

Introduction To Flexible Metal Hose

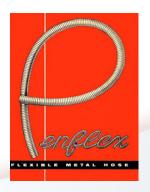
- Penflex.....Who we are.
- Penflex Catalog.
- Functions of a Metal Hose.
- Industry Standards Pertaining to Metal Hose.
- Manufacturing Methods.
- Stainless Steel and Corrosion.
- Influence of Corrugation Geometry on Performance.
- Influence of Braid on Metal Hose.
- Typical Fittings used on Metal Hose.
- Welding Hose Assemblies.
- Hose Failure Analysis.
- Penflex Website.



From the Beginning...1902

The Pennsylvania Flexible Metal Hose Company (Penflex) has been a pioneer in the industry. We continue today to be a leader in the design and manufacturing of flexible metal hose products.

- Widest Range of Products
 - Made in the USA
- Experienced Technical Support
- Responsive Customer Service Staff
 - Penflex owned Vietnam Plant





Penflex Products

- Corrugated Metal Hose (¼" 14" NB)
 - P3, ½-2" 321/316L Braided Hose 321 & 316L Hose/304L Braid
 - P4, ¼-4" 321/316L Braided Hose 321 & 316L Hose/304L Braid
 - 700, 1/4-14" 321/316L/M400/I625/C276/C510 Braided Hose
 - 800, 1/4-6" 321/316L Braided Hose High Pressure
 - 900, 1/4-2" 316L Braided Hose Ultra High Pressure
 - 1400, High Pressure 3-4" 316L Braided Ultra High Pressure
- Contract Braiding: Wire & Synthetic Braids
- SS Expansion Joints

Interlocked Metal Hose

- M100
- Exhaust
- IE 30 light
- IE 50 Standard
- IE 65 Heavy
- Conveyor
- Standard
- Smooth Bore
- Fittings & Hose Assemblies
- Welding Services



Hose Selection Criteria

[S]ize Diameter of the fittings to be used on the assembly.

Minimum and maximum temperatures to which the assembly will be [T]emperature

exposed.

Material of each assembly component. If the materials are not known, then [A]lloy

both the media (along with their concentrations) that will be conveyed

through the assembly as well as to which the assembly may be exposed.

Type of motion (bending, flexing, vibration, etc) with magnitude and [M]otion

frequency

Maximum pressure to which the assembly will be exposed, noting spikes, [P]ressure

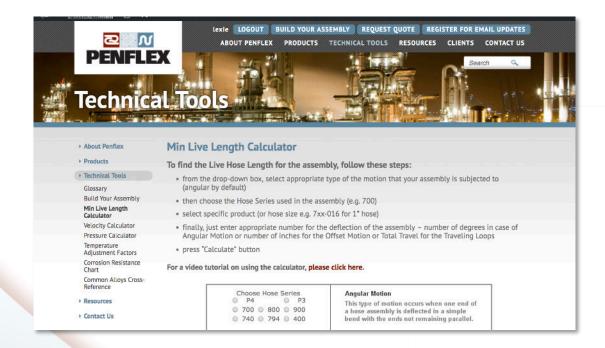
pulsation, and vacuum

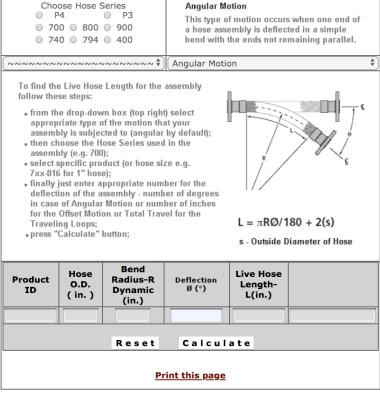
[E]nd Fittings Fitting types compatible with the hose and existing piping system.

Overall length of the assembly. If the overall length is not known then the [D]eveloped Length dimensions of the installation including all movements must be defined



Minimum Live Length Calculator

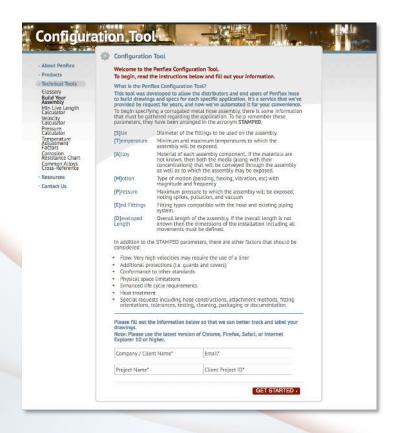


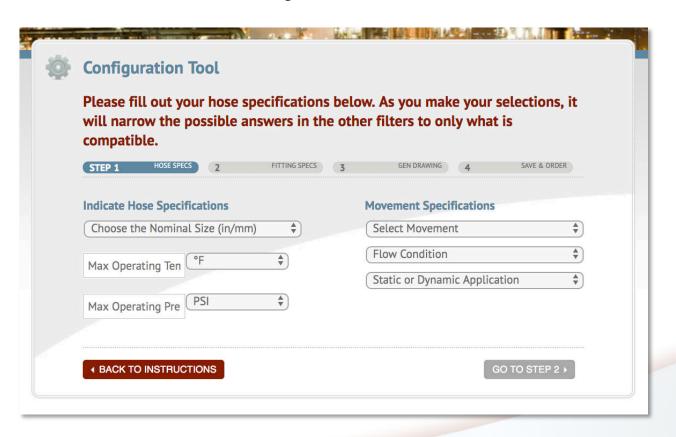




Making Simple Drawings from the Website

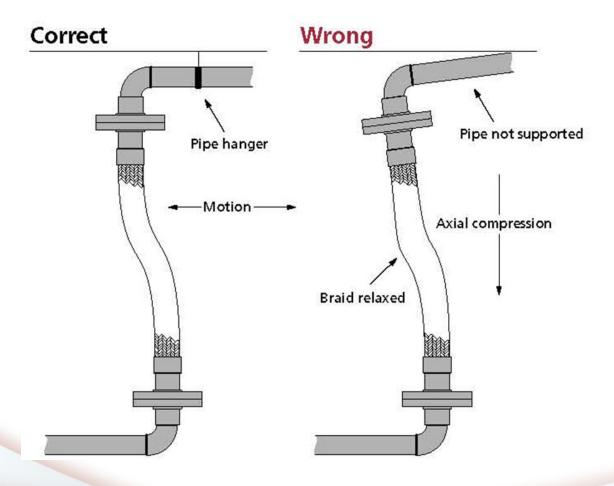
Build Your Own Assembly







Importance of Correct Installation





Comparison of Different 1" Hoses

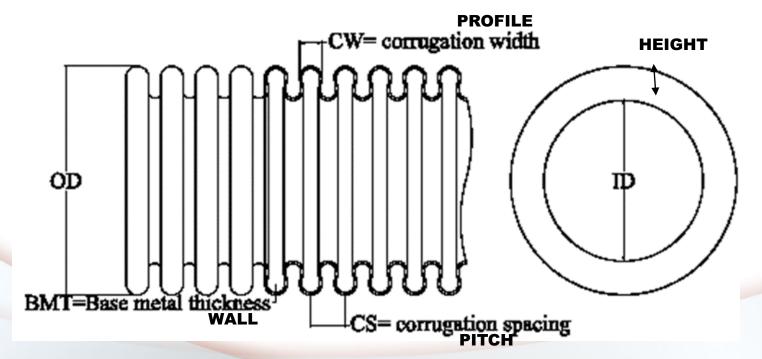
	P4	P3	AF4700
Nom ID	1"	1"	1"
Hose OD	1.51	1.27	1.47
Hose Wt/Ft	0.53	0.24	0.26
Original Hose Wall Thickness	0.015	0.008	0.010
Avg Sidewall Thickness	0.016	0.00848	0.00941
Avg Crest Thickness	0.01669	0.00807	0.00825
Avg Valley Thickness	0.01212	0.00767	0.01003
Braid Construction	36x10x0.014	48x7x0.014	36x12x0.010
Braid Wt/Ft	0.26	0.24	0.24
Total Wt/Ft	0.79	0.48	0.5
Max WP @70°F	590	796	718
Catalog Burst Pressure PSI	2360	3184	2872
Actual Burst Test #1	4006	3754	2535
Actual Burst Test #2	3560	3771	2572
Actual Burst Test #3	4170	3776	N/A



What Creates Flexibility?

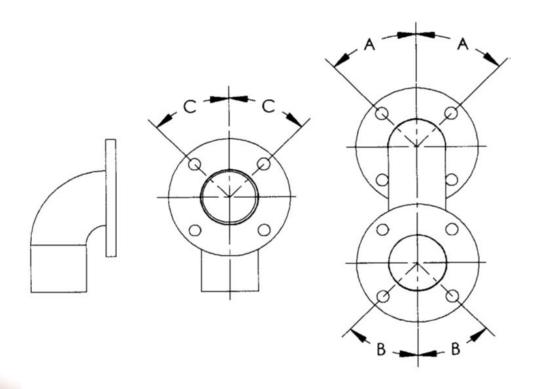
4 key design characteristics define flexibility in a metal hose

- 1. Wall Thickness
- 2. Pitch/Core Count
- 3. Height of corrugations
- 4. Profile





Bolt Hole Alignment (Clocking or 2 Holing)





Bolt Hole Alignment

Certified Welders

- **ASME**: American Society of Mechanical Engineers
- B31.3 Process Piping: piping typically found in petroleum refineries; chemical, pharmaceutical, textile, paper, semiconductor, and cryogenic plants; and related processing plants and terminals
- ASME Boiler and Pressure Vessel Code,
 Section IX: Welding and Brazing Qualifications



Testing Hose Assemblies





Markets Served

- Power Plants
- Gas & Steam Turbine
- HVAC
- Solar Technology
- Oil & Gas Drilling
- Hot Metal Processing
- Iron Ore Reduction
- Cryogenic Liquids
- Compressed Gases
- Vacuum & UHV Technology
- Fuel Cell Power
- Oil & Gas Distribution

- Pulp & Paper
- Shipbuilding & Repair
- Chemical Processing
- Pharmaceuticals
- Waste & Waste Water
- Petro Chemical & Refining
- Plastic & Pellet Manufacturing
- Laboratories & Instrumentation
- Liquid Terminals & Storage Facilities
- Tank Cleaning Services
- OEM Engine exhaust



What's Wrong With This Picture?



