SPECIALTY
HOSE CORPORATION

Metal Hose Selection Factors

Pressure

Maximum Working Pressure

This is the maximum operating pressure that a hose can be subjected to. It is set at 25% of the Nominal Design Burst Pressure.

Maximum Proof Pressure

This is the maximum test pressure that a hose can be subjected to. It is set at 150% of the Maximum Working Pressure with the hose installed straight.

Hose assemblies installed in varying degrees of radial bend or parallel offset should be set at 120% of the maximum rated working pressure at 70°F or 150% of the actual operating pressure, whichever is lower.

Nominal Design Burst Pressure

This is the pressure at which the hose can be expected to rupture or burst. It is based on the minimum annealed ultimate tensile strength of the braid wire and corrugated hose alloys at 70°F, with the hose installed straight.

Pulsating or Shock Pressures

When pulsating, surge, or shock pressures exist, the peak pressure should not exceed 50% of the Maximum Working Pressure.

The hose should be installed so that there is no slack when the pressure pulse, surge, or shock occurs.

Pressure Relative to Unbraided Hose

At Maximum Working Pressure, 1 to 2½% elastic elongation will occur in unbraided hose assemblies.

To avoid squirm, unbraided hose should be unrestrained at one end, or installed so that free axial expansion due to pressure is allowed, as in a 180° loop.

Pressure Relative to Braided Hose

If appreciable internal pressure is applied to a corrugate metal hose, it will elongate unless restrained. Generally, the restraint is provided by a wire braid sheath over the hose. The braid has little effect on the bending or flexibility of the hose. However, in extremely short

lengths of braided and pressurized hose, additional bending forces may be required because of braid friction.

If the strength of the braid sheath is the limiting factor, additional working pressure may be gained by using a single braid that is heavier than the standard single braid, or by using two or more braids. However, when the hoop rupture strength of corrugated hose is the limiting factor, no additional pressure resistance is gained with additional braids.

Pressure Relative to Temperature

For operating temperatures that exceed 70°F, the tabulated pressures must be decreased in accordance with the "Conversion Factors" listed in the table below.

Since the pressure ratings are based on annealed material properties, no reduction in pressure ratings is necessary for fitting attachment by TIG welding, brazing, silver brazing, or soft shoulder.

Conversion Factors

Apply to pressure rating for elevated temperatures

TEMPERATURE			MATERIAL				
C°		F°	STAINLESS STEEL	STEEL	MONEL	BRONZE	INCONEL
20	-	70	1.00	1.00	1.00	1.00	1.00
		150	.97	.99	.93	.92	.97
		200	.94	.97	.90	.89	.94
		250	.92	.96	.87	.86	.92
150	-	300	.88	.93	.83	.83	.88
		350	.86	.91	.82	.81	.86
200	-	400	.83	.87	.79	.78	.83
		450	.81	.86	.77	.75	.81
		500	.78	.81	.73		.78
		600	.74	.74	.72		.74
		700	.70	.66	.71		.70
		800	.66	.52	.70		.66
		900	.62	.50			.62
600	-	1000	.60				
		1100	.58				
		1200	.55				
		1300	.50				
		1400	.44				
		1500	.40				
		1800					

Maximum Service Temperature of Materials

Maximum Service Temperature

ALLOY	MAXIMUM TEMP. °F.	ALLOY	MAXIMUM TEMP. °F.
Inconel 625	1800	Brazing (RCuZn-C or BCuP-2)	
AISI Stainless Steel Type:		Bronze Hose	450
321	1500	Steel Hose	850
316 ELC	1500	Silver Brazing	
304L	1500	(AWS-Bag-2)	600
304	850	Asbestos Packing Guide	
302	850	Commercial Asbestos	400
Mild Steel	850	Underwriters Asbestos	450
Malleable Iron	800	Aluminum 52S-0 (5052-0)	600
Monel	800	Galvanizing	450
Bronze	450	Soft Solder (Pb: 60, Sn: 40)	250
Brass	450	(Pb: 95, Sn: 5)	350
Copper	400		

Flow Velocity

A flexible metal liner of fully interlocked (RT) hose should be used if:

- Flow velocity exceeds 100 ft/sec gas (50 ft/sec liquid) in unbraided hose
- Flow velocity exceeds 150 ft/sec gas (75 ft/sec liquid) in braided hose

If the hose is installed in a bent condition, the flow values should be reduced by:

- 50% for a 90° bend
- 25% for a 45° bend, and so on, proportional to the angle of the bend

If the velocity exceeds the above values, the next larger size corrugated hose should be used with the flexible RT liner size equivalent to the mating pipe size.

If the amount of pressure drop through longer lengths of hose is significant, a larger diameter hose might be required. As a broad rule of thumb, pressure drop through a corrugate4d metal hose is approximately three times that in comparable size standard steel pipe.

For more accurate calculations of pressure drop, please contact us.

Motion

Most industrial applications fall into the following categories of motion:

- Angular
  - Motion that occurs when one end of a hose assembly is deflected in a simple bend with the ends not remaining parallel.
  - May be incorporated in an installation to accommodate misalignment and vibration only
  - Must not be used to accommodate expansion that would result in unloading the braid.
- Axial
  - Motion that occurs when one end of a hose assembly is deflected along its longitudinal axis.
  - Applicable to annular corrugated, unbraided flexible hose only.
  - Neither helical hose nor braided hose should be used in axial motion applications.
- Offset
  - Motion that occurs when one end of the hose assembly is deflected in a plane perpendicular to the longitudinal axis with the end remaining parallel.
  - Offset is measured in inches of displacement of the free end center line from the fixed end center line.
  - The offset should never be greater than ¼ (25%) of the minimum center line bend radius.
- Radial
  - Motion that occurs when the center line of a hose assembly is bent in a circular arc.
  - In industrial applications, radial motion is most commonly found in traveling loops.
- Random
  - Motion that is non-predictable and occurs from manual handling of a hose assembly.
  - Loading and unloading hose generally falls into this category.
  - Abusive handling of hose is an important factor to consider in applications involving random motions.

    - The use of an interlocked (RT-6 or RT-8) guard over the corrugated hose is recommended to protect the hose assembly from rough handling and "over-bending" adjacent to the end fittings.

For additional information on motion, please contact us.

Motion Frequency

The frequency of motion is divided into the following categories:

- Vibration
    - For the normal vibration encountered in industrial applications, the hose live lengths should be taken from the Minimum Live Length for Vibration Columns on Hose Data Charts
- Intermittent Motion
    - Intermittent motion is usually caused by thermal expansion and contraction or other non-continuous actions.
    - The intermittent flexing bend radius shown on Hose Technical Data Pages should be used in the formulas for angular, radial and offset motion when determining hose live length for intermittent motion.
- Continuous Motion
    - Continuous motion usually occurs on a regular cyclic basis, normally at a slow cyclic rate and constant travel.
    - For Continuous Lateral Offset Motion, double the minimum centerline bend radius that is required for Intermittent Flexing shown on Hose Technical Data Pages.
- Static Bend
    - The static bend is the minimum center line bend radius that a flexible metal hose may be bent for installation.
    - No further motion should be imposed other than normal vibration.

For additional information on motion frequency, please contact us.

Cycle Life

The cycle life expectancy of metal hose is affected by:

- Operating pressure
- Operating temperature
- Materials
- Bend radius
- The thickness of the corrugation
- The corrugation pitch
- Corrugation depth
- Shape of the corrugation

Any change in one of these factors will affect the cycle life of a metal hose assembly.
For additional information or cycle life data, please contact us.