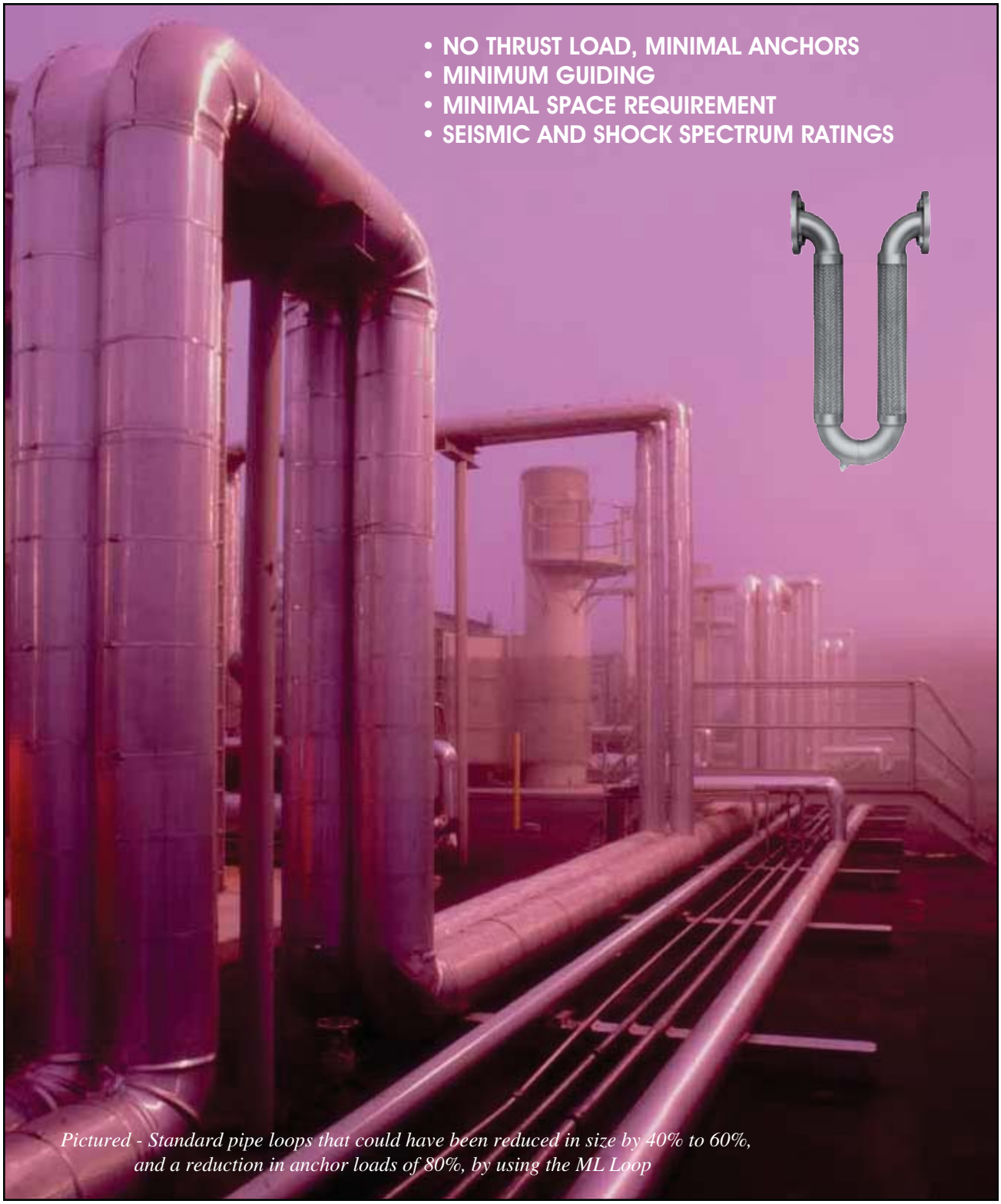
$8.00

ML EXPANSION LOOPS
DESIGN GUIDE

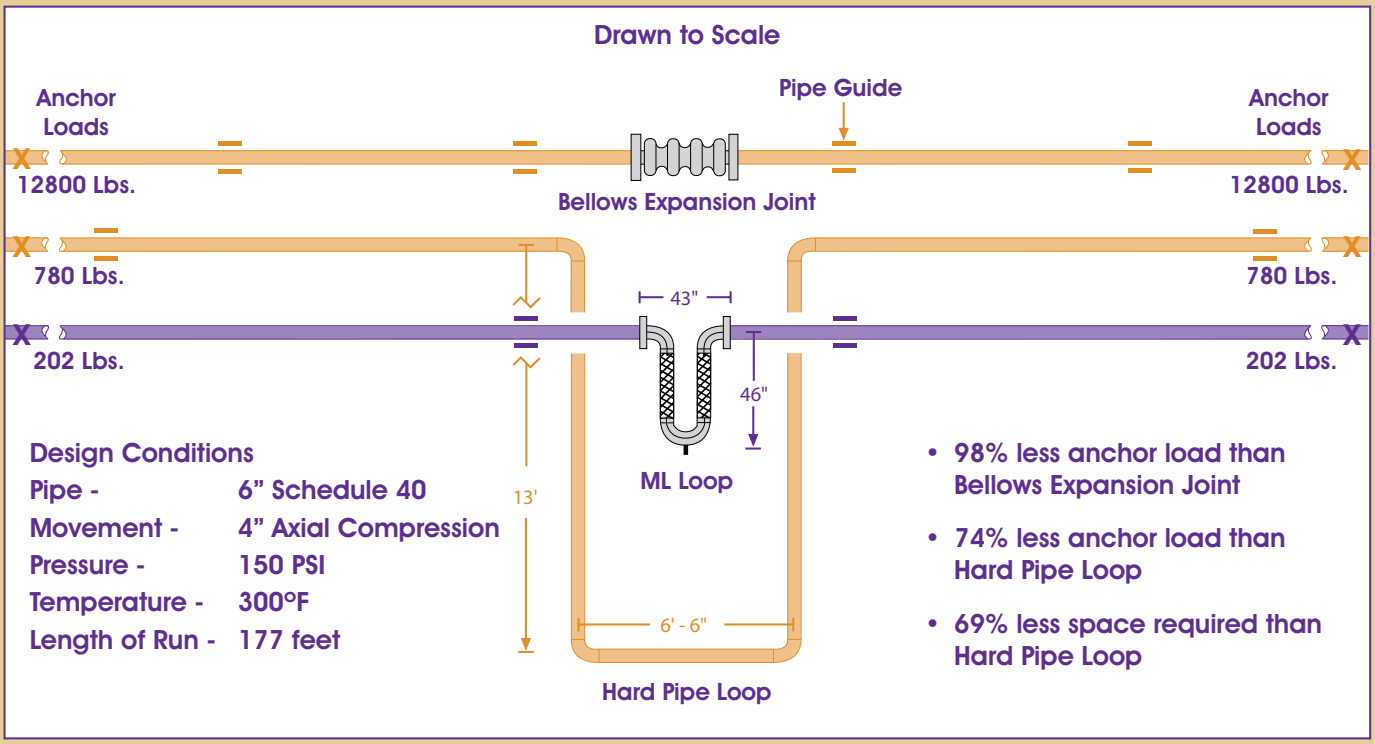


Pictured - Standard pipe loops that could have been reduced in size by 40% to 60%, and a reduction in anchor loads of 80%, by using the ML Loop

FLEXICRAFT

2315 W. HUBBARD ST. • CHICAGO, IL 60612 • 800-533-1024 • 312-738-3588 • FAX 312-421-6327

A New Application for A Time Proven Technology



The ML Loop* is a pre-engineered alternate to hard pipe lops and bellows type expansion joints.

It has significant design advantages which can give you, the engineer, far more freedom in piping layouts and the size, quantity, and strength of pipe supports.

The ML Loop's flexibility translates into compactness, requiring a fraction of the space of hard pipe loops. Runs can be made smaller, tighter and with fewer guides and supports than are required for hard pipe loops. A single ML Loop can be designed for large movements, eliminating multiple expansion joint locations.

Compared to bellows type joints, the ML Loop has incredible flexibility and zero pressure thrust. This means a low force to compress, insignificant anchor loads, and minimal guiding requirements.

The ML Loop combines two time proven technologies, the hard pipe loop and flexible stainless steel hose and braid. Together they significantly reduce the size, anchor loads, support requirements and costs compared to a hard pipe loop designed for the same movement.

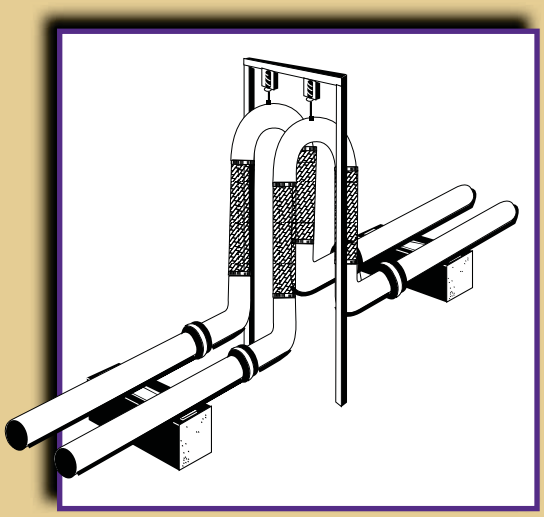
The ML Loop meets **AMSE code B31.1 and B31.3.** See page 5.

Any application where compensation for pipe movement is required, from the unpredictable seismic to the precise calculations using thermal coefficients of expansion, the ML Loop can meet your requirements.

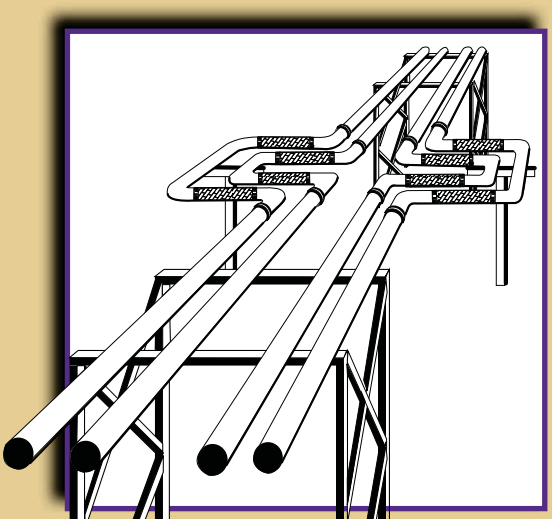
*patent # 5195784

Table of Contents

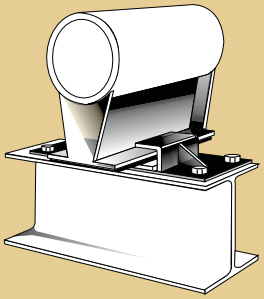
SEE LAST PAGE FOR TERMS AND CONDITIONS



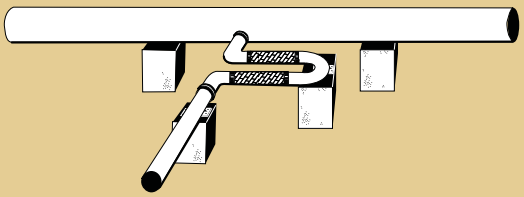
ML Loops extending upward. In this installation a spring hanger is recommended to support the loop because the 180 return bend will travel up and down as the pipe expands and contracts.



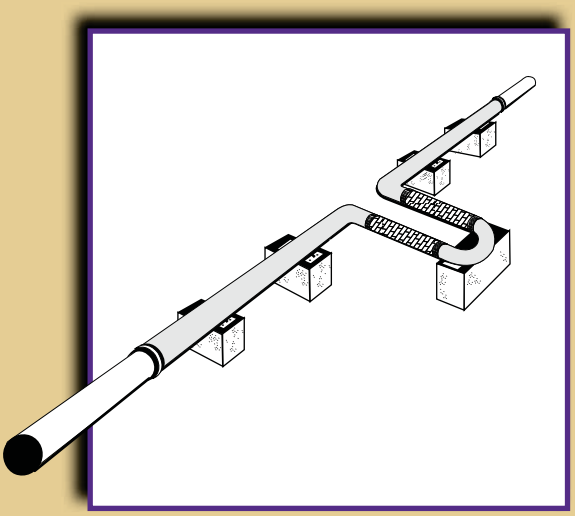
Elevated Pipe Runs. Reduced spring rates, anchor loads and overall size, minimize the structural requirements of the pipe supports. Multiple hard pipe loops can be replaced by a single ML Loop.



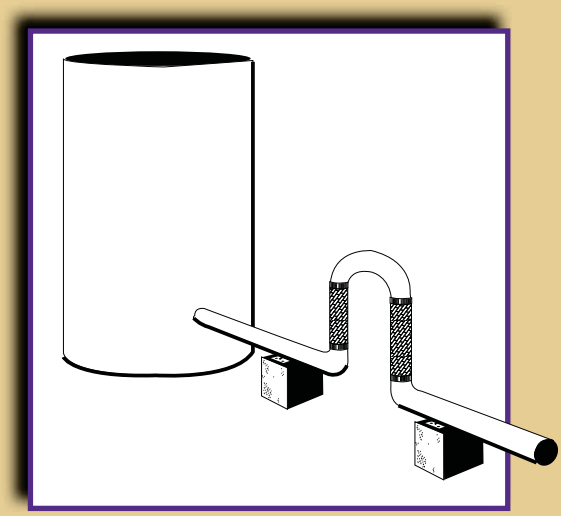
Pipe Supports. Because of the loops extreme flexibility guides are required within 4 pipe diameters before and after the loop. Teflon slide guides are recommended because they are impervious to atmospheric conditions. The teflon to stainless steel slide plates will never bind of gall. The slide guide also has the unique advantage of being able to support the piping so it can be used in place of pipe rollers for the entire pipe run.



Branch line tie ins. In this installation the branch line can move perpendicular to the main line or the main line can move perpendicular to the branch without imposing any thrust loads.



Plastic Pipe. Typically has much greater coefficients of expansion than steel and is more brittle. The ML Loop with its low spring rate is ideal.



Tank Settling. Minimal nozzle loading allows for tank movements and offers seismic protection.

Introduction to Flexible Metal Hose and Braid

Stainless Steel Hose and Braid fulfills the needs of industry for a flexible component having the unique properties of metal: high strength and high resistance to temperature and corrosion, as well as the ability to flex. Like a bellows type expansion joint, a tube of Stainless Steel is corrugated in a geometric shape which enables it to flex without exceeding its elastic limits.

When metal hose is subjected to high internal pressure, the hose is elongated past its ability to recover. The corrugations are stretched out of shape and the flexibility of the hose is impaired. It is necessary, therefore, to equip the hose with a device which can flex with the hose and prevent elongation under pressure. The outer braid is just such a device.

The braid is a tubular sheath of metal wires woven in a basket weave fashion. It is made to fit snugly over the hose, and is fastened to the ends of the hose. It is designed to be strong enough to withstand elongation for the full pressure rating of the hose. The braid alloy is usually similar to that of the hose, but may be different for reasons of strength, corrosion resistance, etc.

Design Considerations

The following are important factors to consider in selecting a ML Loop.

Movement

The flexibility of the ML Loop is determined by its mechanical design and the inherent flexibility of its material. These are a few of the movements the ML Loop is typically designed for:

Seismic – where we design for a minimum of cycles and a maximum stroke.

Thermal movement – which is typically a known amount.

Offset – Such as tank settling. Almost any amount of movement can be designed for; from a few inches to many feet.

Torsional – not recommended

Temperature

The physical properties of any material varies with temperature. Limits for operating temperature are affected by the working pressure, the type of media being conveyed and the nature of the application. By careful selection of material, it is possible to provide flexible metal hose for a wide range of operating temperatures. The choice of hose type, metal alloy, end fitting and method of fitting attachment determines the temperature limit.

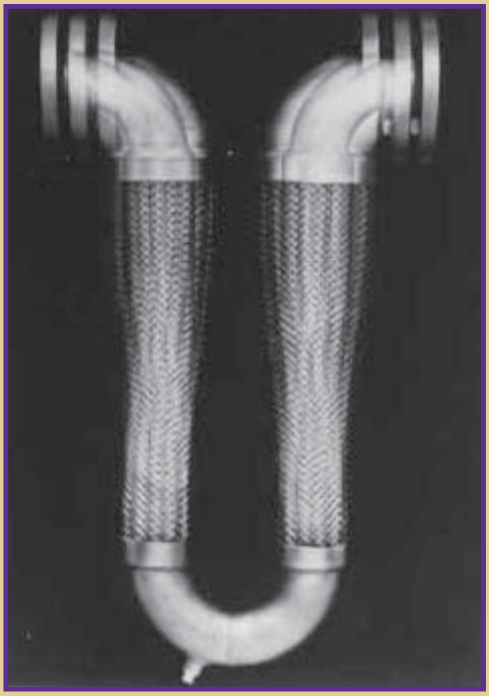
Pressure Ratings

The maximum working, maximum test, and nominal burst pressures for each hose size is based on assemblies with welded-on fittings for stainless steel hose. The ratings shown on page 6 are in PSIG at 70°F.

The Maximum Working Rating is the maximum operating pressure to which a hose assembly should be subjected. These ratings represent the application of a 4 to 1 safety factor against nominal burst pressure. For installations involving pulsating or surge pressures, the peak pressure should be limited to 50% of the maximum working pressure.

The Maximum Test Rating is the maximum pressure to which a straight hose assembly may be subjected without causing permanent deformation of the hose at ambient.

The Nominal Burst Rating is the pressure at which a hose assembly can be expected to rupture.



Media

The type of media being conveyed is an important consideration in the selection process. Metal hose is subject to corrosion by both the material flowing through it and the outside environment. For almost all applications, a metal hose can be selected that is resistant to the intended media. Since metal hose is a thin-walled product, it will not have the same total life as heavier walled tube or pipe of the same material.

Velocity

In high velocity applications (above 25 ft/sec) a liner is recommended to minimize turbulence, vibration and erosion. It may also be desirable in abrasive media applications to minimize erosion, regardless of the velocity.

End Fittings

The uses of ML Loops are complemented by the comprehensive 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.

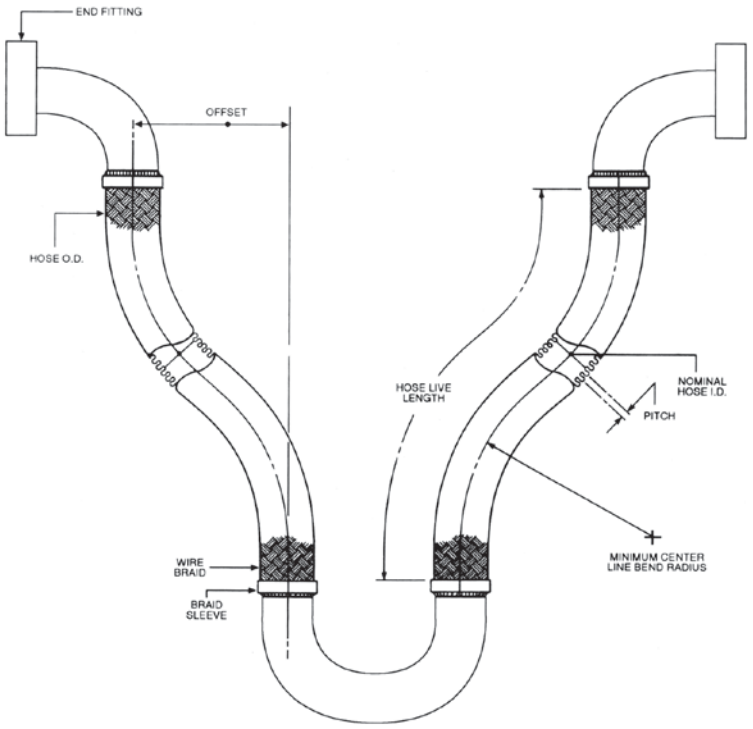
Size

The size of a ML Loop is expressed as nominal diameter. The existing piping will normally dictate the size of the metal hose for a particular application. However, flow rate, velocity and pressure drop considerations may also influence the selection.

Typical Specification

Provide flexible expansion loops of size and material noted on drawings. Flexible loops shall be designed to impart no thrust loads on the anchors. The loop shall consist of two flexible sections of hose and braid, two 90 degree elbows, and a 180 degree return. Loops shall be installed in a neutral, precompressed, or pre-extended condition as required for the application. Loops installed hanging down shall have a drain plug. Loops installed straight up may be fitted with an automatic air release valve to purge air from the high point of the loop. Loops installed in any position other than hanging down must have the 180 degree return supported. Install ML Loop within four pipe diameters, both upstream and downstream, from a pipe guide or anchor. Manufacturer shall provide upon request certification of performance testing and qualification on the ML Loop.

COLD SPRUNG



This illustrates the shape of a pre-extended ML Loop. When installed in a normally hot line, the loop will then be compressed to its neutral configuration.

ASME CODE – (sections Relevant to ML Loops)
Reprinted with Permission from ASME International

Certified by the AMERICAN GAS ASSOCIATION for use on gas pipe lines.

Power Piping ASME B31.1 – 1989 Edition

101.7.2 Expansion, Swivel, or Ball Joints, and Flexible Metal Hose Assemblies.

Joints of the corrugated bellows, slip, sleeve, ball, or swivel types and ***flexible metal hose assemblies*** may be used if their materials conform to the Code, their structural and working parts are of ample proportions, and their design prevents the complete disengagement of working parts while in service. However, flexible metal hose assemblies, and expansion joints of the corrugated bellows, slip, or sleeve type shall not be used in any piping system connecting the boiler and the first stop valve in that system.

119.5 Flexibility

Power piping systems shall be designed to have sufficient flexibility to prevent pipe movements from causing failure from overstress of the pipe material of anchors, leakage at joints, or detrimental distortion of connected equipment resulting from excessive thrusts and moments. Flexibility shall be provided by changes of direction in the piping through the use of bends, loops, or offsets; or provisions shall be made to absorb thermal movements by utilizing expansion, swivel, or ball joints, corrugated pipe, or ***flexible metal hose assemblies.***

119.5.1 Expansion, Swivel, or Ball Joints, an Flexible Metal Hose Assemblies.

Except as stated in Para, 101.7.2 these components may be used where experience or tests have demonstrated that they are suitable for expected conditions of pressure, temperature, service, and cyclic life.

Restraints and supports shall be provided, as required, to limit movements to those directions and magnitudes permitted for specific joint or hose assembly selected.

CHEMICAL PLANT AND PETROLEUM REFINERY PIPING ASME B31.3 – 1990 EDITION

319.7 Means of Increasing Flexibility.

The layout of piping often provides inherent flexibility through changes in direction, so that displacements produce chiefly bending and torsional strains within prescribed limits. The amount of axial tension or compression strain (which produces large reactions) usually is small.

Where the piping lack built-in changes of direction or where it is unbalanced (see para. 319.2.2(b)), large reactions or detrimental overstrain may be encountered. The designer should consider adding flexibility by one or more of the following means: bends, loops, or offsets; swivel joints; corrugated pipe; expansion joints of the bellows or slip-joint type; or other devices, permitting angular, rotational or axial movement. Suitable anchors, ties, or other devices shall be provided as necessary to resist end forces produced by fluid pressure, frictional resistance to movement, and other causes. When expansion joints or other similar devices are provided, the stiffness of the join or device should be considered in any flexibility analysis of the piping.

- Italics added

SELECTION CHART

Warning: For steam service - a double braid is required and the steam pressure rating must be used

WELD ENDS

Fittings -
Sched. 40 Carbon Steel

Hose & Braid -
Series 300 Stainless Steel

PLEASE NOTE:

† When ordering a ML Loop with double-braid, please include the letter "D" at the end of the Model #.

PIPE SIZE		MODEL #	MOVE-MENT	"A"(1) END TO END	"B" (1) LENGTH	WORKING PRESSURE (PSI) (2)			SPRING FORCE LBS. (3)	WEIGHT LBS.
						SINGLE BRAID	DOUBLE BRAID	FOR SAT STEAM		
1/2"	(15mm)	LOOPW30050 LOOPW80050	±1.5" ±4"	6" 9"	13" 17"	1075	1720	300	45	2.5 5
3/4"	(20mm)	LOOPW30075 LOOPW80075	±1.5" ±4"	5-1/4" 9-1/4"	13" 18"	792	1267	300	47	2.5 5
1"	(25mm)	LOOPW30100 LOOPW80100	±1.5" ±4"	6" 10"	15" 20"	571	914	300	53	4 7
1-1/4"	(30mm)	LOOPW30125 LOOPW80125	±1.5" ±4"	7-1/2" 10-3/4"	16" 21"	531	850	300	66	6 9
1-1/2"	(40mm)	LOOPW30150 LOOPW80150	±1.5" ±4"	9" 11-1/2"	17" 23"	472	755	300	70	9 13
2"	(50mm)	LOOPW30200 LOOPW80200	±1.5" ±4"	12" 14"	19" 25"	500	750	300	78	13 16
2-1/2"	(65mm)	LOOPW30250 LOOPW80250	±1.5" ±4"	15" 15-1/2"	21" 28"	387	619	300	83	20 26
3"	(80mm)	LOOPW30300 LOOPW80300	±1.5" ±4"	18" 18"	23" 30"	288	431	216	90	35 39
4"	(100mm)	LOOPW30400 LOOPW80400	±1.5" ±4"	24" 24"	28" 35"	232	371	186	120	48 54
5"	(125mm)	LOOPW30500 LOOPW80500	±1.5" ±4"	30" 30"	32" 40"	191	306	153	186	81 91
6"	(150mm)	LOOPW30600 LOOPW80600	±1.5" ±4"	36" 36"	37" 46"	165	264	132	202	125 140
8"	(200mm)	LOOPW30800 LOOPW80800	±1.5" ±4"	48" 48"	48" 58"	212	230	115	260	245 267
10"	(250mm)	LOOPW31000 LOOPW81000	±1.5" ±4"	60" 60"	55" 67"	175	200	100	383	403 434
12"	(300mm)	LOOPW31200 LOOPW81200	±1.5" ±4"	72" 72"	63" 74"	160	188	94	390	556 586

150# FLANGED ENDS

Fittings -
150# Plate Carbon Steel

Hose & Braid -
Series 300 Stainless Steel

PIPE SIZE		MODEL #	MOVE-MENT	"A"(1) END TO END	"B" (1) LENGTH	WORKING PRESSURE (PSI) (2)			SPRING FORCE LBS. (3)	WEIGHT LBS.
						SINGLE BRAID	DOUBLE BRAID	FOR SAT STEAM		
2"	(50mm)	LOOPF30200 LOOPF80200	±1.5" ±4"	12-1/2" 14-1/2"	19" 25"	285	285	285	78	21 24
2-1/2"	(65mm)	LOOPF30250 LOOPF80250	±1.5" ±4"	15-1/2" 16"	21" 28"	285	285	285	83	30 36
3"	(80mm)	LOOPF30300 LOOPF80300	±1.5" ±4"	18-1/2" 18-1/2"	23" 30"	285	285	216	90	46 50
4"	(100mm)	LOOPF30400 LOOPF80400	±1.5" ±4"	24-1/2" 24-1/2"	28" 35"	232	285	183	120	63 69
5"	(125mm)	LOOPF30500 LOOPF80500	±1.5" ±4"	30-1/2" 30-1/2"	32" 40"	191	285	153	186	91 101
6"	(150mm)	LOOPF30600 LOOPF80600	±1.5" ±4"	36-1/2" 36-1/2"	37" 46"	165	264	132	202	148 163
8"	(200mm)	LOOPF30800 LOOPF80800	±1.5" ±4"	48-1/2" 48-1/2"	48" 58"	212	230	115	260	287 309
10"	(250mm)	LOOPF31000 LOOPF81000	±1.5" ±4"	60-1/2" 60-1/2"	55" 67"	175	200	100	283	453 484
12"	(300mm)	LOOPF31200 LOOPF81200	±1.5" ±4"	72-1/2" 72-1/2"	63" 74"	160	188	94	390	636 666
14"	(355mm)	LOOPF31400 LOOPF81400	±1.5" ±4"	84-1/2" 84-1/2"	71" 80.5"	110	125	63	706	636 666
16"	(400mm)	LOOPF31600 LOOPF81600	±1.5" ±4"	96-1/2" 96-1/2"	78.5" 91.5"	110	170	85	900	636 666
18"	(455mm)	LOOPF31800 LOOPF81800	±1.5" ±4"	108-1/2" 108-1/2"	86.5" 100"	85	150	75	1000	636 666

THREAD ENDS *(MALE)*

Fittings -
Sched. 40 Carbon Steel

Hose & Braid -
Series 300 Stainless Steel

PIPE SIZE		MODEL #	MOVE-MENT	"A"(1) END TO END	"B" (1) LENGTH	WORKING PRESSURE (PSI) (2)			SPRING FORCE LBS. (3)	WEIGHT LBS.
						SINGLE BRAID	DOUBLE BRAID	FOR SAT STEAM		
1/2"	(15mm)	LOOPT30050 LOOPT80050	±1.5" ±4"	10" 13"	13" 17"	1075	1720	300	45	3 5.5
3/4"	(20mm)	LOOPT30075 LOOPT80075	±1.5" ±4"	9-1/4" 13-1/4"	13" 18"	792	1267	300	47	3 5.5
1"	(25mm)	LOOPT30100 LOOPT80100	±1.5" ±4"	11" 15"	15" 20"	571	914	300	53	5 8
1-1/4"	(32mm)	LOOPT30125 LOOPT80125	±1.5" ±4"	12-1/2" 15-3/4"	16" 21"	531	850	300	66	7 10
1-1/2"	(40mm)	LOOPT30150 LOOPT80150	±1.5" ±4"	15" 17-1/2"	17" 23"	472	755	300	70	10.5 14.5
2"	(50mm)	LOOPT30200 LOOPT80200	±1.5" ±4"	18" 20"	19" 25"	500	750	300	78	15 18
2-1/2"	(65mm)	LOOPT30250 LOOPT80250	±1.5" ±4"	21" 21-1/2"	21" 28"	387	619	300	83	23 29
3"	(80mm)	LOOPT30300 LOOPT80300	±1.5" ±4"	24" 24"	23" 30"	288	431	216	90	39 43
4"	(100mm)	LOOPT30400 LOOPT80400	±1.5" ±4"	32" 32"	28" 35"	232	371	186	120	55 59

(1) See Page 8.
(2) At 70° F. See Page 7. Note: The special pressure ratings for saturated steam.
(3) Spring Force: These values reflect the total force required to move the ML Loop it's full rated movement for 150 P.S.I. at 70°F.

SELECTION CHART

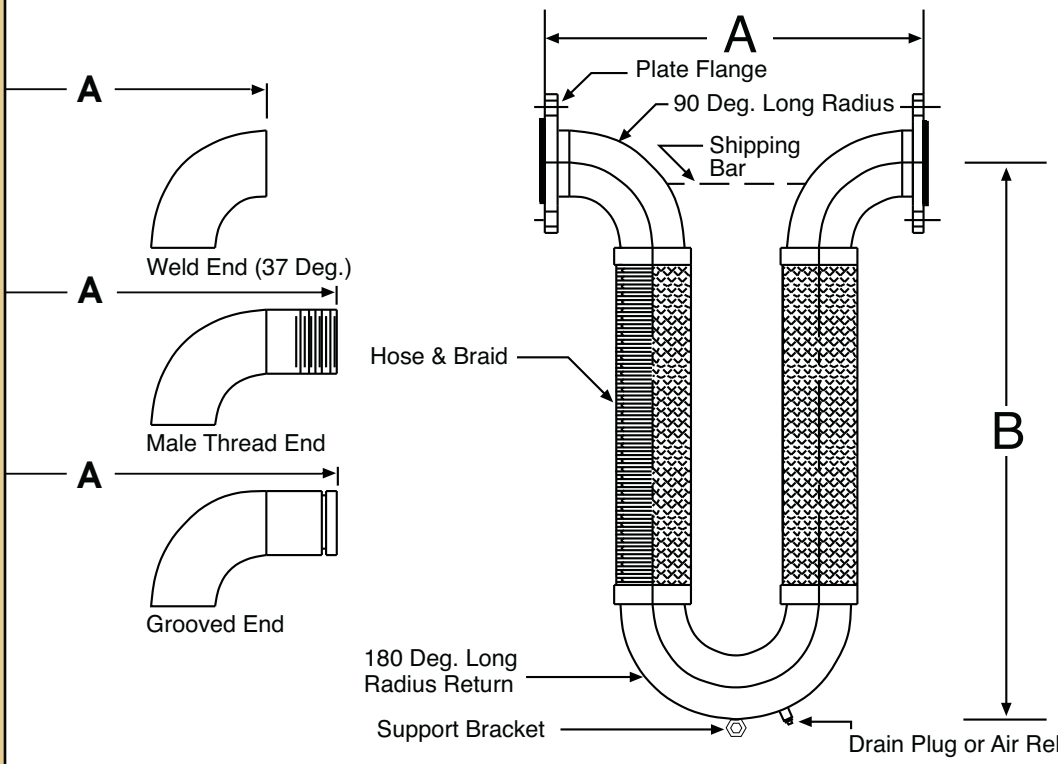
SWEAT ENDS

PIPE SIZE		MODEL #	MOVE-MENT	"A"(1) END TO END	"B" (1) LENGTH	WORKING PRESSURE (PSI) (2)			SPRING FORCE LBS. (3)	WEIGHT LBS.
						SINGLE BRAID	DOUBLE BRAID	FOR SAT STEAM		
1/2"	(15mm)	LOOPS30050 LOOPS80050	±1.5" ±4"	5" 8"	11" 15"	706	1130	NA	45	2 2.5
3/4"	(20mm)	LOOPS30075 LOOPS80075	±1.5" ±4"	6" 9-1/2"	15" 19"	577	923	NA	47	2 2.5
1"	(25mm)	LOOPS30100 LOOPS80100	±1.5" ±4"	6-1/2" 10-1/4"	16" 21"	470	752	NA	53	2.5 3
1-1/4"	(30mm)	LOOPS30125 LOOPS80125	±1.5" ±4"	7-3/4" 11-1/4"	17" 22"	361	577	NA	66	3.5 4
1-1/2"	(40mm)	LOOPS30150 LOOPS80150	±1.5" ±4"	9-1/4" 11-3/4"	18" 24"	329	526	NA	70	4 4.5
2"	(50mm)	LOOPS30200 LOOPS80200	±1.5" ±4"	11-1/4" 14"	21" 26"	317	507	NA	78	9 12
2-1/2"	(65mm)	LOOPS30250 LOOPS80250	±1.5" ±4"	13" 15"	21" 27"	272	435	NA	83	12 18
3"	(80mm)	LOOPS30300 LOOPS80300	±1.5" ±4"	14" 16-1/2"	23" 29"	201	322	NA	90	18 24
4"	(100mm)	LOOPS30400 LOOPS80400	±1.5" ±4"	18" 22"	26" 32"	142	227	NA	120	26 31

TEMPERATURE IN DEGREES F.	MATERIAL				
	BRONZE	STEEL	MONEL	304 STAINLESS	321 OR 316 ELC STAINLESS
Room Temp	1.00	1.00	1.00	1.00	1.00
150	.92	.99	.93	.96	.97
200	.89	.97	.90	.92	.94
250	.86	.96	.87	.91	.92
300	.83	.93	.83	.86	.88
350	.81	.91	.82	.85	.86
400	.78	.87	.79	.82	83
450	.75	.86	.77	.80	.81
500	-	.81	.73	.77	.78
600	-	.74	.72	.73	.74
700	-	.66	.71	.69	.70
800	-	.52	.70	.64	.66
900	-	.50	-	.58	.62
1000	-	-	-	-	.60
1100	-	-	-	-	.58
1200	-	-	-	-	.55
1300	-	-	-	-	.50
1400	-	-	-	-	.44
1500	-	-	-	-	.40

Temperature Correction Factors For Elevated Temperature Applications.

As the service temperature increases, the maximum pressure a ML Loop can withstand decreases. The material from which the hose is made and the method of fitting attachment (mechanical, soldered, welded, silver brazed) determines the maximum pressure at which an assembly can be used. By using the factors given in the chart, the approximate safe working pressure at elevated temperatures can be calculated.



QTY	MODEL NUMBER	PIPE SIZE	MOVEMENT			MAXIMUM		FLOW RATE	INSUL THICKNESS
			AXIAL		OTHER				
			COMPR-ESSION	EXTEN-SION		PSI	TEMP.		

MISC LOOP NOTES:Loops do not have to "hang down" as illustrated; up, down, sideways is acceptable.
For steam service loop must be horizontal or steam trap should be provided.

PIPE GUIDES				
FOR LOOP#	SIZE	QTY.	MODEL #	NOTES
1				
2				
3				
4				

CUSTOMER: _____

PROJECT: _____

ENGINEER: _____

CNTRCTR: _____

P.O. NO: _____

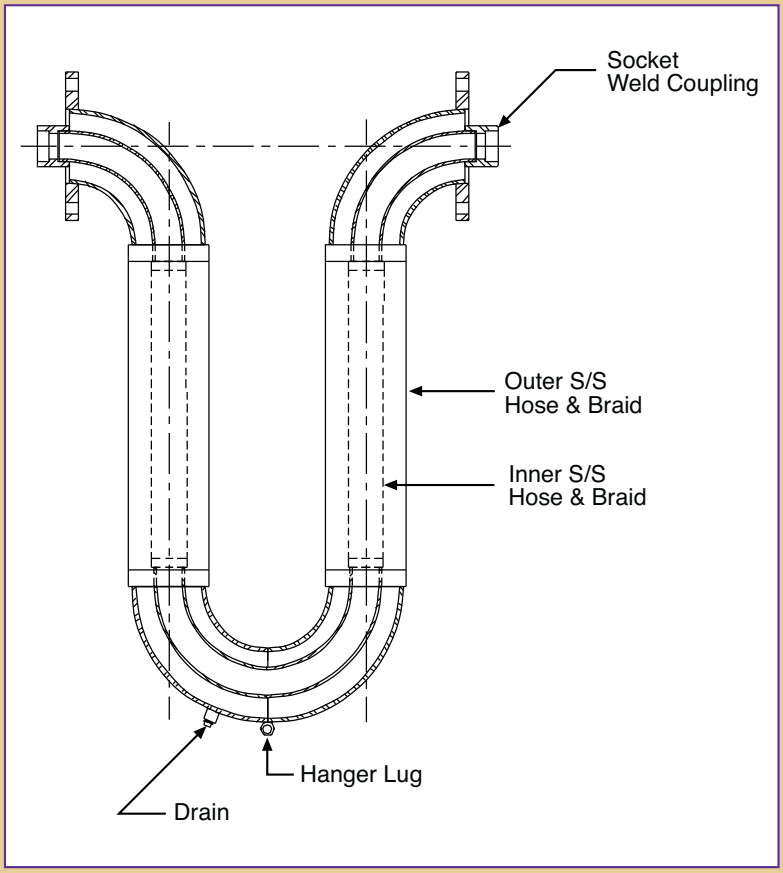
FLEXICRAFT

DESCRIPTION:

ML EXPANSION LOOP

U.S. PAT#5,195,784

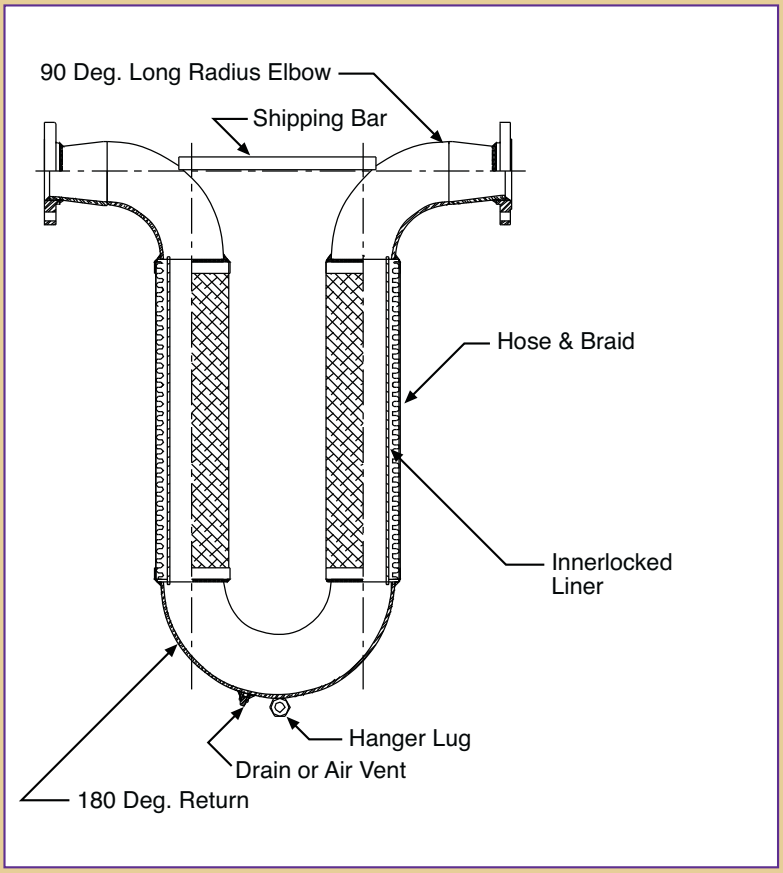
DRAWN BY:	DATE:	DRAWING NO:
JAM	**02/01**	



Containment of Steam Jacketed Piping –

Containment ML Loops for hazardous media can be built of almost any compatible material. A large inspection port in the return bend is a common option. Containment loops can be designed for thermal expansion, seismic, tank settling, nozzle loading requirements, etc…

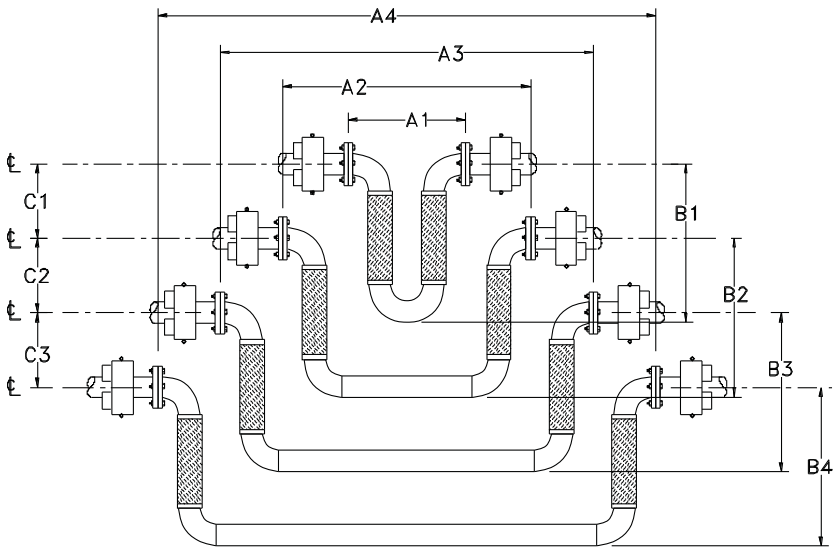
Steam jacketed loops are used to heat or reheat media and at the same time absorb or compensate for thermal movement. Steam connections can be made anywhere except the flexible legs.



Lined ML Loops –

Liners are used when flow velocity exceeds 25 ft/sec. through the hose assembly or when the fluid is erosive.

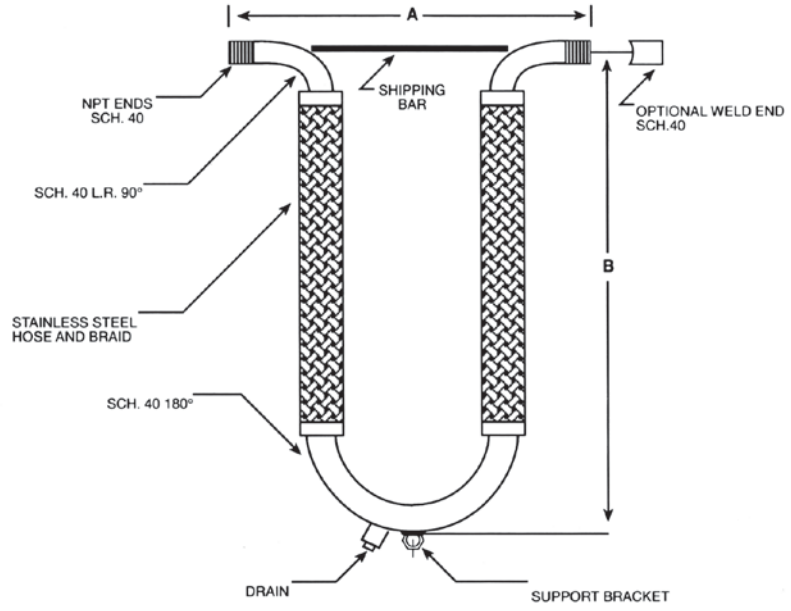
A liner will reduce turbulence and pressure drop if this is critical to the application. Spiral wound interlocked flexible hose is commonly used for liner.



LOOP #1 IS ALWAYS THE INSIDE LOOP

Nested ML Loops –

Nested ML Loops can be used in parallel pipe runs to keep all the expansion devices at one location. ML Loops can be nested in any sequence, large inside of smaller diameters or small inside of large and any number of pipes can be made in a nest.
Cautionary note The spool piece between the legs should not weigh more than the spring force required to bend the loops the full rated movement.

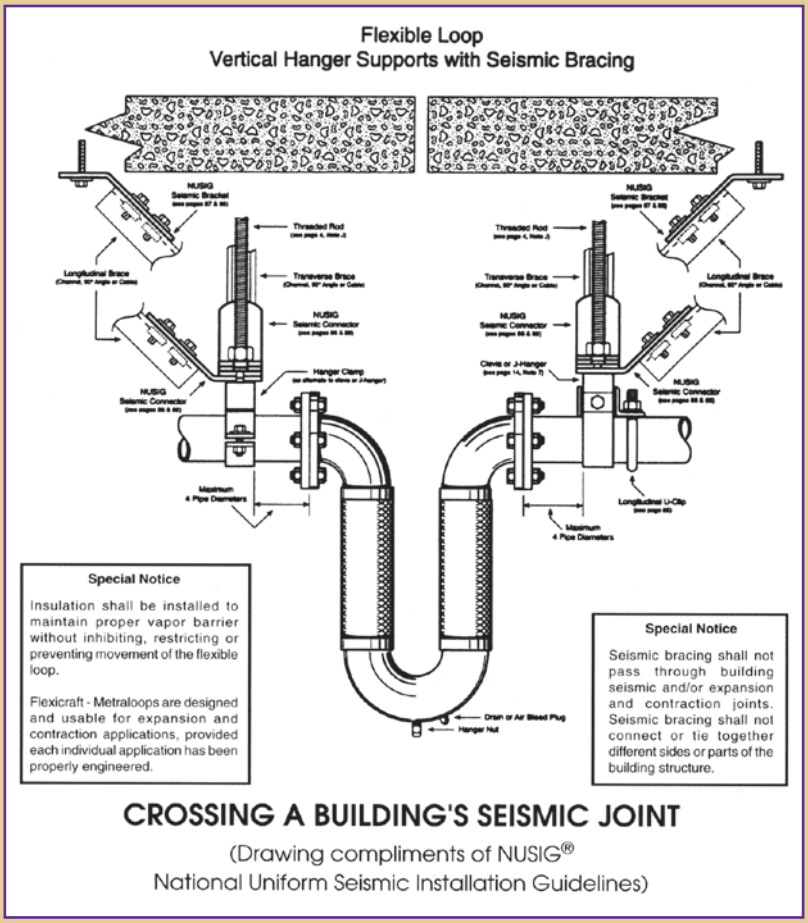


STANDARD MATERIALS OF CONSTRUCTION
HOSE & BRAID - T304 S/S
FITTINGS - CARBON STEEL
OPTIONS - ALL S/S CONSTRUCTION

U.S. PAT # 5,195,784

Certified by the
AMERICAN GAS ASSOCIATION
for use on gas pipe lines.

American Gas Association – Selected sizes, designs and material of construction for the ML Loops have been tested and certified by A.G.A. for use on gas pipe lines. These ML Loops are being used primarily in commercial and industrial facilities located in seismic zones to minimize the possibility of gas line ruptures. Fires cause by broken gas lines are the major cause of damage after earthquakes.



REQUEST NUSIG DRAWING

Seismic ML Loops –

These loops can be designed for almost any amount of movement in any direction. Consideration should be given to the location of the loop within the building or facility. In designing a loop for seismic protection, the function you wish the loop to perform should be considered, ie: minimizing nozzle loads, breaching seismic joints in the building, angular displacement of pipe lines traversing known or suspected faults, etc…

Unless specifically designed, loops should not be used for both thermal expansion and seismic applications.

After an earthquake, ML Loops should be visually inspected and pressurized at 1.5 times rated working pressure. To verify integrity please contact factory for complete inspection criteria.

Insulation Guidelines –

The ML Loop does not require any special insulation other than that some allowance should be made for the flexible sections of the loop legs. Calcium silicate tightly fitted to the flexible sections is not recommended as it may impede the free flexing of the loop. Calcium Silicate, or other materials, can be used with the following suggestions:

1.) Insulating each leg individually – if the insulation is not flexible the insulation must fit loosely around the leg, to allow movement. Interference between opposite legs must also be considered. As the loop compresses, the insulation on opposite legs may come into contact. The customer must satisfy himself that this is an acceptable condition.
2.) Insulating the entire ML Loop – The whole assembly can be enclosed in clam shell or bag like fashion. This will allow the ML Loop to move unimpeded within the insulation.
3.) Removable insulation blanket – This insulation is typically flexible and is used in seismic zones so that after an earthquake the ML Loop can be inspected for signs of damage.

SUMMARY OF THE TEST REPORT OF WISS, JANNEY, ELSTNER ASSOCIATES, INC. NORTHBROOK, IL

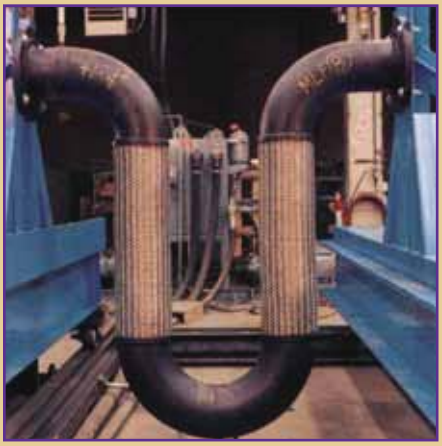
ML Loop Cycle Testing, WJE No. 941166, December 1994

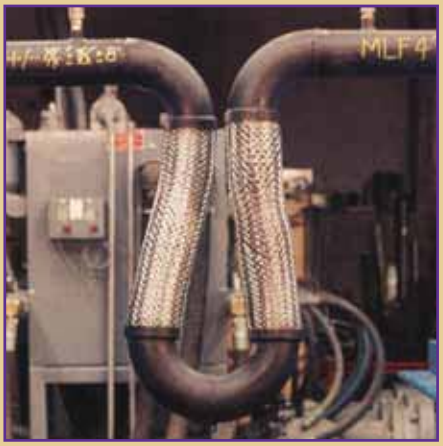
WJE was commissioned to perform cycle testing on 4", 6", and 8" diameter ML Loops simulating the movement that would be expected in an earthquake. All ML Loops which were submitted passed the cycle testing.

Description of test procedure and equipment: ML Loops designed for 4 inches of movement in any direction were pressurized and mounted between two carts. The carts moved perpendicular to each other and were set to simultaneously cycle at +4 inches and -4 inches at a rate of 2 cycles per second for 30 cycles. After 30 cycles, none of the ML Loops showed any signs of stress, damage or fatigue.

After the successful completion of the original test, a 4-inch diameter ML Loop was subjected to progressively larger amplitudes of movement until failure. First for 30 cycles at ±6 inches and then ±8 inches (100%above design movement). At this amount of movement, the ML Loop started to leak.

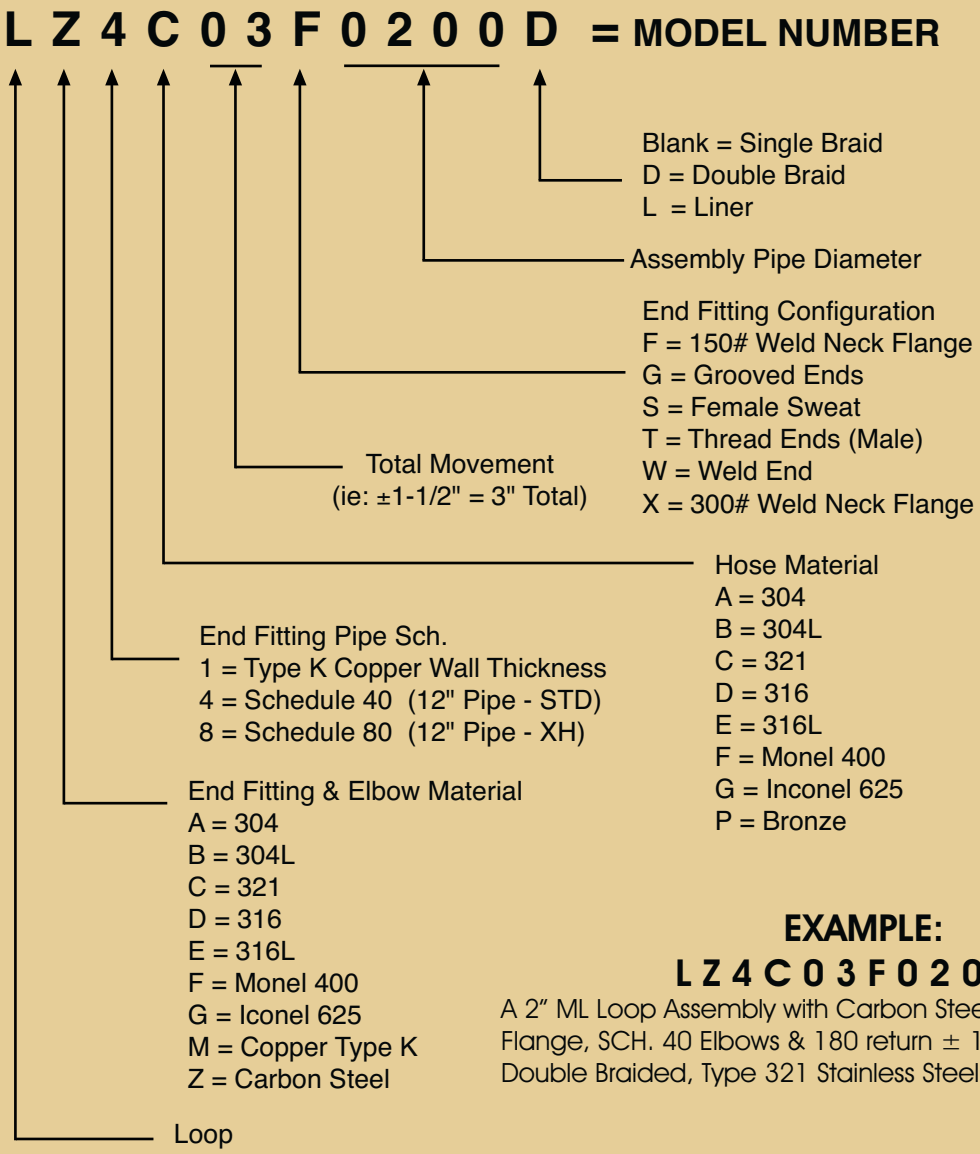
The full test report and a video of the testing is available upon request, please contact the factory.





CUSTOM ORDERING SYSTEM

The sizes, pressures and movements shown on the previous page reflect our standard ML Loops. **Higher pressure, greater movements and special material are available.** Here's how to order.



EXAMPLE:

L Z 4 C 0 3 F 0 2 0 0 D

A 2" ML Loop Assembly with Carbon Steel, 150# Weld Neck Flange, SCH. 40 Elbows & 180 return ± 1-1/2" of movement, Double Braided, Type 321 Stainless Steel Hose.

NOTES...

Terms and Conditions

1. All quotations are subject to approval, acceptance and correction at the home office. Any errors in quotations resulting in orders will be corrected and re-submitted to the customer for their acceptance or refusal.

No prices may be made up from information other than that shown in the tables.

2. All prices are F.O.B. factory, Chicago, Illinois, and are quoted exclusive of any taxes.

Shipments boxed for trans-ocean export add 10% to total trade price.

Terms: Net 30 days from date of invoice.

3. Cancellation or alteration of an order or return of any product by Buyer may not be made without advance written consent of manufacturer and shall be subject to a cancellation charge.

A 35% minimum restocking charge shall be placed on any stocked returned goods. No returns on special orders.

4. We will not be responsible for delays in shipping due to conditions beyond our control such as strikes, fires or accidents.

5. Any claims for shortages or damaged products must be made in writing 10 days after receipt of shipment.

6. Prices subject to change without notice.

Design and Dimensional Specifications

The products illustrated reflect the design characteristics at time of printing.

Flexicraft reserves the right to change dimensions, materials or methods of construction without notice. Please contact the factory for certified prints (exact dimensions) when necessary.

Limited Warranty

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product. (b) If permission given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at its discretion, either repair or replace the product F.O.B. factory, within 60 days of receipt or refund the purchase price. Other than repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description or product or use, sample or model, warning or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF MANUFACTURER. These products are not manufactured, sold or intended for personal, family or household purposes.

2315 West Hubbard Street, Chicago, Illinois 60612, Telephone 800-533-1024, 312-738-3588, Fax 312-421-6327
www.flexicraft.com sales@flexicraft.com

Distributed by:

Catalog FML12

Printed in U.S.A.