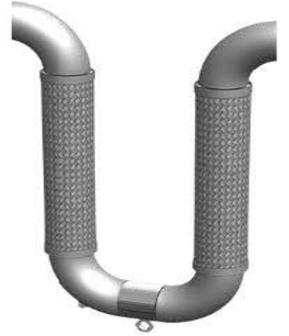


# FLEX PIPE USA INC



# CORRUGATED METAL HOSE

When rigid connections are impractical, flexible metal hose provides non-rigid connections for conveying liquids, gases and semi-solids.

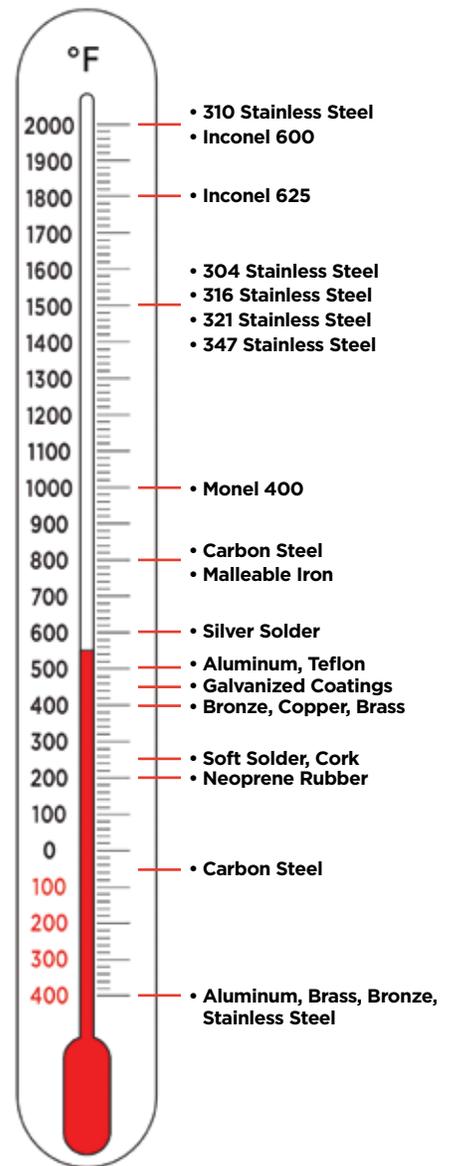
Metal hose offers a number of advantages, including high strength, resistance to high or low temperature extremes and corrosion resistance. It absorbs vibrations and noise, connects misaligned rigid piping, connects moving parts of machinery or equipment, and is practical for hooking up frequently moved or dismantled equipment.

Corrugated metal hose is manufactured in two basic styles: Annular and Helical. The metal choices are: Bronze, Steel, Stainless Steel, Monel and Inconel.

## Annular Corrugated Hose Material

1/4" I.D. thru 24" I.D.	<b>Type 321 Stainless Steel</b> The industry standard, this chromium-nickel (18-8) steel is chemically stabilized to resist intergranular corrosion and is suitable for service from 1500°F to cryogenic (-320°F) temperatures.
	<b>Type 316 Stainless Steel</b> This chromium-nickel-molybdenum (18-8-2) steel has improved corrosion resistance and is suitable for service from 900°F to cryogenic (-320°F) temperatures.
1/2" I.D. thru 3" I.D.	<b>Monel</b> The nickel-copper (70-30) alloy has excellent corrosion resistance to chlorine and salt water service. This alloy is suitable for service from 900°F to cryogenic (-320°F) temperatures.
1/4" I.D. thru 2" I.D.	<b>Bronze</b> The copper-tin (95-5) alloy has good general corrosion resistance and is widely used in water and steam systems. This alloy is suitable for service from 400°F to cryogenic (-320°F) temperatures.

## TEMPERATURE RANGE Maximum/Minimum



**Metal hose offers a number of advantages, including high strength, resistance to high or low temperature extremes and corrosion resistance.**

## PL Series Braided Hose

Precision Series: Light Weight with High Flexibility  
 Materials: Hose: 304L, 321, 316L Stainless  
 Braid: 304 and 316L Stainless  
 Construction: Annular Hose available in either Standard or Compressed Pitch  
 High Coverage Braid

NOM. I.D. (IN.)	PART NUMBER (See Chart)	BRAID LAYERS	BRAID CONSTRUCTION	BRAID COVERAGE (%)	NOM. O.D. (IN.)	MAXIMUM PRESSURE @ 70°F (PSIG)			CENTERLINE BEND RADIUS (IN.)		WEIGHT PER FOOT (LBS.)	BRAID SLEEVE PART NUMBER
						Working	Test	Normal Burst	Dynamic	Static		
1/4"	04PL-xA00	0			0.38	72	----	----			0.05	----
	04PL-xA1x	1	24 x 6 x 0.010	95	0.43	2,386	3,579	9,544	3.00	1.00	0.10	8-304
	04PL-xA2x	2			0.48	2,863	4,295	11,453			0.15	16-304
3/8"	06PL-xA00	0			0.56	72	----	----			0.07	----
	06PL-xA1x	1	24 x 7 x 0.012	93	0.62	1,714	2,571	6,856	5.00	1.50	0.16	32-304
	06PL-xA2x	2			0.68	2,057	3,086	8,228			0.25	42-304
1/2"	08PL-xA00	0			0.66	72	----	----			0.08	----
	08PL-xA1x	1	24 x 8 x 0.012	92	0.72	1,281	1,921	5,124	5.25	1.75	0.18	46-304
	08PL-xA2x	2			0.78	1,537	2,306	6,148			0.28	54-304
3/4"	12PL-xA00	0			1.05	43	----	----			0.19	----
	12PL-xA1x	1	36 x 8 x 0.014	96	1.12	1,056	1,584	4,224	6.50	2.50	0.39	100-304
	12PL-xA2x	2			1.19	1,267	1,900	5,068			0.59	110-304
1"	16PL-xA00	0			1.27	43	----	----			0.24	----
	16PL-xA1x	1	48 x 7 x 0.014	95	1.34	817	1,225	3,268	7.50	3.25	0.48	130-304
	16PL-xA2x	2			1.41	980	1,470	3,920			0.72	140-304
1-1/4"	20PL-xA00	0			1.62	43	----	----			0.33	----
	20PL-xA1x	1	48 x 9 x 0.014	95	1.69	618	922	2,472	10.00	4.00	0.66	176-304
	20PL-xA2x	2			1.76	741	1,112	2,964			0.99	186-304
1-1/2"	24PL-xA00	0			1.95	28	----	----			0.51	----
	24PL-xA1x	1	48 x 9 x 0.016	94	2.03	571	856	2,284	11.75	5.00	0.91	224-304
	24PL-xA2x	2			2.11	685	1,028	2,740			1.31	232-304
2"	32PL-xA00	0			2.38	28	----	----			0.64	----
	32PL-xA1x	1	48 x 9 x 0.020	94	2.48	591	886	2,364	12.50	6.25	1.27	282-304
	32PL-xA2x	2			2.58	709	1,064	2,836			1.90	296-304

PL \_\_\_\_\_ -A \_\_\_\_\_  
 Hose Alloy Code      Braid Code      Braid Alloy Code

Hose Alloy Code:      Braid Code:      Braid Alloy Code:  
 A = 321 Stainless      0 = No Braid      0 = No Braid  
 B = 304L Stainless      1 = Single Braid      1 = 304 Stainless  
 C = 316L Stainless      2 = Double Braid      6 = 316L Stainless

Example: 04PL-AA11 =  
 1/4" PL Series 321 Hose with Single 304 Braid

# PM Series Braided Hose

Precision Series: Medium Weight with Medium Flexibility  
 Materials: Hose: 304L, 321, 316L Stainless  
 Braid: 304 and 316L Stainless  
 Construction: Annular Hose available in either Standard or Compressed Pitch  
 High Coverage Braid

NOM. I.D. (IN.)	PART NUMBER (See Chart)	BRAID LAYERS	BRAID CONSTRUCTION	BRAID COVERAGE (%)	NOM. O.D. (IN.)	MAXIMUM PRESSURE @ 70°F (PSIG)			CENTERLINE BEND RADIUS (IN.)		WEIGHT PER FOOT (LBS.)	BRAID SLEEVE PART NUMBER
						Working	Test	Normal Burst	Dynamic	Static		
1/4"	04PM-xA00	0			0.48	200	---	---			0.11	----
	04PM-xA1x	1	24 x 5 x 0.014	98	0.57	2,500	3,750	10,000	5.00	1.00	0.20	24-304
	04PM-xA2x	2			0.64	4,000	6,000	16,000			0.29	32-304
3/8"	06PM-xA00	0			0.63	100	---	---			0.13	----
	06PM-xA1x	1	24 x 8 x 0.014	98	0.74	1,530	2,295	6,120	5.00	1.25	0.27	44-304
	06PM-xA2x	2			0.81	2,448	3,672	9,792			0.40	54-304
1/2"	08PM-xA00	0			0.82	80	---	---			0.23	----
	08PM-xA1x	1	24 x 9 x 0.014	94	0.89	1,200	1,800	4,800	5.00	1.50	0.37	70-304
	08PM-xA2x	2			0.96	1,920	2,880	7,680			0.50	76-304
3/4"	12PM-xA00	0			1.21	70	---	---			0.44	----
	12PM-xA1x	1	36 x 9 x 0.014	95	1.28	850	1,275	3,400	6.50	2.25	0.64	120-304
	12PM-xA2x	2			1.35	1,360	2,040	5,440			0.84	130-304
1"	16PM-xA00	0			1.51	40	---	---			0.54	----
	16PM-xA1x	1	36 x 10 x 0.014	92	1.58	590	885	2,360	7.50	2.75	0.78	160-304
	16PM-xA2x	2			1.65	944	1,416	3,776			1.02	170-304
1-1/4"	20PM-xA00	0			1.85	25	---	---			0.76	----
	20PM-xA1x	1	48 x 8 x 0.016	92	1.93	540	810	2,160	9.00	3.50	1.07	206-304
	20PM-xA2x	2			2.02	864	1,296	3,456			1.38	214-304
1-1/2"	24PM-xA00	0			2.19	20	---	---			0.85	----
	24PM-xA1x	1	48 x 10 x 0.016	93	2.28	475	713	1,900	10.50	4.00	1.27	254-304
	24PM-xA2x	2			2.37	760	1,140	3,040			1.69	262-304
2"	32PM-xA00	0			2.60	15	---	---			0.91	----
	32PM-xA1x	1	48 x 10 x 0.020	95	2.72	530	795	2,120	13.00	5.00	1.53	312-304
	32PM-xA2x	2			2.84	848	1,272	3,392			2.15	326-304
2-1/2"	40PM-xA00	0			3.23	12	---	---			1.18	----
	40PM-xA1x	1	72 x 8 x 0.020	94	3.33	410	615	1,640	18.00	8.00	1.90	RB-2.5-S16-04
	40PM-xA2x	2			3.43	656	984	2,624			2.62	RB-2.5-S16-04
3"	48PM-xA00	0			3.78	10	---	---			1.67	----
	48PM-xA1x	1	72 x 9 x 0.020	93	3.88	335	503	1,340	19.00	9.00	2.50	RB-3-S16-04
	48PM-xA2x	2			3.98	536	804	2,144			3.33	RB-3-S16-04
4"	64PM-xA00	0			4.85	8	---	---			1.81	----
	64PM-xA1x	1	72 x 11 x 0.020	91	4.98	240	360	960	20.00	13.00	2.86	RB-4-S16-04
	64PM-xA2x	2			5.08	384	576	1,536			3.91	RB-4-S16-04

PM \_\_\_\_\_ -A \_\_\_\_\_  
 Hose Alloy Code      Braid Code      Braid Alloy Code

Hose Alloy Code: A = 321 Stainless      B = 304L Stainless      C = 316L Stainless  
 Braid Code: 0 = No Braid      1 = Single Braid      2 = Double Braid  
 Braid Alloy Code: 0 = No Braid      1 = 304 Stainless      6 = 316L Stainless

Example: 04PM-AA11 =  
 1/4" PM Series 321 Hose with Single 304 Braid

## SM Series Braided Hose

Standard Series: Medium Weight with Medium Flexibility  
 Materials: Hose: 321 and 316L Stainless, Bronze, Monel, and Inconel upon request  
 Braid: 304 and 316L Stainless, Bronze, Monel, and Inconel upon request  
 Construction: Annular Hose available in either Standard or Compressed Pitch

NOM. I.D. (IN.)	PART NUMBER (See Chart)	BRAID LAYERS	BRAID CONSTRUCTION	BRAID COVERAGE (%)	NOM. O.D. (IN.)	MAXIMUM PRESSURE @70°F (PSIG)			CENTERLINE BEND RADIUS (IN.)		WEIGHT PER FOOT (LBS.)	BRAID SLEEVE PART NUMBER
						Working	Test	Normal Burst	Dynamic	Static		
1/4"	04SM-xA00	0			0.48	180	---	---			0.11	---
	04SM-xA1x	1	24 x 5 x 0.014	89	0.57	2,460	3,690	9,840	5.00	1.00	0.20	28-304
	04SM-xA2x	2			0.64	3,690	5,535	14,760			0.29	36-304
3/8"	06SM-xA00	0			0.63	125	---	---			0.13	---
	06SM-xA1x	1	24 x 7 x 0.014	91	0.74	1,860	2,790	7,440	5.00	1.25	0.27	44-304
	06SM-xA2x	2			0.81	2,790	4,185	11,160			0.40	54-304
1/2"	08SM-xA00	0			0.82	90	---	---			0.23	---
	08SM-xA1x	1	24 x 7 x 0.014	82	0.90	1,170	1,755	4,680	5.00	1.50	0.37	70-304
	08SM-xA2x	2			0.97	1,755	2,633	7,020			0.50	80-304
3/4"	12SM-xA00	0			1.21	70	---	---			0.44	---
	12SM-xA1x	1	36 x 8 x 0.014	90	1.29	930	1,395	3,720	6.50	2.25	0.64	122-304
	12SM-xA2x	2			1.36	1,395	2,093	5,580			0.84	132-304
1"	16SM-xA00	0			1.51	50	---	---			0.54	---
	16SM-xA1x	1	36 x 9 x 0.014	85	1.58	640	960	2,560	7.50	2.75	0.78	162-304
	16SM-xA2x	2			1.65	960	1,440	3,840			1.02	172-304
1-1/4"	20SM-xA00	0			1.85	30	---	---			0.76	---
	20SM-xA1x	1	48 x 7 x 0.016	83	1.93	570	855	2,280	9.00	3.50	1.07	208-304
	20SM-xA2x	2			2.02	855	1,283	3,420			1.38	220-304
1-1/2"	24SM-xA00	0			2.19	25	---	---			0.85	---
	24SM-xA1x	1	48 x 9 x 0.016	87	2.28	500	750	2,000	10.50	4.00	1.27	254-304
	24SM-xA2x	2			2.37	750	1,125	3,000			1.69	266-304
2"	32SM-xA00	0			2.60	20	---	---			0.91	---
	32SM-xA1x	1	48 x 9 x 0.020	89	2.73	540	810	2,160	13.00	5.00	1.53	312-304
	32SM-xA2x	2			2.86	810	1,215	3,240			2.15	334-304
2-1/2"	40SM-xA00	0			3.23	20	---	---			1.18	---
	40SM-xA1x	1	72 x 7 x 0.020	86	3.33	400	600	1,600	18.00	8.00	1.90	RB-2.5-S16-04
	40SM-xA2x	2			3.43	600	900	2,400			2.62	RB-2.5-S16-04
3"	48SM-xA00	0			3.78	15	---	---			1.67	---
	48SM-xA1x	1	72 x 8 x 0.020	85	3.88	330	495	1,320	19.00	9.00	2.50	RB-3-S16-04
	48SM-xA2x	2			3.98	495	743	1,980			3.33	RB-3-S16-04
4"	64SM-xA00	0			4.85	10	---	---			1.81	---
	64SM-xA1x	1	72 x 10 x 0.020	84	4.98	240	360	960	20.00	13.00	2.86	RB-4-S16-04
	64SM-xA2x	2			5.10	360	540	1,440			3.91	RB-4-S16-04
5"	80SM-xA00	0			5.90	6	---	---			2.51	---
	80SM-xA1x	1	96 x 10 x 0.020	81	6.03	210	315	840	28.00	18.00	3.78	RB-5-S16-04
	80SM-xA2x	2			6.15	315	472	1,260			5.05	RB-5-S16-04
6"	96SM-xA00	0			6.87	6	---	---			3.50	---
	96SM-xA1x	1	96 x 12 x 0.020	90	7.10	180	270	720	33.00	19.00	4.82	RB-6-S16-04
	96SM-xA2x	2			7.33	270	405	1,080			6.14	RB-6-S16-04
8"	128SM-xA00	0			9.09	6	---	---			5.58	---
	128SM-xA1x	1	96 x (21 x 0.024)	96	9.19	235	353	940	40.00	20.00	9.48	RB-8-H20-04
	128SM-xA2x	2			9.28	353	530	1,412			13.38	RB-8-H20-04
10"	160SM-xA00	0			11.18	5	---	---			6.85	---
	160SM-xA1x	1	96 x (25 x 0.028)	98	11.32	240	360	960	50.00	25.00	12.95	RB-10-H20-304
	160SM-xA2x	2			11.45	360	540	1,440			19.05	RB-10-H20-304
12"	SM192-xA00	0			13.23	3	---	---			9.11	---
	SM192-xA1x	1	96 x (25 x 0.028)	97	13.37	170	255	680	60.00	30.00	14.96	RB-12-H20-304
	SM192-xA2x	2			13.50	255	383	1,020			20.81	RB-12-H20-304
14"	SM224-xA00	0			14.70	3	---	---			14.13	---
	SM224-xA1x	1	96 x (25 x 0.028)	93	14.84	119	179	476	70.00	35.00	22.08	RB-14-H20-304
	SM224-xA2x	2			14.98	190	285	760			30.03	RB-14-H20-304

# SH Series Braided Hose

Standard Series: Heavy Weight with Medium Flexibility  
 Materials: Hose: 321 and 316L Stainless  
 Braid: 304 and 316L Stainless  
 Construction: Annular Hose Close Pitch

NOM. I.D. (IN.)	PART NUMBER (See Chart)	BRAID LAYERS	BRAID CONSTRUCTION	BRAID COVERAGE (%)	NOM. O.D. (IN.)	MAXIMUM PRESSURE @ 70°F (PSIG)			CENTERLINE BEND RADIUS (IN.)		WEIGHT PER FOOT (LBS.)	BRAID SLEEVE PART NUMBER
						Working	Test	Normal Burst	Dynamic	Static		
1/4"	04SH-xA00	0			0.50	180	----	----			0.09	----
	04SH-xA1x	1	24 x 5 x 0.014	89	0.57	2,562	3,843	10,250	5.00	2.50	0.17	28-304
	04SH-xA2x	2			0.64	4,099	6,149	16,400			0.26	36-304
3/8"	06SH-xA00	0			0.67	100	----	----			0.13	----
	06SH-xA1x	1	24 x 7 x 0.014	91	0.74	1,501	2,252	6,004	5.50	2.75	0.25	50-304
	06SH-xA2x	2			0.81	2,401	3,602	9,604			0.36	60-304
1/2"	08SH-xA00	0			0.82	80	----	----			0.39	----
	08SH-xA1x	1	24 x 7 x 0.020	96	0.92	2,194	3,291	8,776	8.00	4.0	0.63	74-304
	08SH-xA2x	2			1.02	3,510	5,265	14,040			0.87	88-304
3/4"	12SH-xA00	0			1.21	70	----	----			0.48	----
	12SH-xA1x	1	36 x 6 x 0.020	92	1.31	1,311	1,967	5,244	8.00	4.0	0.79	126-304
	12SH-xA2x	2			1.41	2,098	3,147	8,392			1.10	140-304
1"	16SH-xA00	0			1.50	40	----	----			0.79	----
	16SH-xA1x	1	36 x 8 x 0.020	95	1.60	1,069	1,604	4,276	9.00	4.50	1.20	164-304
	16SH-xA2x	2			1.70	1,710	2,565	6,840			1.61	178-304
1-1/4"	20SH-xA00	0			1.85	33	----	----			1.02	----
	20SH-xA1x	1	48 x 6 x 0.025	95	1.97	1,110	1,665	4,445	10.00	5.0	1.66	214-304
	20SH-xA2x	2			2.10	1,776	2,664	7,104			2.30	232-304
1-1/2"	24SH-xA00	0			2.17	20	----	----			1.36	----
	24SH-xA1x	1	48 x 7 x 0.025	95	2.30	868	1,302	3,472	10.00	5.0	2.11	258-304
	24SH-xA2x	2			2.43	1,388	2,082	5,552			2.86	276-304
2"	32SH-xA00	0			2.51	15	----	----			1.60	----
	32SH-xA1x	1	48 x 9 x 0.025	95	2.64	810	1,215	3,240	11.50	5.75	2.56	304-304
	32SH-xA2x	2			2.76	1,296	1,944	5,184			3.52	324-304
2-1/2"	40SH-xA00	0			3.23	10	----	----			2.00	----
	40SH-xA1x	1	72 x 7 x 0.025	96	3.36	578	867	2,312	24.00	12.0	3.12	RB-2.5-S16-04
	40SH-xA2x	2			3.49	925	1,388	3,700			3.30	RB-2.5-S16-04
3"	48SH-xA00	0			3.78	10	----	----			2.97	----
	48SH-xA1x	1	72 x 9 x 0.025	88	3.91	540	810	2,160	28.00	14.0	4.42	RB-3-S16-04
	48SH-xA2x	2			4.03	864	1,296	3,456			5.87	RB-3-S16-04
4"	64SH-xA00	0			4.81	8	----	----			3.10	----
	64SH-xA1x	1	72 x 9 x 0.025	89	4.93	333	500	1,332	40.00	20.0	4.55	RB-4-S16-04
	64SH-xA2x	2			5.05	533	800	2,132			6.00	RB-4-S16-04
6"	96SH-xA00	0			6.87	5	----	----			3.85	----
	96SH-xA1x	1	96 x (13 x 0.025)	89	7.10	266	399	1,064	48.00	24.0	6.45	RB-6-S16-06
	96SH-xA2x	2			7.33	425	638	1,700			9.05	RB-6-S16-06

SH \_\_\_\_\_ -A \_\_\_\_\_  
 Hose Alloy Code    Braid Code    Braid Alloy Code

Hose Alloy Code: A = 321 Stainless  
 C = 316L Stainless  
 Braid Code: 0 = No Braid  
 1 = Single Braid  
 2 = Double Braid  
 Braid Alloy Code: 0 = No Braid  
 1 = 304 Stainless  
 6 = 316L Stainless

Example: 04SH-AA11 =  
 1/4" SH Series 321 Hose with Single 304 Braid

SM Series shown on page 4.

SM \_\_\_\_\_ -A \_\_\_\_\_  
 Hose Alloy Code    Braid Code    Braid Alloy Code

Hose Alloy Code: A = 321 Stainless  
 C = 316L Stainless  
 Braid Code: 0 = No Braid  
 1 = Single Braid  
 2 = Double Braid  
 Braid Alloy Code: 0 = No Braid  
 1 = 304 Stainless  
 6 = 316L Stainless

Example: 04SM-AA11 =  
 1/4" SM Series 321 Hose with Single 304 Braid

## Pump Connectors

FF SERIES: PUMP CONNECTORS						
HOSE I.D.	PHI Catalog No.	Overall Length	Live Length	Fitting Length (each end)	Working Pressure PSI @70°F*	Weight per unit
2"	FF-32	9"	5-3/4"	5/8"	400	11
2-1/2"	FF-40	9"	5-3/4"	5/8"	285	14
3"	FF-48	9"	5-3/4"	5/8"	240	15
4"	FF-64	9"	5-3/4"	5/8"	260	22
5"	FF-80	11"	7-1/2"	3/4"	220	29
6"	FF-96	11"	7-1/2"	3/4"	200	36
8"	FF-128	12"	8"	1"	190	60
10"	FF-160	13"	9"	1"	165	85
12"	FF-192	14"	10"	1"	125	120



### SPECIFICATIONS

- Plate Flanges: ASA 150 lb. Standard Carbon Steel
- Stainless Steel Hose
- Stainless Steel Single Braid

Optional:

- 300 lb. or 600 lb. Flanges
- Double Braid

Larger sizes available. Please contact factory.

MM SERIES: PUMP CONNECTORS						
HOSE I.D.	PHI Catalog No.	Overall Length	Live Length	Fitting Length (each end)	Working Pressure PSI @70°F*	Weight per unit
1/2"	MM-8	6-1/2"	2-1/4"	1-1/2"	1125	.60
3/4"	MM-12	7"	2-1/4"	1-1/2"	760	.80
1"	MM-16	8"	3"	1-3/4"	525	1.0
1-1/4"	MM-20	8-1/2"	3"	2"	490	1.5
1-1/2"	MM-24	9"	3-1/2"	2"	450	2.0
2"	MM-32	10-1/2"	4-1/2"	2-1/4"	400	2.7
2-1/2"	MM-40	12"	5-1/2"	2-1/2"	285	4.0
3"	MM-48	14"	6-1/2"	3"	240	6.0
4"	MM-64	16"	7"	3-1/2"	260	9.0



### SPECIFICATIONS

- Male NPT End Connections, Carbon Steel Schedule 40
- Stainless Steel Hose
- Stainless Steel Single Braid

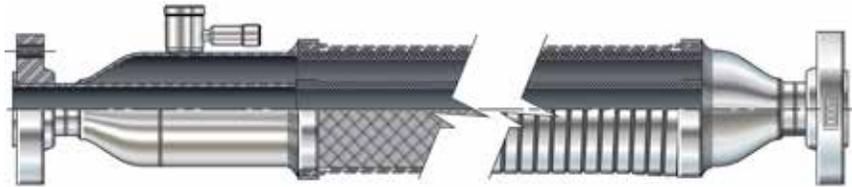
Optional:

- Schedule 80 Fittings
- Stainless Steel Fittings
- Hex Nut Attachment
- Double Braid

Larger sizes available. Please contact factory.

\*To calculate pressure at elevated temperatures, see page 12 for Temperature Correction Factors Table.

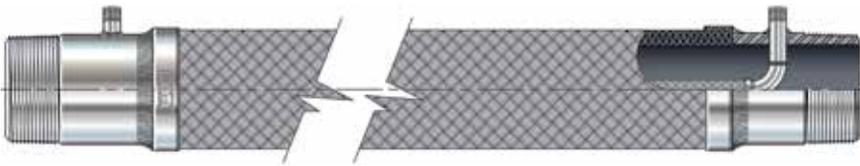
# Special Application Assemblies



## JACKETED ASSEMBLY

Jacketed assemblies are normally used in one of the following applications:

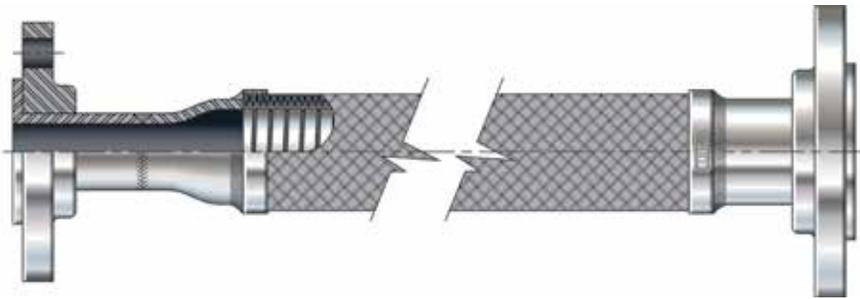
1. As a heated transfer line for those products, such as Sulphur, which must be maintained at an elevated temperature in order to flow readily. Steam or hot oil is circulated through the jacket, which in turn heats the product being conveyed in the core hose.
2. As a cryogenic transfer line, maintaining a high vacuum in the jacket effectively insulates cryogenic liquids being conveyed in the core hose.



## TRACED ASSEMBLY

Traced Hose assemblies are used:

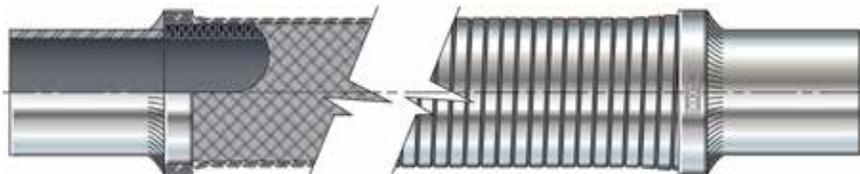
When the product being conveyed must be heated in order to flow freely. Steam or hot oil circulated through the inner tracer hose heats the product in order to maintain flow rates.



## LINED ASSEMBLY

Lined hose assemblies are used:

When high flow rate of the conveyed product could cause resonant vibration in an unlined corrugate metal hose.



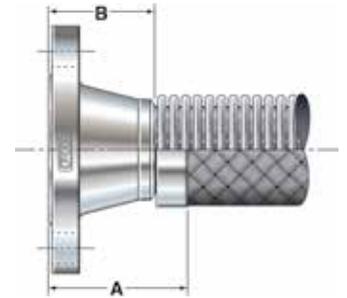
## GUARDED ASSEMBLY

Guarded assemblies are used:

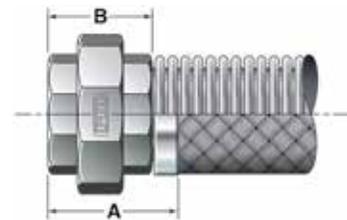
Where a corrugated metal hose could be damaged by rough handling, abrasion, or over-bending.

## Hose Fittings

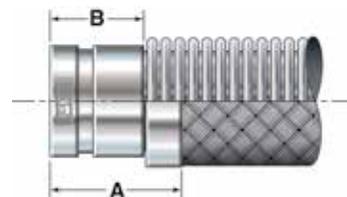
WELDED NECK FLANGE:						Stainless Steel / Carbon Steel								
HOSE SIZE	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6	8	10	12
<b>A</b>	2.50	2.81	2.93	3.00	3.19	3.25	3.75	3.75	4.00	4.50	4.50	5.00	5.00	5.50
<b>B</b>	1.88	2.06	2.19	2.25	2.44	2.50	2.75	2.75	3.00	3.50	3.50	4.00	4.00	4.50



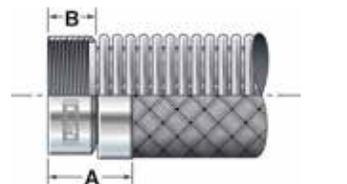
FEMALE UNION:						Stainless Steel / Carbon Steel					
HOSE SIZE	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	1.84	2.11	2.35	2.77	2.94	3.01	3.22	3.50	4.25	4.54	4.90
<b>B</b>	1.46	1.61	1.72	2.02	2.19	2.26	2.47	2.75	3.25	3.54	3.90



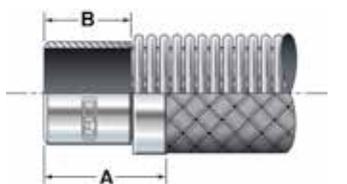
GROOVED END FITTING:						Stainless Steel / Carbon Steel			
HOSE SIZE	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	2.63	2.75	2.75	2.75	2.75	2.75	3.00	3.00	3.00
<b>B</b>	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00



FEMALE PIPE COUPLING:						Stainless Steel / Carbon Steel					
HOSE SIZE	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	0.81	0.97	1.22	1.42	1.50	1.62	1.62	1.77	2.18	2.30	2.57
<b>B</b>	0.43	0.47	0.59	0.67	0.75	0.87	0.87	1.02	1.18	1.30	1.57

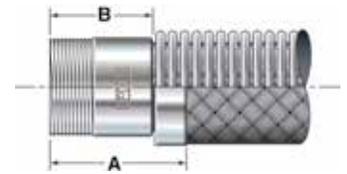


WELD NIPPLE / 37-1/2°:						Stainless Steel / Carbon Steel					
HOSE SIZE	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	1.88	2.00	2.63	2.75	2.75	3.25	3.25	3.25	4.00	4.00	4.00
<b>B</b>	1.50	1.50	2.00	2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.00

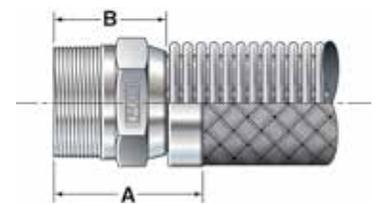


# Hose Fittings

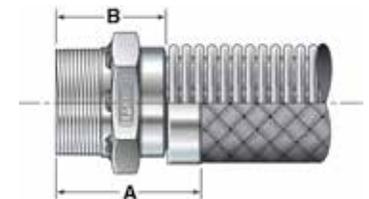
MALE PIPE NIPPLE: Sch 40 (Sch 80 Available) Stainless Steel / Carbon Steel											
HOSE SIZE	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	1.88	2.00	2.63	2.75	2.75	3.25	3.25	3.25	4.00	4.00	4.00
<b>B</b>	1.50	1.50	2.00	2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.00



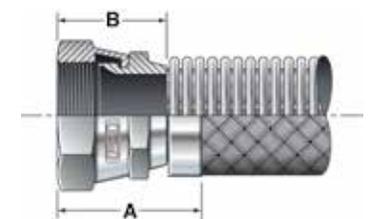
MALE HEX NIPPLE: Stainless Steel / Carbon Steel									
HOSE SIZE	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	
<b>A</b>	1.66	1.78	2.13	2.31	2.50	2.53	2.69	2.72	
<b>B</b>	1.28	1.28	1.50	1.56	1.75	1.78	1.94	1.97	



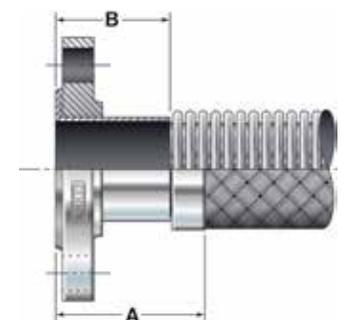
MALE PIPE NIPPLE W/ HEX NUT: Stainless Steel / Carbon Steel							
HOSE SIZE	1	1-1/4	1-1/2	2	2-1/2	3	4
<b>A</b>	2.75	3.25	3.25	3.25	4.00	4.00	4.00
<b>B</b>	2.00	2.50	2.50	2.50	3.00	3.00	3.00



FEMALE JIC: Stainless Steel / Carbon Steel									
HOSE SIZE	1/4	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2	2
<b>A</b>	1.70	1.89	2.16	2.38	2.49	2.68	2.80	3.00	3.32
<b>B</b>	1.33	1.39	1.53	1.63	1.74	1.93	2.05	2.25	2.57



SCH 10/TYPE C STUB END WITH FLOATING FLANGE: Stainless Steel														
HOSE SIZE	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	5	6	8	10	12
<b>A</b>	2.63	2.75	2.75	2.75	2.75	3.25	3.50	3.50	4.00	4.00	4.50	5.00	6.00	7.00
<b>B</b>	2.00	2.00	2.00	2.00	2.00	2.50	2.50	2.50	3.00	3.00	3.50	4.00	5.00	6.00



## Live Hose Length Bending Table

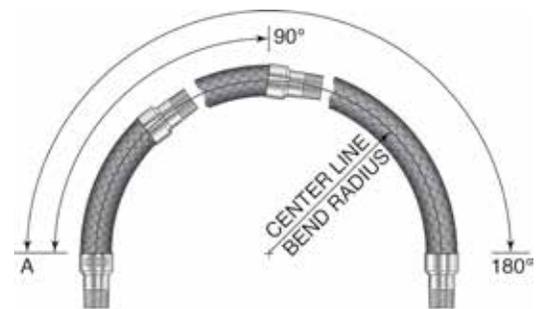
Centerline Bend Radius in Inches	MINIMUM LIVE LENGTH		
	45°	90°	180°
1	1	2	4
2	2	3 1/2	7
3	2 1/2	5	10
4	3 1/2	6 1/2	13
5	4	8	16
6	5	10	20
7	5 1/2	11	22
8	6 1/2	13	26
9	7 1/2	14 1/2	29
10	8	16	32
11	9	18	36
12	10	19 1/2	39
13	10 1/2	21	42
14	11 1/2	22 1/2	45
15	12	24	48
16	13	26	52
17	13 1/2	27	54
18	14 1/2	29	58
19	15 1/2	30 1/2	61
20	16	32	64
21	17	33 1/2	67
22	17 1/2	35	70
23	18 1/2	36 1/2	73
24	19	38	76
25	20	40	80

Centerline Bend Radius in Inches	MINIMUM LIVE LENGTH		
	45°	90°	180°
26	21	42	83
27	21 1/2	43	86
28	22 1/2	44 1/2	89
29	23	46	92
30	24	48	95
31	24 1/2	49	98
32	25 1/2	51	101
34	27	54	108
36	28 1/2	57	114
38	30	60	120
40	9	18	36
45	36	72	144
50	40	80	160
55	45	90	180
60	49	97	194
65	53	105	210
70	56	112	224
80	65	130	260
90	73	145	290
100	80	160	320
120	95	190	380
140	112	225	450
160	128	255	510
180	143	285	570
200	160	320	640

**IMPORTANT NOTES:**

**Determine the centerline bend radius required for your application.**

- Under the column headed "Centerline Bend Radius in Inches," find your radius and read horizontally to the desired degree of bend (45°, 90°, or 180°).
- The number in that column will be the minimum live length required to make that degree of bend along the desired centerline radius.
- Note: Add fitting and braid sleeve length to dimension "A" to each end of hose for overall length.



# Live Hose Length for Lateral Offset Motion

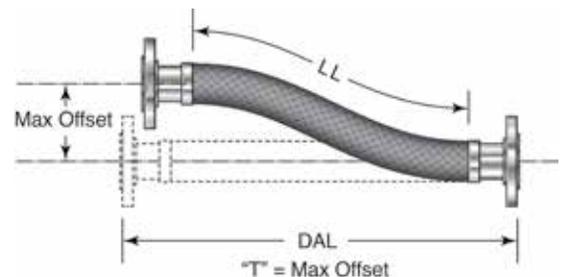
Centerline Bend Radius in Inches	Maximum Distance "T" One Side of Centerline													
	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	5"	6"	8"	10"
5	2	3	3 1/2	4	5	6	7	7 3/4	10 1/4	12 1/4	13 1/2	15	18	20 1/2
6	2 1/4	3 1/4	3 3/4	4 1/4	5 1/4	6 1/4	7 1/2	8 1/4	10 3/4	12 3/4	14 1/4	16	19	21 1/2
7	2 3/8	3 3/8	4	4 3/4	5 3/4	6 3/4	8 1/4	9 1/4	11 1/2	13 1/2	15 1/4	17	19 3/4	23
8	2 1/2	3 1/2	4 1/4	5	6	7	8 3/4	10	12 1/2	14 1/2	16 1/4	18	21 1/2	24 1/4
9	2 5/8	3 3/4	4 1/2	5 1/4	6 1/2	7 1/2	9 1/4	10 3/4	13 1/4	15 1/4	17	19	22 1/2	25 1/2
10	2 3/4	4	4 3/4	5 1/2	6 3/4	8	9 3/4	11 1/4	13 3/4	16	18	20	23 1/2	26 1/2
11	2 7/8	4 1/8	5	5 3/4	7 1/4	8 1/4	10 1/4	11 3/4	14 1/2	16 3/4	18 3/4	20 3/4	24 1/2	27 1/2
12	3	4 1/4	5 1/4	6	7 1/2	8 1/2	10 1/2	12 1/4	15	17 1/2	19 1/2	21 1/2	25 1/2	28 3/4
13	3 1/8	4 1/2	5 1/2	6 1/4	7 3/4	9	10 3/4	12 3/4	15 3/4	18	20 1/4	22 1/2	26 1/4	29 3/4
14	3 1/4	4 3/4	5 3/4	6 1/2	8	9 1/4	11 1/4	13 1/4	16 1/4	18 3/4	21	23 1/2	27 1/4	30 3/4
15	3 3/8	4 7/8	5 7/8	6 3/4	8 1/4	9 3/4	11 3/4	13 1/2	16 3/4	19 1/4	21 3/4	24 1/4	28	31 3/4
16	3 1/2	5	6	7	8 1/2	10	12 1/4	14	17 1/4	20	22 1/2	25	29	32 3/4
17	3 5/8	5 1/8	6 1/4	7 1/4	8 3/4	10 1/4	12 1/2	14 1/2	17 3/4	2 1/2	23 1/4	25 1/2	29 3/4	33 1/2
18	3 3/4	5 1/4	6 1/2	7 1/2	9	10 1/2	13	15	18 1/4	21 1/4	24	26	30 1/2	34
19	3 7/8	5 3/8	6 5/8	7 3/4	9 1/4	10 3/4	13 1/4	15 1/4	18 3/4	21 3/4	24 1/2	26 3/4	31 1/4	35
20	4	5 1/2	6 3/4	8	9 1/2	11	13 1/2	15 3/4	19 1/4	22 1/2	25	27 1/2	32 1/4	36 1/4
22	4 1/8	5 3/4	7	8 1/4	9 3/4	11 1/2	14	16 1/4	20	23 1/4	25 3/4	28 1/2	33 1/2	37 1/2
24	4 1/4	6	7 1/4	8 1/2	10	12	14 1/2	17	20 3/4	24	26 1/2	29 1/2	34 3/4	39
26	4 3/8	6 1/4	7 1/2	8 3/4	10 1/2	12 1/2	15	17 1/2	21 1/2	25	27 3/4	30 3/4	36	40 1/4
28	4 1/2	6 1/2	7 3/4	9	11	13	15 3/4	18 1/4	22 1/2	26	29	32	37 1/2	41 1/2
30	4 3/4	6 3/4	8 1/4	9 1/2	11 3/4	13 1/2	16 1/2	19	23 1/2	27 1/4	30 1/2	33 1/2	39	43 3/4
35	5 1/4	7 1/4	9	10 1/4	12 1/2	14 1/2	18	20 3/4	26 1/4	29 1/2	32 3/4	36	42	47
40	5 1/2	7 3/4	9 1/2	11	13 1/2	15 1/2	19	22	27	31 1/4	35	38 1/2	44 3/4	50
45	6	8 1/4	10	11 3/4	14 1/4	16 1/2	20 3/4	23 1/2	28 1/2	33 1/4	37	41	47 1/2	53
50	6 1/4	8 3/4	10 3/4	12 1/4	15	17 1/2	21 1/2	24 3/4	30	35	39	43	50	56
60	6 3/4	9 1/2	11 3/4	13 1/2	16 1/2	19	23 1/4	27	33	38 1/4	43	47	54 1/2	61
70	7 1/4	10 1/4	12 3/4	14 3/4	17 3/4	20 1/2	25 1/4	29	35 1/2	41 1/2	46	51	58 3/4	65 3/4
80	7 3/4	11	13 1/2	15 1/2	19	22	27	31	38	44	49 1/2	54	62 3/4	70
90	8 1/4	11 3/4	14 1/4	16 1/2	20 1/4	23 1/2	28 1/2	33	40 1/2	46 3/4	52	57 1/4	66 1/4	74 1/4
100	8 3/4	12 1/4	15	17 1/2	21 1/4	24 1/2	30	35	42 1/2	49 1/4	55	60 1/2	69 3/4	78 1/4

### ASSEMBLY LENGTH (Live Length and Overall Length)

The live length and overall length of the assembly must be determined to complete the design. The live length is the flexible portion of an assembly; after the live length has been determined by adding the dimensions of the end fittings.

### IMPORTANT NOTES

The values shown in the shaded portion of this chart are applicable to static bends only. For intermittent flexing, the offset motion should never be greater than 25% of the centerline bend radius.



## TEMPERATURE CORRECTION FACTORS

### Temperature Correction Factors for Elevated Temperature Applications

As the service temperature increases, the maximum pressure a hose assembly 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.

**Multiply the listed correction factor times the hoses room temperature rating to determine elevated temperature maximum working pressure.**

Temp °F	Material					
	304, 316L Stainless	321 Stainless	Bronze	Monel	Hastelloy	Inconel
Room	1.00	1.00	1.00	1.00	1.00	1.00
150	0.96	0.97	0.92	0.93	0.97	0.99
200	0.92	0.94	0.89	0.90	0.94	0.98
250	0.91	0.92	0.86	0.87	0.92	0.97
300	0.86	0.88	0.83	0.83	0.91	0.97
350	0.85	0.86	0.81	0.82	0.89	0.96
400	0.82	0.83	0.78	0.79	0.87	0.95
450	0.80	0.81	0.75	0.77	0.86	0.94
500	0.77	0.78	---	0.73	0.85	0.94
600	0.73	0.74	---	0.72	0.84	0.92
700	0.69	0.70	---	0.71	0.82	0.90
800	0.64	0.66	---	0.70	0.81	0.89
900	---	0.62	---	---	0.79	0.87
1000	---	0.60	---	---	0.78	0.86
1100	---	0.58	---	---	0.75	0.84
1200	---	0.55	---	---	0.73	0.82
1300	---	0.50	---	---	0.69	0.79
1400	---	0.44	---	---	0.65	0.77
1500	---	0.40	---	---	---	0.74

## SATURATED STEAM PRESSURE TEMPERATURE

Vacuum HG

Saturated Steam	Temperature °F						
----	0	15	250	90	331	300	422
----	20	20	259	95	335	350	436
29.74	32	25	267	10	338	400	448
29.67	40	30	274	102	341	450	460
29.40	60	35	281	110	344	500	470
28.89	80	40	287	115	347	600	489
27.99	100	45	292	120	350	700	505
26.48	120	50	298	125	353	800	520
24.04	140	55	303	130	356	900	520
20.27	160	60	307	150	366	1000	546
14.63	180	65	312	175	377	1250	574
6.46	200	70	316	200	388	1500	606
0	212	75	320	225	397	2500	669
5	227	80	324	250	406	3000	696
10	238	85	328	275	414	3191	705

# Technical Data

## FLOW VELOCITY:

### When to use Liners

Liquid or gas applications conveying media at high velocity should use an interlock liner in the hose assembly. This liner will decrease the turbulence caused by the high velocity and reduce the vibration that will occur. A liner is recommended if the velocity is greater than the following:

Media	Hose Alignment	Maximum Velocity NO Liner (ft./sec.)
liquid	straight	70
liquid	45° bend	55
liquid	90° bend	35
gas	straight	140
gas	45° bend	110
gas	90° bend	70

## Conversion Formulas

Definitions	Feet Per Second (ft./sec.)
gph: gallons per hour	$(gph \div ID^2) \times 0.0068$
gpm: gallons per minute	$(gpm \div ID^2) \times 0.4083$
cfh: cubic feet per hour	$(cfh \div ID^2) \times 0.0509$
cfm: cubic feet per minute	$(cfm \div ID^2) \times 3.0558$
cfs: cubic feet per second	$(cfs \div ID^2) \times 183.35$

## PRESSURE:

### Maximum Rated Working Pressure

The maximum pressure that a hose should be subjected to on a continuous basis. We established this rating by multiplying the nominal rated burst pressure by 25%. Our catalog pressure is calculated at 70°F.

### Maximum Rate Test Pressure

The maximum pressure a hose should be subjected to during proof pressure or system testing. Hose corrugation deformation will occur if the maximum rated test pressure is exceeded. The maximum rate working pressure is multiplied by 150% to determine the maximum rated test pressure.

### Nominal Rate Burst Pressure

The average pressure at which the core or braid will rupture at ambient temperature. Correct hose assembly fabrication procedure must be used to ensure the hose will meet our catalog pressures.

### Pulsating or Shock Pressure

The performance of metal hose can be greatly reduced under this type of working pressure. Pressures are normally reduced by 50% in pulsating or shock pressure applications.

## Pressure/Temperature Correction

Metal hose pressure capabilities decrease as the temperature increases. Consult the temperature correction factor table to determine pressure rating at elevated temperatures.

## Safety Factors

The maximum working pressure should not be greater than 25% of the nominal rated burst pressure after correcting for the application temperature. The safety factor is generally expressed as a ratio of 4:1.

## Pressure Drop

Pressure drop occurs in long hose runs. The amount of pressure loss is approximately 3 times that of steel pipe.

## MEDIA:

Our metal hose assembly engineer must know what the hose will convey. Matching the application piping material is sometimes used as a guide in selecting the alloy for the metal hose. Metal hose is manufactured from thin wall material and may not have the same total life a heavier wall tube or pipe of the same material. Some factors to be considered when designing metal hose assemblies include corrosion, abrasion, and viscosity of the media conveyed.

## Corrosion

Material selection of the core and braid should take into consideration the corrosive nature of the media conveyed by the hose assembly and the outside environment.

## Abrasion

For internal abrasion, premature failure can occur if the media is abrasive. The use of interlock liner may extend the life of a hose assembly. For external abrasion, a protective cover may be used to extend hose life. This cover is normally stainless steel interlock hose. See our catalog page 7.

## Viscosity

Flow of viscous media can be enhanced by incorporating the use of a jacketed hose assembly. This design utilizes an inner hose that is encapsulated by an outer hose. See our catalog page 7.

## TEMPERATURE:

### Operating Temperature

Each hose material had unique temperature capabilities. Consult Temperature Correction Factor table for temperatures.

## TESTING:

Standard testing of the weld and structural components of the hose assembly include hydrostatic testing and pneumatic testing (All of our hose assemblies are 100% tested). Other testing methods used include mass spectrometer, cold shock and dye penetration.

## Corrosion Resistance

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Acetaldehyde	C <sup>2</sup>	A	B	A	A
Acetanilide	B <sup>3</sup>	B	B	B	B
Acetic Acid	C	B	C	B <sup>1</sup>	A <sup>1</sup>
Acetic Anhydride	B	B	C	B	B
Acetone	A	A	C	B	B
Acetophenone	A	A	A	B	B
Acetylene	C <sup>2</sup>	A	A	A	A
Acrylates	B	B	B	B	B
Acrylic Acid	B	B	C	B	B
Acrylonitrile	A <sup>4</sup>	A	A	A	A
Alcohols	A <sup>5</sup>	A	A <sup>5</sup>	A	A
Alum	B	B	B	B	B
Alumina	A	A	A	A	A
Aluminum Acetate	B	B	B	B	B
Aluminum Chloride-Dry	B <sup>1</sup>	A	B	A	A
Aluminum Chloride-Moist	C	B	C <sup>3</sup>	C <sup>3,4</sup>	C <sup>3</sup>
Aluminum Fluoride	B	B	B	C	C
Aluminum Hydroxide	B	B	B	A	A
Aluminum Sulfate	C	B	C	B <sup>1,3</sup>	A <sup>3</sup>
Ammonia-Dry	A	A	A	A	A
Ammonia-Moist	C <sup>3</sup>	C	C <sup>3</sup>	A	A
Ammonium Acetate	C	A	A	A	A
Ammonium Bromide	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Ammonium Chloride-Dry	C <sup>4</sup>	A	B	A	A
Ammonium Chloride-Moist	C <sup>4</sup>	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Ammonium Hydroxide 6	C <sup>3</sup>	A	B	A	A
Ammonium Nitrate	C <sup>2</sup>	C <sup>2</sup>	C <sup>3</sup>	A	A
Ammonium Sulfate	C	B	C	C <sup>1</sup>	B
Amyl Acetate	A	A	A	A	A
Amyl Alcohol	A	A	A	A	A
Amyl Chloride-Dry	A	A	B	A	A
Amyl Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Aniline	C <sup>3</sup>	A	C	B	B
Aniline Dyes	C <sup>3</sup>	A	C	B	B
Asphalt	A	A	A	A	A
Atmosphere-Industrial	A	A	C	B <sup>4</sup>	A <sup>4</sup>
Atmosphere-Marine	A	A	C	B <sup>4</sup>	B <sup>4</sup>
Atmosphere-Rural	A	A	C	A	A
Barium Carbonate	B	B	B	B	B
Barium Chloride-Dry	B	A	A	A	A
Barium Chloride-Moist	B	B	B	C <sup>3,4</sup>	C <sup>3</sup>
Barium Hydroxide	C	B	B	B	A
Barium Sulfate	B	B	B	B	B
Barium Sulfide	C	C	C	B	B
Beer	A	A	C	A	A
Beet Sugar Syrups	A	A	B	A	A
Benzaldehyde	C	B	C	B	B
Benzene (Benzol)	A	A	A	A	A
Benzolc Acid	A	B	C	A	A
Benzylamine	C	B	B	B	B
Benzyl Chloride-Dry	B	A	A	A	A
Benzyl Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Black Liquor, Sulfate Process	C	A	C	B	B
Bleaching Powder-Dry	B <sup>1</sup>	A	C	A	A

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Bleaching Powder-Moist	B	B	C	C <sup>1,3,4</sup>	C <sup>3,4</sup>
Borax	A	A	B	A	A
Bordeaux Mixture	B	A	B	A	A
Boric Acid	B	B	C	A	A
Boron Trichloride-Dry	B	B	A	B	B
Boron Trichloride-Moist	B	B	B	C <sup>3,4</sup>	C <sup>3</sup>
Boron Trifluoride-Dry	B	B	A	B	B
Brines	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Bromic Acid	C	C	C	C	C
Bromine-Dry	A	A	C	B	B
Bromine-Moist	B	B	C	C	C
Butladene	A	A	A	A	A
Butane	A	A	A	A	A
Butano (Butyl Alcohol)	A	A	A <sup>5</sup>	A	A
Butyl Phenois	B	A	B <sup>5</sup>	B	B
Butylamine	C <sup>3</sup>	A	A	A	A
Butric Acid	B	B	C	B	B
Cadmium Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Cadmium Chloride-Dry	B	A	A	A	A
Cadmium Sulfate	B	A	B	A	A
Calcium Bisulfite	B	B	B	B <sup>1</sup>	B
Calcium Bromide	B	B	C	C <sup>3</sup>	C <sup>3</sup>
Calcium Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Calcium Chloride-Dry	B	A	A	A	A
Calcium Fluoride	B	B	C	C	C
Calcium Hydroxide	B	B	C	B	B
Calcium Hypochlorite-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3,4</sup>
Calcium Hypochlorite-Dry	B	A	B	A	A
Calcium Nitrate	B	B	C <sup>1</sup>	B <sup>1</sup>	B
Calcium Oxide	A	A	A	A	A
Cane Sugar Syrups	A	A	B	A	A
Carbolic Acid (Phenol)	B	B	C	B	A
Carbon Dioxide-Dry	A	A	A	A	A
Carbon Dioxide-Moist	C <sup>4</sup>	A	C	A	A
Carbonated Beverages	B	A	C	A	A
Carbonated Water	B <sup>4</sup>	A	C	A	A
Carbon Disulfide	B	B	B	B	B
Carbon Tetrachloride-Dry	A	A	B	A	A
Carbon Tetrachloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>4</sup>
Castor Oil	A	A	A	A	A
Chlorine-Dry	A	A	B	A	A
Chlorine-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Chloroacetic Acid	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Chloric Acid	C	C	C	C <sup>3</sup>	C <sup>3</sup>
Chlorine Dioxide-Dry	B	A	B	A	A
Chlorine Dioxide-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Chloroform-Dry	A	A	A	A	A
Chloroform-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Chromic Acid	C	B	C <sup>3</sup>	C <sup>1,4</sup>	B
Chromic Fluorides	C	B	C	C	C
Chromic Hydroxide	B	B	B	B	B
Chromium Sulfate	B	B	C	B	B
Cider	A	A	C	A	A
Citric Acid	C	B	C	B	B

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Coffee	A	A	C	A	A
Copper Chloride-Dry	A	A	B	A	A
Copper Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Copper Nitrate	C	C	C	A	A
Copper Sulafte	C	B	C	B <sup>1</sup>	B
Corn Oil	A	A	A	A	A
Cottonseed Oil	A	A	A	A	A
Creosole	B	A	A	A	A
Crude Oil	B	A	C	C <sup>1</sup>	B
Cyclohexane	B	B	B	B	B
DDT	B	B	C	A	A
Dichloroethane-Dry	A	A	A	A	A
Dichloroethane-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Dichloroethylene-Dry	A	A	B	A	A
Dichloroethylene-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Dichlorophenol	B	B	C	B <sup>2</sup>	B <sup>2</sup>
Diisocyanate	B	A	B	A	A
Dimethyl Sulfate	B	B	B	B	B
Epichlorohydrin-Dry	B <sup>4</sup>	A	C <sup>4</sup>	A	A
Epichlorohydrin-Moist	C	B	C <sup>4</sup>	C <sup>3,4</sup>	C <sup>3</sup>
Ethane	A	A	A	A	A
Ethers	A	A	B	A	A
Ethyl Acetate	A	B	B	B	B
Ethyl Alcohol	A	A	A	A	A
Ethyl Benzene	B <sup>5</sup>	B	B	B <sup>3</sup>	B
Ethyl Chloride-Dry	A	A	A	A	A
Ethyl Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3,4</sup>
Ethylene	A	A	A	A	A
Ethylene Chlorohydrin-Dry	B	A	B	A	A
Ethylene Chlorohydrin-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Ethylene Diamine	C	B	B	B	B
Ethylene Glycol	A	A	A	A	A
Ethylene Oxide	C <sup>2</sup>	B	B	A	A
Fatty Acids	C	B	C	B <sup>1,4</sup>	A
Ferric Chloride-Dry	B	A	B	A	A
Ferric Chloride-Moist	A	B	C	C <sup>1,3,4</sup>	C <sup>3,4</sup>
Ferric Nitrate	C	C	C	B	B
Ferric Sulfate	C	C	C	B <sup>1</sup>	A
Ferrus Chloride-Dry	B	A	B	A	A
Ferrus Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Ferrus Sulfate	B	A	C	B <sup>4</sup>	B
Fluorine-Dry	B	A	A	A	A
Fluorine-Moist	C	B	C	C	C
Formaldehyde	A <sup>5</sup>	A <sup>5</sup>	B <sup>5</sup>	B	B
Formic Acid	B	B	C	B <sup>1</sup>	A
Freon	A	A	A	A	A
Fruit Juices	C	A	C	A	A
Fuel Oil	B	A	C	A	A
Furtural	A	A	B	A	A
Gasoline	A	A	B	A	A
Gelatine	A	A	C	A	A
Glucose	A	A	B	A	A
Glue	B	A	C	A	A
Glutamic Acid	C <sup>4,5</sup>	B	C	B <sup>3,4</sup>	B <sup>3,4</sup>

# Corrosion Resistance

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Glycerin (Glycerol)	A	A	B <sup>5</sup>	A	A
Heptane	A	A	A	A	A
Hexachloroethane-Dry	B	A	B	A	A
Hexachloroethane-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Hydrazine	C <sup>3</sup>	C	C	A	A
Hydrobromic Acid	C	C	C	C <sup>4</sup>	C
Hydrocarbons, Pure	A	A	A	A	A
Hydrochloric Acid	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Hydrocyanic Acid	C	B	C <sup>3</sup>	C <sup>1,3</sup>	C <sup>3</sup>
Hydrofluoric Acid	C	B	C	C <sup>1,3</sup>	C
Hydrofluorosilicic Acid	C	B	C	C	C
Hydrogen	A	A	A	A	A
Hydrogen Chloride-Dry	A	A	B	A	A
Hydrogen Chloride-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Hydrogen Peroxide	C	C	C	B	B
Hydrogen Sulfide-Dry	A <sup>5</sup>	A	B	A	A
Hydrogen Sulfide-Moist	C <sup>4,5</sup>	B	C <sup>3</sup>	B <sup>4</sup>	A
Hydroquinone	B	B	B <sup>5</sup>	B	B
Kerosine	A	A	B	A	A
Lacquers	A	A	A	A	A
Lacquer Solvents	A	A	A	A	A
Lactic Acid	B	B	C	B <sup>1,4</sup>	B <sup>1</sup>
Lime	A	A	B	A	A
Lime Sulfur	C	B	C	B	B
Linseed Oil	A	A	B	A	A
Lithium Chloride-Dry	B	A	B	A	A
Lithium Chloride-Moist	B	B	B	C <sup>3,4</sup>	C <sup>3</sup>
Lithium Hydroxide	C	B	B	B	B
Magnesium Chloride-Dry	B	A	B	A	A
Magnesium Chloride-Moist	B	B	C	C <sup>3,4</sup>	C
Magnesium Hydroxide	A	A	A	A	A
Magnesium Sulfate	A	A	B	B	A
Maleic Acid	C	B	B	B <sup>1</sup>	B
Mercurio Chloride-Dry	B	A	B	A	A
Mercurio Chloride-Moist	C	B	C	C <sup>3,4</sup>	C
Mercurous Nitrate	C <sup>3</sup>	B <sup>3</sup>	B	B	B
Mercury	C	B <sup>3</sup>	B	B	B
Methyl Alcohol	A	A	A	A	A
Methane	A	A	A	A	A
Methyl Chloride-Dry	A	A	A	A	A
Methyl Chloride-Moist	B	B	C	C <sup>3,4</sup>	C
Methyl Ethyl Ketone	B	B	B	B	B
Milk	B	A	C	A	A
Mine Water	C	B	C	B	B
Naphtalene	B	B	A	A	A
Natural Gas	A	A	A	A	A
Nickel Chloride-Dry	B	A	B	A	A
Nickel Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Nitric Acid	C	C	C	A	A
NitroToluene	B	B	B	B	B
Nitrogen	A	A	A	A	A
Oleic Acid	B <sup>5</sup>	A	C	B <sup>4</sup>	B
Oleum (Fuming H2SO4)	C	C	B <sup>3</sup>	B	B
Oxalid Acid	B	B	C	C <sup>1</sup>	B <sup>1</sup>

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Oxygen	A	A	C	A	A
Palmitic Acid	B	A	C	A	A
Paraffin	A	A	B	A	A
Pentane	B	B	B	B	B
Phenol	B	B	C	B	A
Phosphoric Acid	C	B	C	C <sup>1</sup>	B <sup>1</sup>
Phthalic Acid	B	B	C	B <sup>1</sup>	B
Picric Acid	C	C	C	B	B
Potassium	B	B	C	C	C
Potassium Carbonate	B	A	B	A	A
Potassium Chloride-Dry	A	A	A	A	A
Potassium Chloride-Moist	B <sup>3</sup>	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Potassium Chromate	B	B	C	B	B
Potassium Cyanide	C <sup>4</sup>	A	B	B	B
Potassium Dichromate	C	A	C	A	A
Potassium Fluoride	B	B	C	C	C
Potassium Hidroxide	C <sup>5</sup>	A <sup>3</sup>	B <sup>3</sup>	B <sup>3</sup>	A
Potassium Nitrate	B	A	B	B	A
Potassium Permanganate	B	B	B	B	B
Potassium Sulfate	B	B	C	B	B
Propane	A	A	A	A	A
Propylene	A	A	A	A	A
Propylene Oxide	C	C	C	A	A
Propylene Dichloride-Dry	B	A	B	A	A
Propylene Dichloride-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Pyridine	B <sup>5</sup>	B	B <sup>5</sup>	B	B
Pyrrolidine	C <sup>3</sup>	B	B	B	A
Quinine	B	B	C	B	B
Rosin	A <sup>5</sup>	A	C <sup>5</sup>	A	A
Sea Water	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Sewage	A	A	B	A	A
Silver Salts	C	A	C	B	B
Silver Nitrate	C	C	C <sup>3</sup>	B	A
Soap Solutions	A	A	B	A	A
Sodium	C	A	A	A	A
Sodium Bicarbonate	B	A	C	A	A
Sodium Bisulfate	B	B	C	B <sup>1,4</sup>	A
Sodium Bisulfite	C <sup>4</sup>	B <sup>4</sup>	C	B	B
Sodium Bromine	B	B	B	C	C
Sodium Carbonate	B	A	B	A	A
Sodium Chlorate-Dry	B	A	A	A	A
Sodium Chlorate-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Sodium Chloride-Dry	B	A	B	A	A
Sodium Chloride-Moist	B	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Sodium Chromate	A	A	B	A	A
Sodium Citrate	C	B	B	B	B
Sodium Cyanide	C <sup>4</sup>	B	B	B	B
Sodium Dichromate	C	B	C	A	A
Sodium Fluoride	B	A	B	C <sup>1</sup>	C
Sodium Hydroxide 6	B <sup>4</sup>	A	B <sup>3</sup>	B <sup>3</sup>	B <sup>3</sup>
Sodium Hypochlorite-Dry	B	A	B	A	A
Sodium Hypochlorite-Moist	C	B	C	C <sup>1,4</sup>	C <sup>4</sup>
Sodium Metasilicate	B	A	B	A	A
Sodium Nitrate	B	A	B <sup>3</sup>	A	A

	Bronze	Monel	Carbon Steel	304L/321 Stainless	316L Stainless
Sodium Nitrite	B	B	B	B	B
Sodium Peroxide	C	B	C	A	A
Sodium Phosphate	B	A	C	A	A
Sodium Silicate	A	A	B	A	A
Sodium Sulfate	A	A	B	B <sup>3</sup>	B
Sodium Sulfide	C	A	C	B <sup>4</sup>	B
Sodium Sulfite	B	A	C	B	B
Sodium Thiosulfate	C	A	C	B	B
Stannic Chloride-Dry	B	A	B	A	A
Stannic Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Stannous Chloride-Dry	B	A	B	A	A
Stannous Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Steam	A	A <sup>3</sup>	C	A	A
Stearic Acid	B	B	C <sup>5</sup>	B	B
Stronium Nitrate	B	B	C	B	B
Sulfate Black Liquor	C	B	B	B	B
Sulfate Green Liquor	C	B	B	B <sup>3</sup>	B
Sugar Solutions	A	A	B	A	A
Sulfur-Dry	C	A	B	A	A
Sulfur-Molten	C	C	C	C	B
Sulfur Chloride-Dry	B	A	C	A	A
Sulfur Chloride-Moist	C	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Sulfur Dioxide-Dry	B	B	C	C <sup>1</sup>	B
Sulfur Dioxide-Moist	C <sup>4</sup>	C	C	C <sup>1</sup>	B
Sulfur Trioxide-Dry	A	A	C	A	A
Sulfuric Acid 95-100%	B	B	B	A	A
Sulfuric Acid 80-95%	B	B	C	B	A
Sulfuric Acid 40-80%	C	C	C	C <sup>1</sup>	C <sup>1</sup>
Sulfuric Acid 40%	C	C	C	C <sup>1</sup>	C <sup>1</sup>
Sulturous Acid	B	B	C	C <sup>1,4</sup>	C <sup>1,4</sup>
Tall Oil	C	B	B	B	B
Tannic Acid	B	B	C <sup>5</sup>	B	B
Tar	A	A	B	A	A
Tartaric Acid	C	B	C	B	B
Tetraphosphoric Acid	C	C	C	B	B
Toluene	A	A	A	A	A
Trichloroacetic Acid	C	B	C	C <sup>3,4</sup>	C <sup>4</sup>
Trichloroethane-Dry	A	A	A	A	A
Trichloroethane-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Trichloroethylene-Dry	A	A	A	A	A
Trichloroethylene-Moist	C	B	C	C <sup>4</sup>	C <sup>4</sup>
Turpentine	A	A	B	A	A
Varnish	A	A	B	A	A
Vinegar	B	B	C	A	A
Water, Potable	A	A	C	A	A
Xylene	B	A	B	A	A
Zinc Chloride-Dry	B	A	A	A	A
Zinc Chloride-Moist	C <sup>4</sup>	B	C	C <sup>3,4</sup>	C <sup>3</sup>
Zinc Sulfate	B	B	C	B	A

NOTES: 1. Susceptible to intergranular corrosion  
 2. May cause explosive reaction  
 3. Susceptible to stress corrosion cracking  
 4. Susceptible to pitting type corrosion  
 5. Discolors  
 6. Concentration over 50% and/or temperature over 200°F, refer to our Engineering Dept.

## Corrugated Hose & Braid Part Numbers

# 04PL-AA11

ID	Hose Size	Hose Series	Hose Alloy	Hose Type	Braid	Braid Alloy
0.25	04	PL	A - 321	A - ANNULAR	0 - No Braid	0 - No Braid
0.38	06	PM	B - 304L	H - HELICAL	1 - Single Braid	1 - 304
0.50	08	SM	C - 316L		2 - Double Braid	2 - 321
0.75	12	SH	D - C/S		3 - Triple Braid	3 - BRONZE
1.00	16	SXH	E - BRONZE		4 - Quadruple Braid	4 - C/S
1.25	20	EB	F - MONEL			5 - MONEL
1.50	24	EM	G - INCONEL			6 - 316L
2.00	32	EI				7 - INCONEL
2.50	40	HL				
3.00	48	HM				
4.00	64					
5.00	80					
6.00	96					
8.00	128					
10.00	160					
12.00	192					
14.00	224					
16.00	256					
18.00	288					
20.00	320					

"C" Following 2 Letter Hose Series = Compressed Hose

"BB" Following Braid = Braided Braid, if BB is Not Standard on Series Selected

## Check out our other products

Please call the factory or visit us online to request a catalog for any of the following products:

- Corrugated Metal Hose & Braid
- Stripwound Metal Hose
- Weld Fittings & Braid Sleeves
- Metal Expansion Joints
- Rubber Expansion Joints
- Fabric Expansion Joints

If you have a special product that's not covered in one of our catalogs, please contact our engineering department for assistance. Our state of the art facility has the technology and ability to create custom products for any application requirement.

# Warranty

- 1. DEFINITION:** "Document" shall refer to these General Terms and Conditions and the Purchase Order, Invoice, or Delivery Ticket, as the case may be, printed on the face hereof.
- 2. DELIVERY:** Time is of the essence in this transaction, and if delivery of conforming Product(s) or performance of conforming services is not completed by the time(s) promised, Buyer reserves the right, in addition to its other rights and remedies, to cancel this order, to reject such Product(s) or services in whole or part on reasonable notice to Seller, and/or to purchase substitute Products or services elsewhere and charge Seller with any loss incurred. Shipments sent C.O.D. without Buyer's written consent will not be accepted and will be at Seller's risk.
- 3. PRICE:** Buyer shall not be billed at prices higher than stated herein unless authorized in writing by Buyer. Seller agrees to notify Buyer of any price reduction made in Products or services covered by this Document subsequent to the date hereof and prior to delivery or performance and agrees that any such reduction will be applicable to this Document.
- 4. TERMS:** This sale is limited of these terms and conditions. Any additional or different terms or conditions proposed by you are rejected unless we expressly agree there to in writing. A contract embodying all and only these terms and conditions shall be formed by (i) delivery of materials or goods ("Product(s)") or performance of services and (ii) acceptance of such Product(s) or services by buyer. References to this document shall, unless the context otherwise requires, include any contract resulting from this Document. No modification of this document shall be effective without our written consent. No course of prior dealings, no usage of trade, and no course of performance shall be used to modify, supplement, or explain any terms used in this Document.
- 5. PAYMENT:** All payments are due pursuant to the payment term on the face of this Document.
- 6. TERMINATION:** Buyer expressly reserves the right, in the event that this Document is issued pursuant to a prime contract with the Government or to a subcontract thereunder, to terminate the work under this Document at any time by written or telegraphic notice to Seller stating the extent and effective date of such termination, in which event the rights and obligations of the parties hereto shall be determined in accordance with the termination provisions applicable to such Government contract.
- 7. CONTINGENCIES:** Failure of either party to perform hereunder, except for the payment of money, in whole or in part, occasioned by act of God, act of the public enemy, fire, explosion, perils of sea, flood, drought, war, riot, sabotage, terrorism, accident, embargo, government priority, requisition or allocation, or any circumstance of like or different character beyond the reasonable control of the party so failing to perform, shall not subject said party to any liability to the other party for such period of time and to the extent that such contingency precludes performance.
- 8. WARRANTIES:**
  - (a) Seller makes NO WARRANTY WHATSOEVER, except as to title, with respect to any Product(s) manufactured and/or designed to Buyer's own specifications (other than mere dimensions), and Buyer shall, at its own expense, indemnify, defend and hold Seller harmless from and against any claim, suit, or expense which shall be asserted or brought against Seller by reason of its manufacture or sale of such Product(s).
  - (b) Seller makes NO WARRANTY WHATSOEVER concerning any Product(s) manufactured by others, but will extend to Buyer any warranties respecting such Product(s) as made by the manufacturer of such Product(s). Seller will repair or replace any Product(s) manufactured by Seller which prove defective within one (1) year from the date of shipment if such defects are due to defective workmanship of Seller's employees, provided that the Product(s) has or has been (i) properly assembled and utilized in accordance with Seller's design thereof and instructions relating thereto AND (ii) returned to the Seller at Buyer's expense. This warranty shall be voided by any changes made in the Product(s) prior to or in connection with their assembly or use.
  - (c) EXCEPT FOR THE EXPRESS WARRANTY DESCRIBED ABOVE THERE ARE NO WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, WHICH EXTEND BEYOND THE DESCRIPTION OF THE PRODUCT(S) ON THE FACE HEREOF NO WARRANTIES OF REPRESENTATIONS AT ANY TIME MADE BY ANY REPRESENTATIVE OF SELLER SHALL BE EFFECTIVE TO VARY OR EXTEND THE ABOVE REFERENCED EXPRESS WARRANTIES OR ANY OTHER TERMS HEREOF.
  - (d) In no event shall Seller be liable for consequential, incidental, or special damages resulting from or in any matter related to the Product(s), the design, use, or any inability to use the Product(s), including without limitation, damages arising out of or in any manner relating to the delivery of the Product(s), or any delay with respect to delivery of the Product(s). The sole and exclusive remedy with respect to any defective Product(s) manufactured by Seller shall be repair, correction, or replacement thereof pursuant to the "WARRANTY" provisions above. Should the Product(s) prove so defective, however, as to preclude the remedying of warranted defects by repair or replacement. Buyer's sole and exclusive remedy shall be the refund of the purchase price of the defective Product(s) involved, upon return of the Product(s) to Seller.
  - (e) Seller warrants that the use or sale of any Product(s) delivered hereunder, or any part thereof, except any Product(s) produced to Buyer's drawings or specifications, does not infringe any adverse valid existing patent. Seller shall indemnify, defend, and hold harmless Buyer, Buyer's customers, users of the Product(s), and any of their successors and assigns, from and against any and all liability, damage, loss, cost, or expense incurred in connection with any claim, suit, or action for actual or alleged infringement of any such patent, arising out of or in connection with the use or sale of such Product(s).
- 9. LOSS IN TRANSIT:** Title and risk of loss in transit shall pass to Buyer upon delivery to (i) Buyer or (ii) a carrier, where shipment is made F.O.B. Seller's shipping point.
- 10. ASSIGNMENT:** Either party's assignment of this Document, of any interest herein, or of any money due or to become due hereunder without the prior written consent of the other party shall be void, unless such assignment is made to an affiliate of the assigning party.
- 11. INDEPENDENT CONTRACTOR:** In performing any services hereunder, each party is and undertakes performance hereof as an independent contractor, with sole responsibility for all persons employed in connection therewith, including without limitation, exclusive liability for the payment of all Federal, State, and local Unemployment and Disability Insurance and all Social Security and/or other taxes and contributions payable in respect of such persons from and against which liability each party agrees to indemnify, defend, and hold harmless the other part.
- 12. MANNER OF PERFORMANCE:**
  - (a) Each party shall comply with all laws, regulations, and/or other requirements of local, state, and federal governments in connection with its manufacture or delivery of any Product(s) or performance of any services hereunder, including without limitation, those pertaining to financial capability responsibility and security for pollution damage and the price production sale, or delivery of the Product(s) or services. Specifically, but not by way of limitation, each party agrees to comply with Executive Order 11246 regarding equal employment opportunity, the Rehabilitation Act of 1973, the Vietnam Era Veterans Readjustment Act of 1972, the Occupational Safety and Health Act, the Fair Labor Standards Act, the Americans with Disabilities Act, and all regulations promulgated pursuant to any of the above.
  - (b) If this order involves the presence of either party on the other party's premises, such party comply with all safety, health, and security laws, regulations, and the other party's policies and shall take all necessary precautions to prevent injury or damage to persons or property while so engaged.