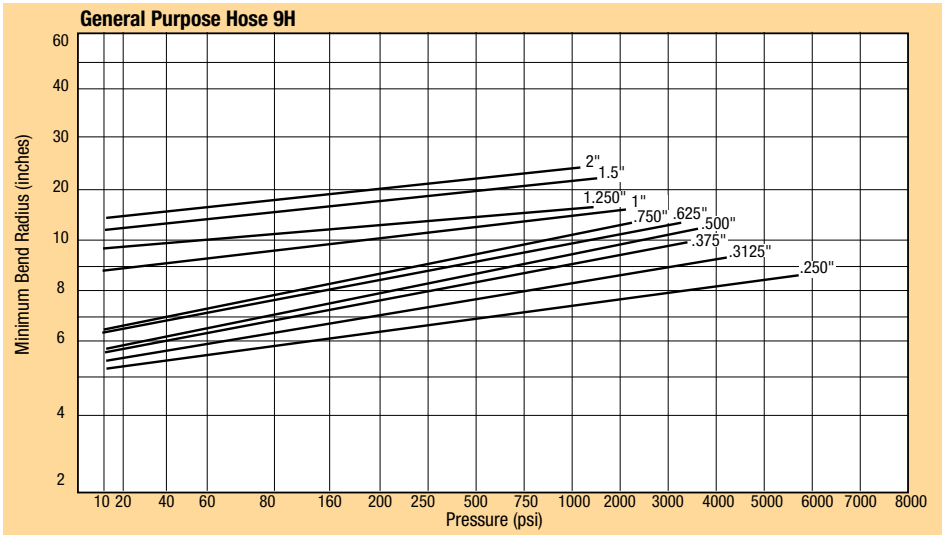
Pressure Rating vs. Bend Radius by Hose I.D.



Notes:

- The minimum bend radius is measured from the center line of the hose.
- The minimum bend radius increases with pressure (see graphs).
- Pressure is calculated at 70°F ambient temperature.





Technical Information

Velocity in Metal Hose

When gas or liquid being conveyed in a corrugated metal hose exceeds certain limits, resonant vibration can occur. Resonance may cause very rapid failure of the assembly.

In those applications where product velocities exceed the limits shown in the graph below, a revision of the assembly design might include:

1) Addition of an interlocked metal hose liner.
2) An increase in the corrugated hose I.D.
3) A combination of the above.

Pressure Drop

Pressure drop in a piping system is often a concern of the designer.

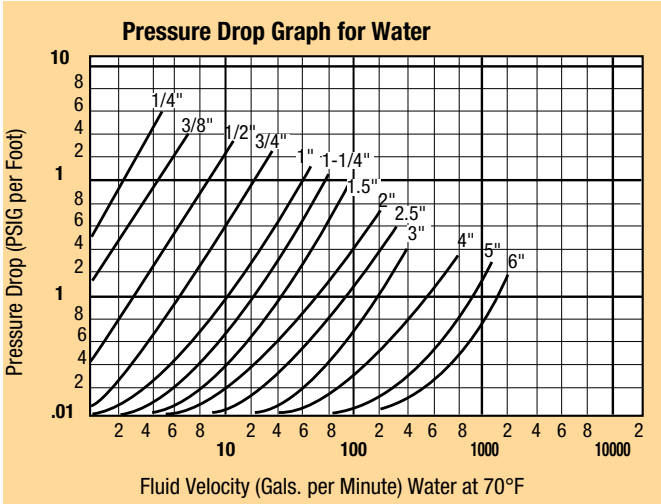
Compared to rigid pipe, there is always a greater pressure drop in corrugated metal hose. The following graphics are offered as aids in estimating pressure drop in corrugated hose conveying water and air. The values derived are approximate and apply only to straight line installations. Bends and fittings in the hose assembly can increase the pressure drop.

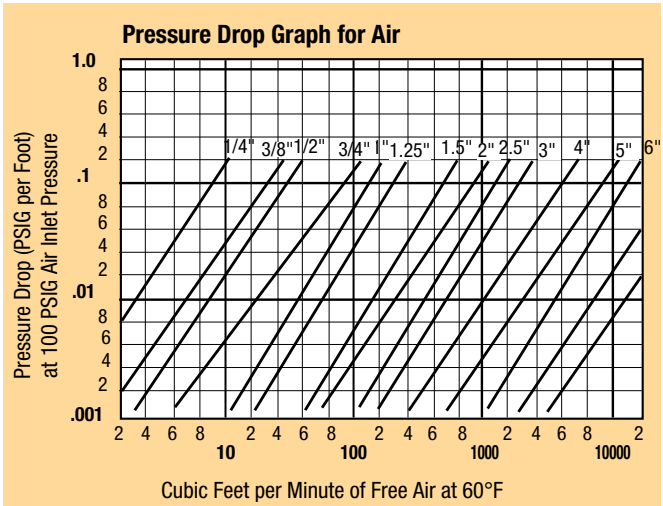
Installation Configuration	Maximum Product Velocity (Ft./Sec.)			
	Unbraided		Braided	
	Dry Gas	Liquid	Dry Gas	Liquid
Straight Run	100	50	150	75
45° Bend	75	40	115	60
90° Bend	50	25	75	40
180° Bend	25	12	38	19

Working Pressure Derating Factor for Elevated Temperatures				
Temperature	Working Pressure Derating Factor			
°F	304	316	321	Carbon Steel
70	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00
200	1.00	1.00	1.00	1.00
300	1.00	1.00	1.00	1.00
400	0.93	0.93	1.00	1.00
500	0.86	0.86	0.96	0.95
600	0.81	0.81	0.91	0.87
650	0.79	0.79	0.89	0.85
700	0.77	0.77	0.87	0.83
750	0.75	0.75	0.86	0.65
800	0.74	0.74	0.84	0.54
850	0.72	0.72	0.84	0.44
900	0.71	0.71	0.83	0.33
950	0.69	0.69	0.81	
1000	0.67	0.67	0.81	
1050	0.65	0.65	0.70	
1100	0.62	0.61	0.55	
1150	0.53	0.52	0.41	
1200	0.38	0.38	0.32	

To calculate a working pressure derated for elevated temperature: Multiply the hose working pressure shown in the catalog by the appropriate derating factor from above.

Note: The working pressure of an assembly at elevated temperatures may be affected by fitting type, material and method of attachment.





For air inlet pressures other than 100 psig:
PD = PD @ 100 psig $\left(\frac{100 + 14.7}{P + 14.7}\right)$

Testing, Cleaning & Packaging

Testing, Cleaning and Packaging of Parflex Metal Hose Assemblies				
Code	**Testing[2]**	**Cleaning**	**Packaging**	**Fittings/Welds**
P1	General requirement (low pressure air under water)	General requirement	Bulk packed in cardboard box	As welded
P2	Customer specified	General requirement	Customer specified	Welds buffed[1] fittings polished (32 Ra)
P3	General requirement (low pressure air under water)	General requirement	Bulk packed in cardboard box	Welds buffed[1] fittings polished (32 Ra)
P4	General requirement (low pressure air under water)	Water flushed, hot air dried	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P5	300 PSI Helium under water / 5 minutes	General requirement	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P6	300 PSI Helium under water / 5 minutes	Oxygen cleaned per CGA G-4.1	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P7	Customer specified	Oxygen cleaned per CGA G-4.1	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P8	Helium leak test - leak rate < $1x10^{-5}$ cc/sec	Water flushed, hot air dried	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P9	Helium leak test - leak rate < $1x10^{-7}$ cc/sec	Flushed with alcohol, hot air dried	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P10	Helium leak test - leak rate < $1x10^{-9}$ cc/sec	Flushed with alcohol, hot air dried	Plastic mesh protectors - assemblies sealed in plastic bag	Welds buffed[1] fittings polished (32 Ra)
P11	Customer specified	Customer specified	Customer specified	Customer specified

Footnotes

1. Buffing of welds will remove any heat discoloration due to welding, marker on hose, etc. All welds are argon purged.
2. With any gas under water test, the presence of bubbles would indicate failure.

Technical Information

Corrosion Resistance Chart

Caution: This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis. See Parker Safety Guide on pages 17-20.

Ratings: 1 – Excellent Resistance
2 – Good Resistance
3 – Fair or Conditional Resistance
X – Not Recommended

Notes: (A) Ratings are based on ambient temperature
(B) No rating indicates no data available

	T321	T316
Acetate Solvents (crude)	1	2
Acetate Solvents (pure)	1	1
Acetic Acid 80%	1	1
Acetic Acid 50%	2	1
Acetic Acid 20%	2	1
Acetic Acid 10%	1	1
Acetic Anhydride	2	2
Acetone	1	1
Acetylene	1	1
Alcohols		
Amyl Alcohol	2	2
Benzyl Alcohol	1	1
Butyl Alcohol	1	1
Diacetone Alcohol	2	2
Ethyl Alcohol	2	2
Hexyl Alcohol	–	–
Isobutyl Alcohol	–	–
Isopropyl Alcohol	2	2
Methyl Alcohol	2	2
Octyl Alcohol	–	–
Propyl Alcohol	1	1
Aluminum		
Aluminum Chloride	X	X
Aluminum Fluofide (sat.)	X	2
Aluminum Nitrate (sat.)	2	2
Aluminum Potssium Sulfate	X	2
Aluminum Sulfate (sat.)	2	2
Alum	X	2
Ammonia		
Ammonia Anhydrous	2	1
Ammonia Gas	1	1
Ammonia Nitrate	–	–
Ammonium		
Ammonium Biflouride	–	–
Ammonium Carbonate (sat.)	2	2
Ammonium Casenite	–	–
Ammonium Chloride (sat.)	X	X
Ammonium Hydroxide (sat.)	2	2
Ammonium Nitrate	–	–
Ammonium Phosphate	–	–
Ammonium Sulfate (10%-40%)	X	2
Aniline	1	1
Arsenic Acid	2	2
Barium		
Barium Carbonate (sat.)	2	2
Barium Chloride	X	2
Barium Hydroxide	2	2
Barium Sulfate	2	2
Barium Sulfide	2	2
Beer	1	1
Benzaldehyde	2	2

	T321	T316
Benzene, Benzol	2	2
Benzine	–	–
Benzoic Acid	2	2
Black Liquor	2	2
Bleach (12.5% chlorine)	–	X
Borax	2	1
Boric Acid	–	–
Brake Fluid	1	1
Brine Acid	–	–
Bromic Acid	–	–
Bromine Liquid	X	X
Butadeine, Butylene	2	2
Butane	2	2
Butyl Acetate	2	2
Butyric Acid	2	2
Calcium		
Calcium Busulfate	X	2
Calcium Bisulfide	–	–
Calcium Bisulfite	2	2
Calcium Carbonate	1	2
Calcium Chloride	–	–
Calcium Hydroxide	2	2
Calcium Hypochlorite (sat.)	X	2
Carbon		
Carbon Bisulfide	2	2
Carbon Dioxide (dry)	2	2
Carbon Dioxide (wet)	2	2
Carbon Disulfide	2	2
Carbon Monoxide	1	1
Carbon Tetrachloride	1	1
Carbonic Acid	2	2
Castor Oil	2	2
Caustic Potash	–	–
Cellosolves	2	2
Chlorine (liquid)	–	–
Chloroform	–	1
Chlorosulfonic Acid	X	X
Chromic Acid 50%	3	2
Citric Acid	–	–
Clorox (bleach) 5.5% CL	–	2
Coke Oven Gas	2	2
Copper		
Copper Chloride	X	X
Copper Cyanide	2	2
Copper Sulfate (sat.)	–	2
Creysylic Acid	2	2
Cyclohexane	2	2
Detergents	1	2
Dextrose	–	–
Diesel Fuels	1	1
Diethylamine	2	2

	T321	T316
Disodium Phosphate	–	1
Ethers	1	1
Ethyl		
Ethyl Acetate	2	2
Ethyl Chloride	1	1
Ethylene		
Ethylene Chloride	–	–
Ethylene Dichloride	2	2
Ethylene Glycol	2	2
Ethylene Oxide	2	2
Fatty Acids	–	1
Ferric		
Ferric Chloride	X	X
Ferric Hydroxide	1	1
Ferric Nitrate (10%-50%)	2	2
Ferric Sulfate	–	–
Ferrous		
Ferrous Chloride (sat.)	X	X
Ferrous Sulfate	2	2
Fluoboric Acid	–	–
Formaldehyde (50%)	1	1
Formic Acid (Anhyd)	–	–
Freon		
Freon 11	2	2
Freon 12 (wet)	2	2
Freon 22	2	2
Fruit Juice	2	2
Fuel Oils	2	2
Furfural	2	2
Gasoline		
Refined Gasoline	2	2
Sour Gasoline	2	2
Gelatine	2	2
Glucose	2	2
Glue	2	2
Glycerine	1	1
Glycol	2	2
Green Liquor	–	–
Heptane	2	2
Hexane	1	1
Hydrobromic Acid (50%)	X	X
Hydrobromic Acid (20%)	X	X
Hydrochloric Acid (20%)	X	X
Hydrochloric Acid (37%)	X	X
Hydrocyanic Acid	2	2
Hydrofluoric Acid	X	2
Hydrofluosilicic Acid	X	2
Hydrogen		
Hydrogen Peroxide (50%)	2	–
Hydrogen Sulfide (Aqueous)	X	2
Hydrogen Chloride (Gas, Dry)	–	–

Technical Information

	T321	T316
Hydrogen Gas	1	1
Hypochlorous Acid	X	X
Iodine	X	X
Isopropyl Ether	1	2
Jet Fuel (JP3, JP4, JP5)	2	2
Kerosene	2	2
Ketones	2	2
Lactic Acid (25%)	–	–
Lactic Acid (80%)	2	–
Lard Oil	2	2
Lead		
Lead Acetate	2	2
Lead Chloride	2	2
Lead Sulfate	2	2
Lime Sulphur	2	2
Linoleic Acid	2	2
Linseed Oil	2	2
Lubricants (Oil)	2	2
Magnesium		
Magnesium Carbonate	2	2
Magnesium Chloride	–	–
Magnesium Hydroxide	1	1
Magnesium Nitrate	2	2
Magnesium Oxide	–	–
Magnesium Sulfate	2	2
Maleic Acid	2	2
Mercuric		
Mercuric Chloride	X	–
Mercuric Cyanide	2	2
Mercury	1	1
Methane	1	1
Methanol	2	2
Methyl		
Methyl Bromide	2	2
Methyl Ethyl Ketone	2	2
Methyl Isobutyl Ketone	2	2
Methyl Methacrylate	2	2
Methylene Chloride	–	–
Milk	1	1
Mineral Oil	1	2
Muriatic Acid	X	X
Naptha	2	2
Napthalene	1	1
Nickel		
Nickel Chloride	–	–
Nickel Sulfate	2	2
Nitric		
Nitric Acid (100%)	–	–
Nitric Acid (50%)	1	–
Nitric Acid (30%)	1	–
Nitrobenzene	2	2
Oils		
Castor Oil	2	2
Coconut Oil	2	2
Corn Oil	–	2
Cotton Seed Oil	3	2
Fuel Oil	2	2
Linseed Oil	2	2
Mineral Oil	1	2
Silicone Oil	2	2
Vegetable Oil	1	1
Oleic Acid	–	1
Oleum	2	2
Oxalic Acid (sat.)	X	X

	T321	T316
Oxygen	2	2
Palmitic Acid	2	2
Paraffin	2	2
Perchlorethylene	–	–
Petroletum	2	2
Phenol (Carbolic Acid)	–	1
Phosphoric Acid		
Phosphoric Acid (25%-50%)	–	–
Phosphoric Acid (50%-85%)	1	
Photographic Solutions	1	1
Phthalic Anhydride	1	1
Picric Acid	2	2
Plating Solutions		
Brass Plating Solution	–	2
Cadmium Plating Solution	–	2
Chrome 40% Plating Solution	–	2
Copper (Cyanide) Plat. Solution	–	–
Gold Plating Solution	–	1
Iron Plating Solution	–	–
Lead Plating Solution	1	1
Nickel Plating Solution	1	1
Silver Plating Solution	1	1
Tin Plating Solution	X	X
Zinc Plating Solution	–	–
Potassium		
Potassium Acetate	–	–
Potassium Bicarbonate (30%)	1	1
Potassium Carbonate (50%)	1	1
Potassium Chlorate (30%)	2	1
Potassium Chloride (30%)	–	–
Potassium Chromate (30%)	2	2
Potassium Cyanide Sol. (30%)	2	2
Potassium Dichromate (30%)	1	1
Potassium Hydroxide (90%)	X	–
Potassium Nitrate (80%)	2	2
Potassium Permanganate (20%)	2	2
Potassium Sulfate (10%)	–	–
Propane	2	2
Propylene Glycol	2	2
Propylene Oxide	–	–
Pyridine	2	2
Pyrogallic Acid	2	2
Silver Nitrate	2	1
Soap Solutions	2	2
Sodium		
Sodium Acetate	2	2
Sodium Bicarbonate (20%)	1	1
Sodium Bisulfate	–	–
Sodium Bisulfite	–	–
Sodium Borate	2	2
Sodium Perborate (10%)	2	2
Sodium Carbonate	–	–
Sodium Chlorate	–	–
Sodium Chloride	–	–
Sodium Cyanide	–	–
Sodium Dichromate	2	2
Sodium Hydroxide (70%)	2	2
Sodium Hydroxide (50%)	1	–
Sodium Hydroxide (30%)	1	1
Sodium Hypochlorite	X	X
Sodium Metaphosphate	2	2
Sodium Nitrate	–	–
Sodium Perborate (10%)	2	2
Sodium Peroxide (10%)	2	2

	T321	T316
Sodium Silicate	2	2
Sodium Sulfate	–	1
Sodium Sulfide (50%)	–	2
Sodium Thiosulphate	2	2
Stannic Chloride	X	X
Stannous Chloride	X	–
Steam	–	–
Stearic Acid	2	1
Stoddard Solvent	2	2
Sugar Liquors (cane)	2	2
Sugar Liquors (beet)	1	1
Sulfate Liquors	–	2
Sulfite Liquors	2	2
Sulphur Chloride	–	–
Sulphur Dioxide (dry)	–	2
Sulphur Trioxide	–	2
Sulfuric Acid (to 10%)	X	X
Sulfuric Acid (10%-75%)	–	–
Sulfurous Acid	X	–
Tannic Acid	2	2
Tanning Liquors	1	1
Tartaric Acid	1	1
Titanium Tetrachloride	–	–
Toluene	1	1
Tetrahydrofuran	1	2
Tomato Juice	2	2
Trichloroethylene	–	–
Triethanolamine	2	2
Triethylamine	2	2
Trisodium Phosphate	–	–
Turpentine	1	1
Urea	–	–
Urine	1	1
Vinegar	2	2
Water Acid (mine)	–	–
Water (distilled)	2	2
Water (sea)	2	2
Whiskey	1	1
White Liquor (pulp)	2	2
Wine	1	1
Xylene	2	2
Zinc		
Zinc Chloride	X	2
Zinc Nitrate	2	2
Zinc Sulfate (30%)	1	1

Technical Information

Do's & Don'ts

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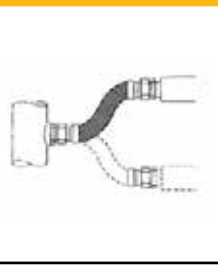	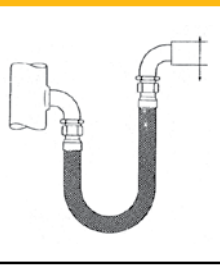
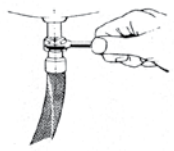	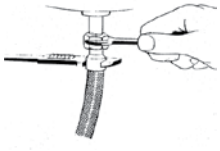
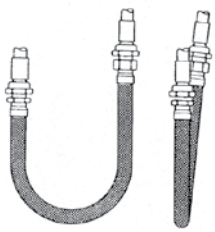	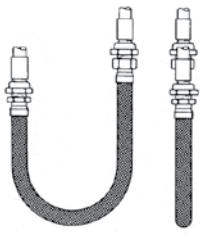
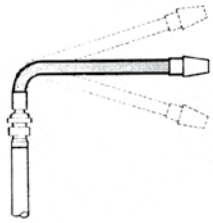	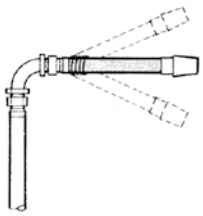

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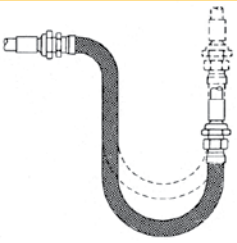
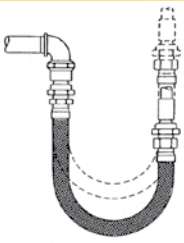
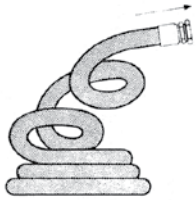
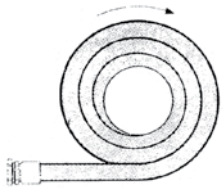
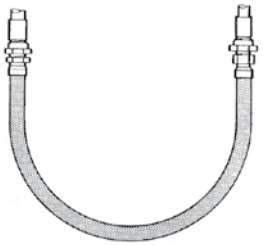
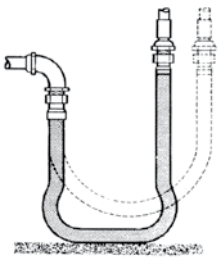
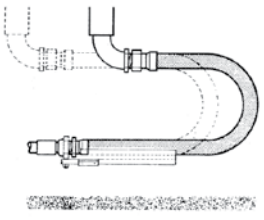
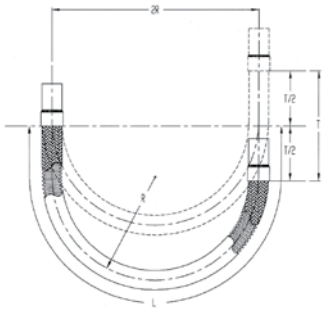
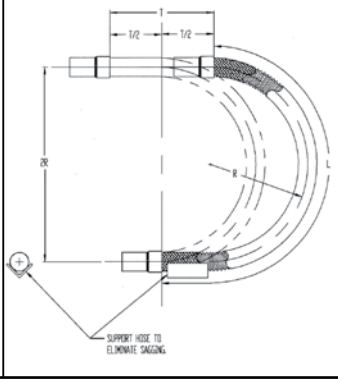
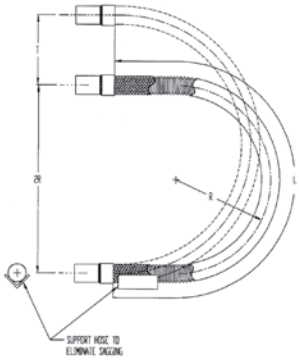
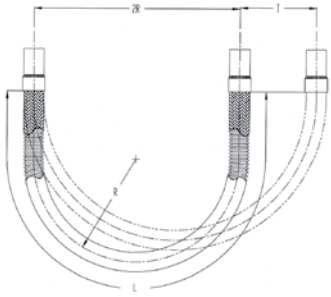
	
	
	
	

Length Calculations

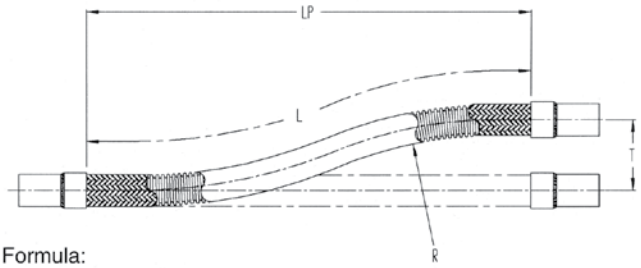
For the following formulas:

L = Live Length of Hose (inches)
T = Travel (inches)
S = Hose Outside Diameter (see specification sheets)

Verify that the installed radius is less than the stated Minimum Bend Radius for the hose at the required working pressure.

Constant Radius Travelling Loop (A-Loop) Formula: L = 4R + 1/2T		Variable Radius Travelling Loop (B-Loop) Formula: L = 4R + 1.57T	
A. Vertical Travel	**B. Horizontal Travel**	**A. Vertical Travel**	**B. Horizontal Travel**
			

Lateral Offset



Formula:

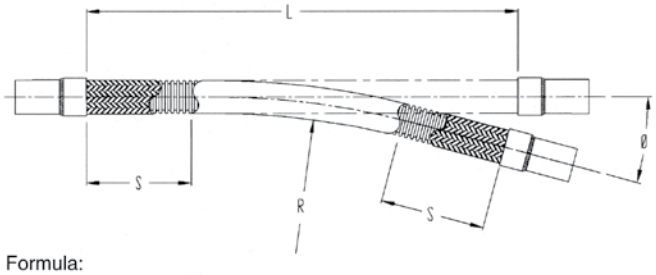
$$L = \sqrt{20R \times T}$$

$$L_p = \sqrt{L^2 - T^2}$$

Note 1: *When the offset motion occurs on both sides of the hose centerline, use total travel in the formula.*

Note 2: *The offset distance "T" for constant flexing should never exceed 25% of the centerline bend radius.*

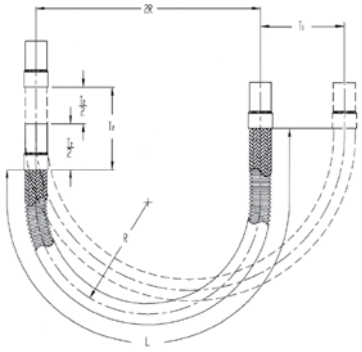
Angular Deflection



Formula:

$$L = 2S + (\theta/57.3)R$$

Vertical Loop with Movement in Two Directions (Combination Loop)



Formula:

$$L = 4R + 1.57T_1 + (T_2/2)$$