

# HAM-LET Metal Hoses

## General

The HAM-LET Metal Hoses are top quality all Stainless Steel factory welded assemblies that are manufactured and tested to meet industry demands and regulation for chemical, process, Oil & Gas, Power generation, Pumps & Vacuum, instrumentation, gases and semiconductors manufacturing and machinery.

The HAM-LET Metal Hose assemblies are constructed from only the best materials and components and by the most advanced corrugating and welding technologies for leak free durable performances.

HAM-LET Metal Hoses are the best solution for flexible connection of Gas & Liquid lines where vibrating, moving parts and installations involve high temperatures, chemicals and aggressive media, high pressures and full vacuum.

## Features

- All stainless steel assembly
- LET-LOK®, ONE-LOK®, Face seal, UH Line end fittings among others
- ID sizes: 1/4" up to 2"
- Pressure rating: Vacuum to 6,000 psi (414 bar), 4 to 1 safety factor
- Working temperatures -425°F (-254°C) up to 1300°F (705°C)
- Hydroformed or spirally-welded corrugated inner hose
- Machine braided (braid is woven directly on inner hose)
- Maximum Working Pressure marked on metal tag as standard.
- Manufactured in accordance to
  - NAHAD - Corrugated Metal Hose Assembly specification guidelines
  - DIN ISO 10380:2013 (ISO 10380:2012 for designated items)- Pipework - Corrugated metal hoses and hose assemblies.

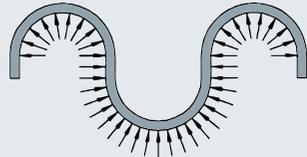
## Metal Hoses Manufacturing Process

### Corrugated Tube

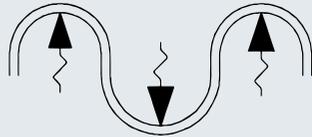
A high quality stainless steel thin walled tube is specifically manufactured. As a second stage, corrugations are formed into the tube to make it flexible. Corrugations are formed into the tube hydraulically using a unique process called "Hydroforming" (rather than the commonly used mechanical method).

The hydroforming process evenly distributes stresses on the tube wall. This unique method maintains wall thickness, reduces concentrated residual stress, and minimizes work hardening, resulting in enhanced flexibility and prolonged life cycle.

**Hydroformed**  
Evenly distributed stresses



**Mechanically Formed**  
Concentrated stresses



Hydroforming is a clean process, using water to form the hose, while most other processes require lubrication.

There are two corrugation profiles:



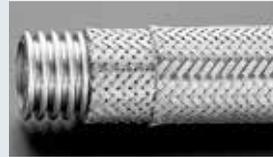
**Annular Profile**  
Independent corrugations, straight and parallel



**Helical Profile**  
One continuous corrugation that spirals around the hose

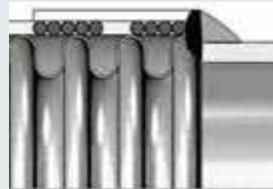
### Braid

As a third (optional) stage, stainless steel wire is braided over the hose, enabling the corrugated hose the ability to withstand higher pressures. Hoses may be single braided (one layer of braid) or double braided (two layers of braid) to achieve even greater working pressures.



**Braiding Superiority** - A High Percentage of Braid Coverage- it has the highest percentage of braid coverage, yielding better life cycle and protection against damage to the hose.  
**Machine Braided** - The braid is woven directly onto the hose, ensuring that the braid fits tightly against the hose, preventing potential hose deformation or squirm. Machine Braided Hose also offers repeatable performance and longer life cycle.

### Assembly



Combining top quality hoses with top quality fittings together with specialized welding, brazing, joining, fabrication procedures, and severe testing assures compatibility, integrity and serviceability of metal hose

assemblies in even the most extreme applications and demanding industries.

Standard assembly process consists of:

- Cutting the hose and braid through a hose corrugation valley.
  - Installing a braid collar over each end of the hose.
  - Trimming of any excess braid.
  - "Cap" welding the hose, braid, and braid collar together.
  - Cleaning the cap weld surface.
  - Placement and alignment of a fitting on the cap weld.
  - "Attachment" welding the fitting to the cap weld.
- The assembled hose is tested, cleaned, marked and packed as required.

## Metal Hose Selecting Considerations:

When selecting a Flexible Metal Hose, consider the following 5 variables:

### 1. Temperature

As the media or ambient temperature increases, the hose working pressure decreases. With your selected hose construction materials, go to "Working Pressure De-Rating Factor" table and match the alloy of the hose and braid with the highest temperature to which they will be exposed (either internally or externally) to obtain the proper de-rating factors. Then multiply the hose maximum working pressure by the most limiting temperature de-rating factor, Maximum Working Pressures marked on metal tag as standard.

### 2. Dynamic Pressure

Pulsating, surge or shock pressures, like those encountered by quick opening or closing valves, can inflict severe damage on a hose. If your application entails pulsating pressures, the working pressure should be de-rated by 1/2. If your application entails shock pressures, de-rate the stated working pressure to 1/6 of its value.

Example : 1/4" hose - T316L stainless steel hose and T304 stainless steel braid at 500°F with the shock pressures:  
 Catalog Maximum Working Pressure = 1800 psi  
 Temperature De-rating Factor at 500°F = 0.86  
 Pressure De-rating Factor = 1/6 Maximum Application Working  
 Actual allowable working pressure = 1800 PSI x 0.86 x 1/6 = 258 psi

### 3. Flexibility

Verify that the minimum bend radius of the hose is less than the bend radius required.  
 Larger installation radius reduces fatigue on the hose for a longer assembly life.

### 4. Chemical Compatibility

The material that you choose for the hose and braid must be compatible with the media that will flow through the hose, as well as the environment in which the hose is installed. When determining chemical compatibility, be sure that you know the temperature and concentration of the chemical or chemicals. Although there are many resources to confirm chemical compatibility, two of the industry standards that you may find useful are the National Association of Corrosion Engineers (NACE) and the Compass Corrosion Guides.

### 5. Accessories

Optional accessories available include spring guards, protective covers, insulating covers and protective armor.

## Cleaning & Packing

The hydroforming hose manufacturing process yields a very clean product.

Clean and Degrease to CGA G-4.1 "Oxygen Clean" is available.

Ultrasonic Cleaning for Pharmaceutical application is available. Each hose is packed in a plastic bag, end connections are capped.

## Testing

All HAM-LET hose assemblies are 100% Helium leak tested up to 1x10<sup>-6</sup> Std. CC/Sec.

Helium leak testing up to 1x10<sup>-9</sup> Std. CC/Sec is available.

Other test such as Hydrostatic testing, Nitrogen/Helium bubble test are available.

\*Helium leak test is available to hoses up to 100' (30m)

## Working pressure de-rating factor:

Temp. in		304	304L	316	316L	321	C276
Degrees F	Degrees C						
70	20	1.00	1.00	1.00	1.00	1.00	1.00
100	40	1.00	1.00	1.00	1.00	1.00	1.00
200	95	1.00	1.00	1.00	1.00	1.00	1.00
300	150	1.00	1.00	1.00	1.00	1.00	1.00
400	205	0.94	0.93	0.97	0.93	1.00	1.00
500	260	0.88	0.86	0.90	0.86	0.96	0.99
600	315	0.82	0.81	0.85	0.81	0.91	0.93
650	345	0.81	0.79	0.84	0.79	0.89	0.90
700	370	0.80	0.77	0.82	0.77	0.87	0.88
750	400	0.78	0.75	0.81	0.75	0.86	0.86
800	430	0.76	0.74	0.80	0.74	0.84	0.84
850	455	0.75	0.72	0.79	0.72	0.84	0.83
900	480	0.73	0.71	0.78	0.71	0.83	0.82
950	510	0.72	0.69	0.77	0.69	0.81	0.81
1000	540	0.69	0.67	0.77	0.67	0.81	0.80
1050	565	0.61	0.65	0.73	0.65	0.70	0.68
1100	595	0.49	0.62	0.62	0.61	0.55	0.55
1150	620	0.39	0.53	0.49	0.52	0.41	0.47
1200	650	0.30	0.38	0.37	0.38	0.32	0.36
1250	675	0.24	0.28	0.28	0.28	0.25	0.29
1300	705		0.21	0.21	0.21		