

Stripwound Metal Hose (Designing an Assembly)



Care should be taken when specifying a stripwound hose assembly. Each of the components can have a dramatic effect on the assembly's performance. In addition to carefully selecting components, the way they are assembled is also very important. Hose Master has developed fabrication techniques that help maximize the assembly's performance. Two of these techniques are square cutting the hose ends and welding on the inside of the fittings.



The stripwound profile is helical. When it is cut by traditional methods, the hose end will also be helical. This creates a gap between the fitting and the end of the hose. This gap can cause the fittings to separate from the hose during use. Square cutting ensures that the hose end and the fitting are flush, leaving no gaps.



If the fittings are welded on the hose, welding the inside provides for a smooth transition between hose and fittings, preventing product from becoming damaged.

Specifying a Stripwound Hose Assembly:

Designing a stripwound hose assembly requires the determination of five factors:

1. Hose (type, alloy, and size): page 45
2. End fittings (type, alloy, and size for each end): page 51
3. Assembly length: page 54
4. Fabrication options: page 55
5. Accessories: page 57

If these factors have been determined, a fabricator will be able to make the assembly. If not, these questions may be answered by proceeding to the next section, *Analyzing an Application*.

Analyzing an Application:

S.T.A.M.P.E.D.

To properly design a metal hose assembly for a particular application, the following design parameters must be determined. To help remember them, they have been arranged to form the acronym “S.T.A.M.P.E.D.”

1. **Size** – The diameter of the connections in which the assembly will be installed is needed to provide a proper fit. This information is required.
2. **Temperature** – As the temperature to which the assembly is exposed (internally and externally) increases, the strength of the assembly’s components decreases. If you do not provide this information it will be assumed that the temperatures are 70°F.
3. **Application** – This refers to the configuration in which the assembly is installed. This includes the dimensions into which the assembly must fit as well as the details of any movement that the assembly will experience. This is required since you cannot determine the proper length or proper hose type without it.
4. **Media** – Identify all chemicals to which the assembly will be exposed, both internally and externally. This is important since you must be sure that the assembly’s components are chemically compatible with the media. If no media is given it will be assumed that both the media and environment are compatible with all of the available materials for each component.
5. **Pressure** – Identify the internal pressure to which the assembly will be exposed. Stripwound metal hose, by the nature of its construction, is not pressure tight. However, pressure and media infiltration through the stripwound wall can be minimized by the insertion of one of a variety of packings into the wall during hose manufacturing. If no pressure is given it will be assumed that there is no pressure.
6. **End Fittings** – Identify the necessary fittings. This is required since fittings for the assembly must be chosen to properly fit the mating connections.
7. **Dynamics** – Identify the velocity of the media flowing through the assembly. Extremely high flow or abrasive media can cause premature failure. If no velocity is given, it will be assumed that the velocity is not fast enough to affect the assembly’s performance.

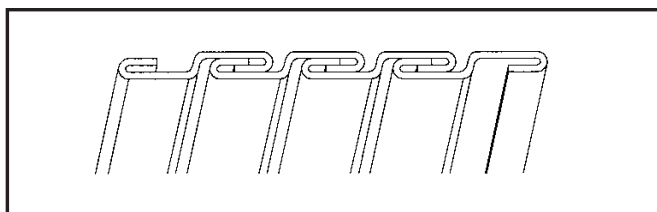
To make gathering this information easier, Hose Master has provided a convenient worksheet to help select components on page 78.

Stripwound Metal Hose (Hose)



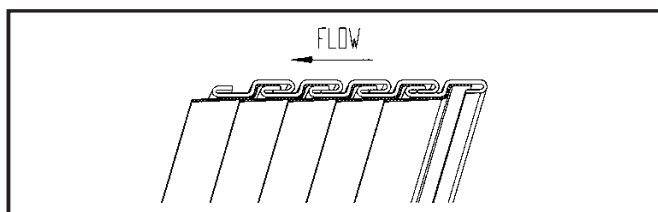
As the name suggests, stripwound hose is made from a strip of steel that is profiled and continuously wound around a mandrel to form a hose. Hose Master's proprietary manufacturing process yields an extremely consistent and balanced profile, maximizing strength and flexibility. There are four different types of stripwound hose:

1. **Roughbore Interlocked** - The strip is formed with legs that interlock to form a tighter, more rugged construction.



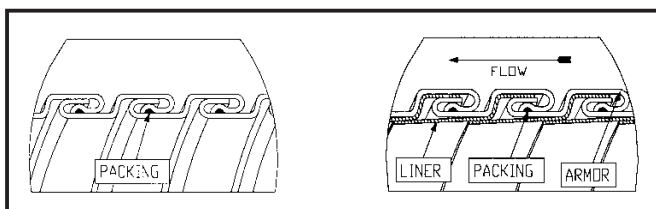
Extremely flexible. Ideally suited for conveying dry, bulk materials, for open-end gas exhaust, and as a protective cover.

2. **Smoothbore Interlocked** - Made by adding another steel strip inside a roughbore hose to provide a smooth surface, thereby reducing damage to sensitive materials.



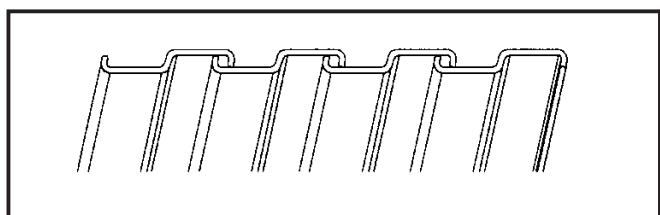
Extremely flexible. Ideally suited for dry bulk conveying.

3. **Packed Interlocked** - Packing may be added to interlocked hose to minimize leakage through the hose profile.



The most effective packings are made from resilient materials such as elastomers and, to a lesser extent, cotton. Harder materials (stainless steel and copper) are also available if required.

4. **Squarelocked** - The strip is formed into square shapes that are locked together.



Extremely flexible. Primarily used as a protective covering for wires, fiberoptic cables, and other hoses.

Selecting a Hose:

When selecting a stripwound hose, you should first decide the most appropriate type of hose (squarelocked, interlocked, smoothbore interlocked). Then, of the options that are available, select the one best suited for the application. Choose the most compatible alloy for the service and environment in which the hose will be installed. Then, based on your requirements, choose a strip thickness. The thicker the steel strip, the better the hose is suited for heavier duty. Finally, determine if you need packing and, if so, which packing best suits your application.

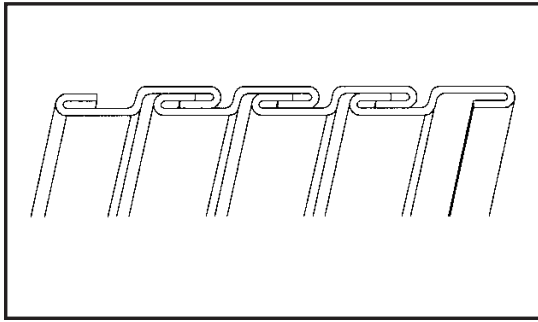


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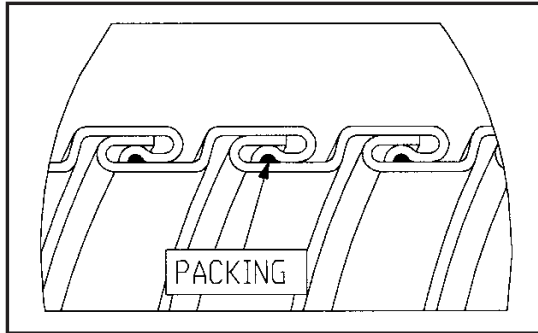
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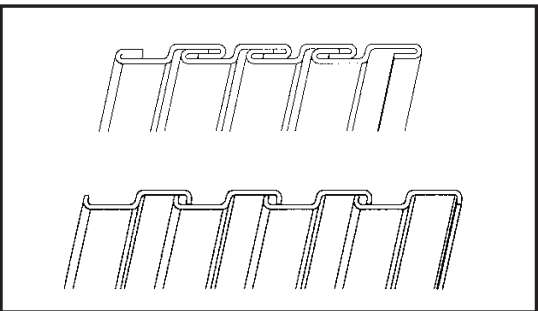
Stripwound Metal Hose (Products)



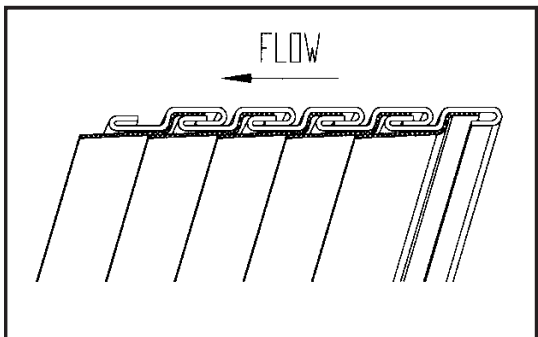
Interflex is a high-quality, general-purpose, roughbore interlocked metal hose formed from a single metal strip. Hose Master's balanced interlocking process provides maximum flexibility and the longest service life47



Tar and Asphalt is a sturdy, leak resistant, flexible interlocked metal hose used for the transfer of high temperature viscous fluids. Tar and Asphalt hose is constructed from a high grade, heavy gauge galvanized steel with Hose Master's proprietary packing. Tar and Asphalt hose ensures maximum suction and is design tested to 100 psi48



FloppyGuard™ is Hose Master's line of small-bore, stripwound, metal hose. Used for armor or casing applications, FloppyGuard™ offers superior flexibility and crush resistant construction49

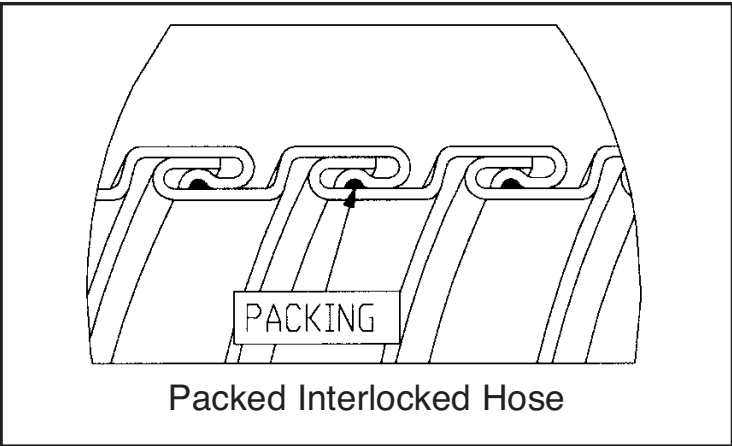
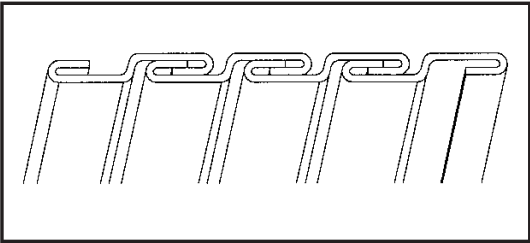


Ultraflex is a smoothbore metal hose ideally suited for dry bulk pneumatic conveyance. This hose is produced with a durable armor and a highly abrasion-resistant liner. Hose Master's precision manufacturing process makes Ultraflex unequalled in strength and flexibility50

Note: Product specifications are subject to change.

Stripwound Metal Hose (Products)

INTERFLEX



Interflex is Hose Master's general-purpose interlocked metal hose which is used to convey air, exhaust, and a variety of solid materials. (Interflex hose should not be used with products that can be damaged when conveyed through a roughbore hose.) It is constructed from a single strip of metal that is profiled and locked onto itself. The interlocked, or overlapping, sections of strip are able to slide back and forth, thus providing the ability to flex.

Explanation of **Interflex** Part Numbers:

IN _____	
Strip Thickness	Material Code
Strip Thicknesses:	
10 - Extra Light Weight	
15 - Light Weight	
18 - Medium Weight	
20 - Medium Weight (Aluminum only)	
25 - Heavy Weight	
30 - Extra Heavy Weight	
Material Codes:	
AL - Aluminum	
GS - Galvanized Steel	
SS - Stainless Steel (Consult Factory)	

Inside Diam. (in.)	IN 10 _____ GS or SS		IN 15 _____ GS or SS		IN 18 _____ GS or SS		IN 25 _____ GS or SS		IN 30 _____ GS Only		IN 20 _____ AL Only	
	Wt. Per Ft. (lbs.)	Min Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)
1 1/2	0.5	6	0.7	7	0.9	7	1.3	8				
2	0.7	8	1.0	9	1.1	9	1.7	10	2.0	11		
2 1/2	0.8	10	1.2	11	1.4	11	2.1	12	2.5	13		
3	1.0	11	1.4	12	1.6	13	2.5	15	2.9	15	0.7	15
3 1/2	1.1	13	1.6	14	1.9	15	2.8	17	3.4	18	0.8	17
4	1.2	15	1.8	16	2.2	17	3.2	19	3.8	20	0.9	19
4 1/2	1.4	17	2.0	18	2.4	19	3.6	21	4.3	22	1.0	21
5	1.5	19	2.2	20	2.7	21	4.0	24	4.7	25	1.1	24
6	1.8	22	2.7	24	3.2	25	4.7	28	5.6	29	1.3	28
7			3.1	28	3.7	30	5.5	33	6.5	34	1.5	33
8			3.5	32	4.2	34	6.2	37	7.4	39	1.8	37
9			3.9	35	4.7	38	7.0	42	8.3	43	2.0	42
10			4.4	39	5.2	42	7.7	46	9.2	48	2.2	46
11					5.7	46	8.5	51	10.1	53	2.4	51
12					6.2	50	9.3	55	11.0	57	2.6	55
13					6.7	54	10.0	60	11.9	62	2.8	60
14					7.2	58	10.8	64	12.8	67	3.0	64
15					7.7	62	11.5	69	13.7	71	3.2	69
16					8.2	66	12.3	73	14.6	76	3.4	73

Notes: Other diameters are available upon request. For packed hose add 10% to both weight per foot and minimum bend radius. Minimum bend radius is measured from the centerline of the hose.

Available Packings		
Packing Type	Features	Max Temp.
Low-Temp Elastomeric	Max Pressure and Vacuum	200°
High-Temp Elastomeric	Max Pressure and Vacuum	400°
Low-Temp Fiber	Economical	180°
High-Temp Fiber	High-Temp. Filament	1000°
Metal	Extreme Temp.	800° - 1200°

When to Consider Packing:

Interlocked metal hose, by the nature of its construction, is not pressure tight. However, pressure and media infiltration through the interlocked wall can be minimized by the insertion of one of a variety of packings into the wall during hose manufacturing. Packing consists of a continuous cord or strand of elastomer, or other material which is locked into a special channel between the interlocked hose wall layers. The choice of packing material is tailored to the demands of the specific application.



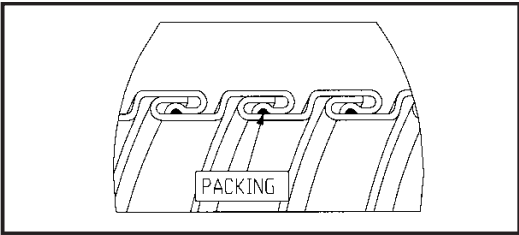
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Stripwound Metal Hose (Products)

TAR & ASPHALT



Tar and Asphalt is Hose Master’s heavy-weight interlocked metal hose. Constructed from a single strip of galvanized steel with Hose Master’s proprietary packing, this hose is ideal for transferring high-temperature viscous fluids. Tar and Asphalt hose is leak resistant and handles maximum suction. It is design tested to 100 psi and has a temperature range of -40° F to 500° F.

Explanation of **Tar and Asphalt** Part Numbers:

TA 30 GS
Strip Material
Thickness Code

Strip Thicknesses:
30 - Extra Heavy Weight

Material Codes:
GS - Galvanized Steel

Diameter (inches)	Minimum Bend Radius (inches)	Weight Per Foot (lbs.)
1 1/2	9	1.8
2	12	2.2
2 1/2	15	2.8
3	17	3.2
4	22	4.2

Notes: Other diameters are available upon request. Minimum bend radius is measured from the centerline of the hose.

TAR & ASPHALT FITTINGS



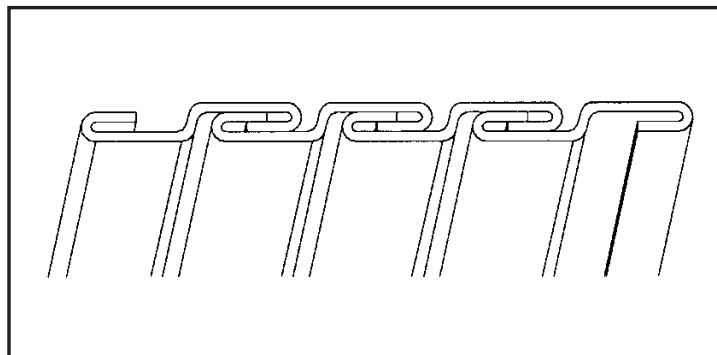
Heavy duty packed-on reusable rigid male or female swivel fittings can be attached upon request. Please refer to page 53 for fitting details.

Stripwound Metal Hose (Products)

FloppyGuard™

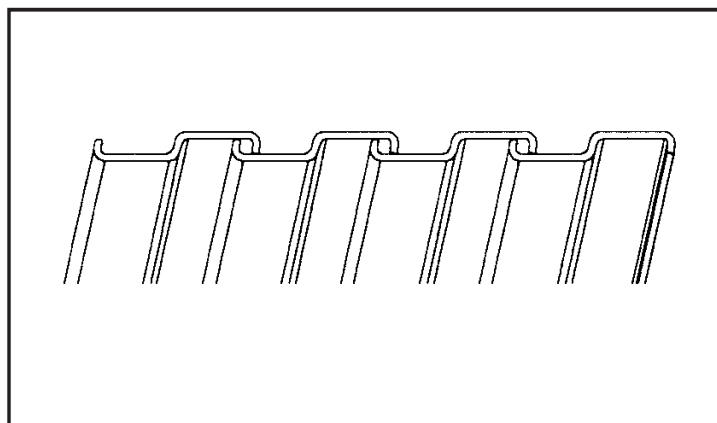


FloppyGuard™ is Hose Master's line of floppy-interlocked metal hose. Constructed from a variety of alloys, this product offers superior flexibility and crush-resistant construction. Used in a wide range of applications, including casing or armor for small diameter hose and electrical cable, FloppyGuard™ is available in sizes from 3/16" I.D. and up, and can be covered with PVC or fluoropolymer coatings for liquid-tight or chemically-resistant service. All FloppyGuard™ is ultrasonically cleaned prior to packaging. Because of Hose Master's ability to design and make its own tooling, Hose Master can custom design FloppyGuard™ to meet your exact specifications. Please contact Hose Master's Customer Service Department with your specific requirements.



Interlocked Design (SB)

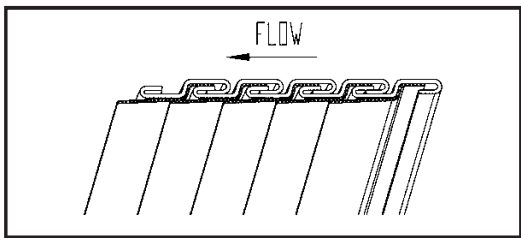
FloppyGuard SQ™ is Hose Master's line of squarelocked stripwound hose. It can be used in a wide variety of applications where fully interlocked construction is not required. It is excellent for use as shielding on electrical wiring and fiberoptic cable. FloppyGuard SQ™ is available in sizes ranging from 1/8" to 5/8" I.D., and can be covered with PVC or fluoropolymer coatings for liquid-tight or chemically-resistant service.



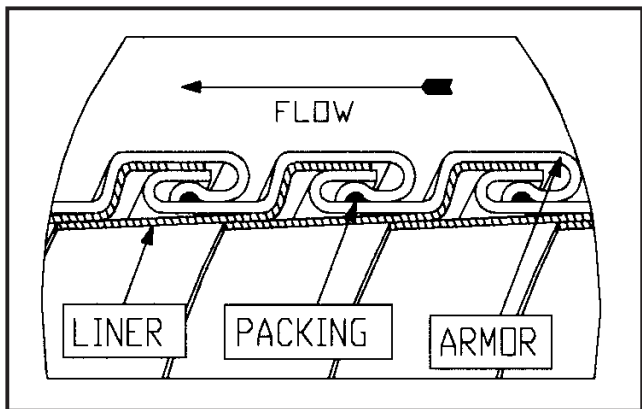
Squarelocked Design (SQ)

Stripwound Metal Hose (Products)

ULTRAFLEX



Ultraflex is Hose Master’s smoothbore lined hose. It is constructed from two strips of metal that form a durable armored hose and a smooth, abrasion-resistant metal liner (see drawing). The liner protects the product being conveyed from damage that can be caused by a rough interior. Ultraflex is ideal for pneumatic and dry bulk conveying. A directional arrow on the hose indicates flow direction for optimum performance.



Explanation of **Ultraflex** Part Numbers:

UF		
Armor Material	Armor Strip	Liner Material
Armor Materials: A - Aluminum G - Galvanized Steel S - Stainless Steel (Consult Factory)	Armor Strips: 15 - Light Weight 18 - Medium Weight 20 - Medium Weight (AL only) 25 - Heavy Weight	Liner Materials: S - Stainless Steel (consult Factory) C - Carbon Steel

	UF (G/S) 15 (C/S)		UF (G/S) 18 (C/S)		UF (G/S) 25 (C/S)		UF A 20 (C/S)	
Inside Diam. (in.)	Wt. Per Ft. (lbs.)	Min Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft. (lbs.)	Min. Bend Radius (in.)	Wt. Per Ft (lbs.)	Min. Bend Radius (in.)
1 1/2	1.2	7	1.3	8				
2	1.6	9	1.7	10				
2 1/2	1.9	11	2.2	12				
3	2.3	13	2.6	14	3.2	18		
3 1/2	2.6	15	3.0	16	3.7	21		
4	3.0	17	3.4	18	4.2	23	2.1	23
4 1/2	3.4	19	3.8	21	4.7	26	2.3	26
5	3.7	21	4.2	23	5.2	29	2.6	29
6	4.5	25	5.0	27	6.2	34	3.1	34
7	5.2	29	5.8	32	7.2	40	3.6	40
8	5.9	33	6.6	36	8.2	45	4.1	45
9	6.6	37	7.4	40	9.2	51	4.6	51
10	7.4	40	8.2	45	10.2	56	5.1	56
11			9.0	49	11.2	62		
12			9.8	53	12.2	67		
13			10.6	58	13.2	73		
14			11.4	62	14.2	78		
15			12.2	66	15.2	84		
16			13.1	71	16.2	89		

Notes: Other diameters are available upon request. For packed hose add 10% to both weight per foot and minimum bend radius. Minimum bend radius is measured from the centerline of the hose.

When to Consider Packing:

Interlocked metal hose, by the nature of its construction, is not pressure tight. However, pressure and media infiltration through the interlocked wall can be minimized by the insertion of one of a variety of packings into the wall during hose manufacturing. Packing consists of a continuous cord or strand of elastomer, or other material which is locked into a special channel between the interlocked hose wall layers. The choice of packing material is tailored to the demands of the specific application.

Available Packings		
Packing Type	Features	Max Temp.
Low-Temp Elastomeric	Max Pressure and Vacuum	200°
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Low-Temp Fiber	Economical	180°
High-Temp Fiber	High-Temp. Filament	1000°
Metal	Extreme Temp.	800° - 1200°

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Stripwound Metal Hose (Fittings)



Selecting the proper fittings for an application is largely determined by the mating fittings to which the hose assembly will be attached. Once the mating fittings have been identified, the hose fittings should complement the mating fittings in type, size and alloy. Even though the selection of hose fittings is determined by the mating fittings, it is a good idea to confirm that the fittings used in the application are appropriate for the application and any necessary changes made. Ensure that the fittings are chemically compatible with and are able to withstand the conditions in which the hose is installed and in which it will be used.

The following pages show commonly used fittings for stripwound hose.

Please contact Hose Master's Customer Service Department for end connections that have not been listed.



Male Pipe Nipple

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel, Aluminum
- **Sizes** - 1 1/2" thru 8"
- **Schedules** - 40, 80



Victaulic Fitting

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel
- **Sizes** - 1 1/2" thru 8"

Stripwound Metal Hose (Fittings)



Slip-on Flange

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel
- **Sizes** - 1 1/2" thru 12"
- **Class** - 150#, 300#



Plate Flange

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel
- **Sizes** - 1 1/2" thru 14"
- **Class** - 150#



C Stub with Floating Flange

- **Alloys** - T304 and T316 Stainless Steel
- **Sizes** - 1 1/2" thru 10"
- **Schedule** - 10



Part A and Part D (Cam-Lock)

- **Alloys** - T316 Stainless Steel, Carbon Steel, Aluminum
- **Sizes** - 1 1/2" thru 8"



Tube End

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel, Aluminum
- **Sizes** - 1 1/2" thru 8"
- **Wall Thickness** - Various

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Stripwound Metal Hose (Fittings)



Reducer

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel
- **Sizes** - 1 1/2" thru 6"
- **Schedule** - 10, 40 (Carbon Steel)



Beveled Pipe End

- **Alloys** - T304 and T316 Stainless Steel, Carbon Steel, Aluminum
- **Sizes** - 1 1/2" thru 8"
- **Schedules** - Various



NPSH Female or Male

- **Alloys** - T304 Stainless Steel
- **Sizes** - 4" thru 6"



Tar and Asphalt Male and Female

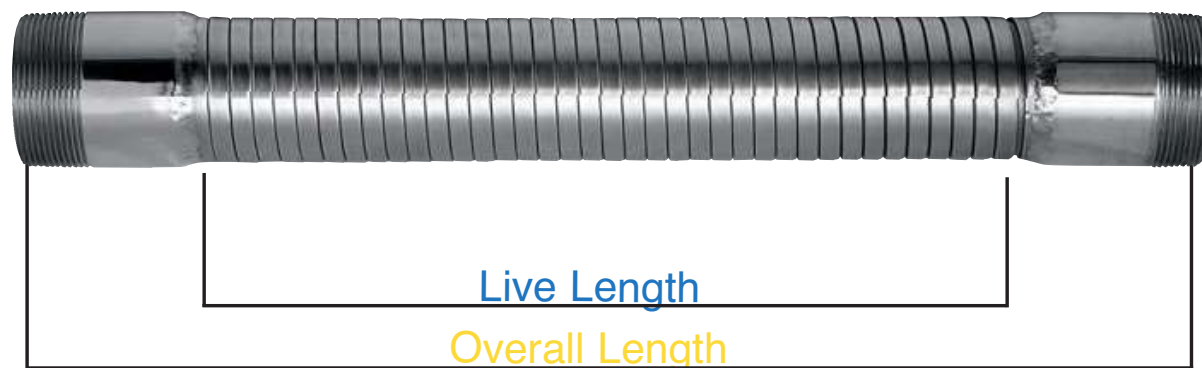
- **Alloys** - Malleable Iron
- **Sizes** - 1 1/2" thru 4"



Compensator

- **Alloys** - Urethane
- **Sizes** - 3" thru 6"

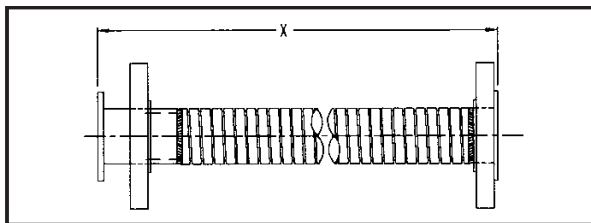
Stripwound Metal Hose (Length)



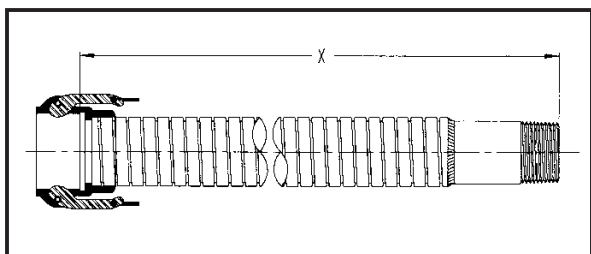
To calculate the proper length of a hose assembly you should follow these steps:

- **Verify that the installation is properly designed for the hose assembly** – Page 72 illustrates the right and wrong ways to install a hose assembly. Basically, there are two considerations:
 1. Do not torque the hose.
 2. Do not overbend the hose.
- **Calculate the live length of the assembly** – The live length of the assembly is the amount of active (flexible) hose in an assembly; that is, the length of hose between the fittings. Pages 73 - 75 give formulas to calculate live length for a variety of common hose installations.
- **Calculate the overall length of the assembly** – Overall length is equal to the live length plus the lengths of the fittings. When adding fitting lengths be aware that the points from which measurements should be taken vary for different fitting types. When calculating overall length for assemblies with threaded fittings, remember to account for the length of thread that is lost by threading into the mating connection (see Thread Allowance chart on page 72).

Because of its design, stripwound hose may be fully extended, fully compressed, or any state between the two. The length difference between fully compressed and fully extended may be as great as 30%. Stripwound hose performs best at the midpoint between fully compressed and fully extended, so bear this in mind when specifying length.



Flanges are measured from the flange face or, if used, from the face of the stub end.



Threaded fittings are measured to the end of the fitting. Female cam and groove fittings are measured from the seat of the fitting.

For assistance in making any calculation or for dimensional information on fittings, please contact Hose Master's Customer Service Department.

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Stripwound Metal Hose (Fabrication Options)



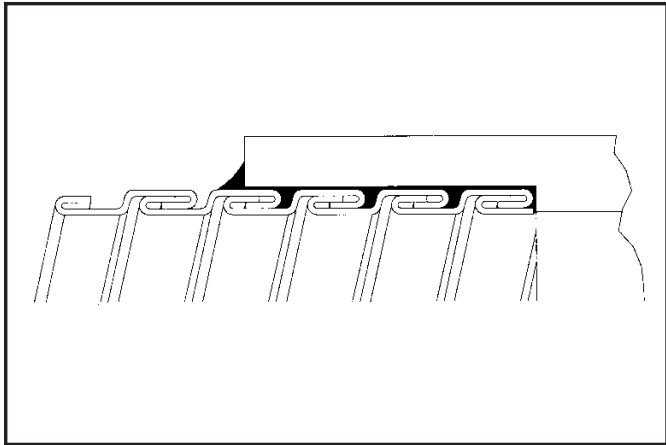
Interlocked metal hose is used in a variety of applications. Just as the hose, fittings, and other assembly parts must be tailored to suit the demands of the service, so must the methods of joining these components. Hose Master has developed specialized fabrication procedures to assure the integrity and serviceability of metal hose assemblies in even the most extreme applications.

The attachment options to be considered are:

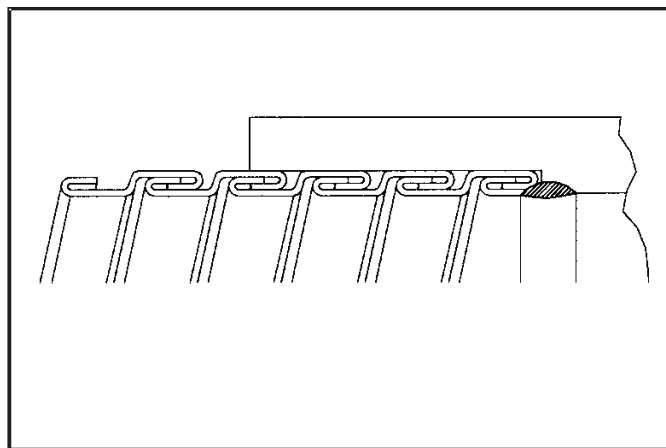
1. Epoxy
2. Welding/Brazing
3. I.D./O.D. Welding
4. Mechanical Attachment

The following page identifies each of these methods and gives a brief explanation under what circumstances each should be considered.

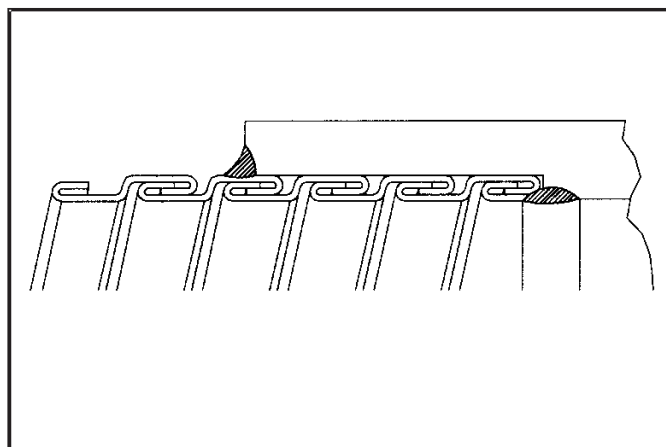
Stripwound Metal Hose (Fabrication Options)



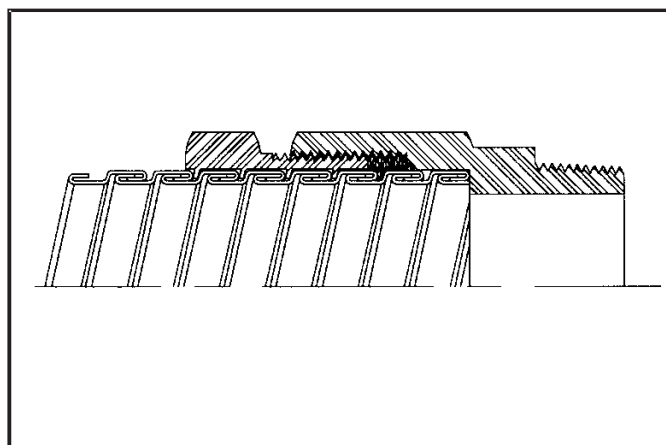
Epoxy - Fittings may be attached to interlocked hose using a 2-part epoxy. An epoxied fitting-to-hose connection, made with properly prepared fittings, can be as strong or stronger than the hose itself at service temperatures up to 200°F. Epoxy is recommended for packed interlocked hose to avoid damaging the packing material. Epoxy also affords a convenient method for field attachment of a variety of fittings to interlocked hose.



Welding/Brazing - Welding provides the strongest possible connection between the hose and fittings. Whenever possible, the weld is made on the interior, or I.D., hose-to-fitting joint in order to provide a smooth surface over which the media flows. Welding is generally not recommended for packed interlocked hose, as the packing may be damaged by the high welding temperature.



I.D./O.D. - If the fittings are welded to the hose, welding the I.D. provides for a smooth transition between hose and fittings, preventing product from becoming damaged. Also, welding the O.D. of the fitting prevents exterior contamination from entering the crevice while providing additional strength.



Mechanical Attachment - Certain high temperature applications requiring interlock hose, particularly Tar and Asphalt service, require a fitting that actually threads and locks onto the hose corrugations. A high temperature packing is used to seal against leakage. These fittings are leak tight up to 400°F and are easily field attached.

Stripwound Metal Hose (Accessories)



Stripwound hose assemblies often require special accessories or components. Accessories may be used to improve performance or to make the assembly easier to use.

The following pages list some common accessories along with a brief explanation of the benefits each accessory offers. This is not an exhaustive list of all possible accessories. Please contact Hose Master's Customer Service Department if you would like an accessory not listed.



Lay Line - A straight, painted line can be applied to interlocked hose along its entire length. This lay line serves to give clear warning to the user if the hose is being potentially damaged from torque or twisting in service. Monitoring torsion or twisting of the assembly can significantly increase the service life of the hose.



Flow Arrows - Smoothbore interlocked hose is unidirectional in that the overlapping liner strip affords a smooth surface in one direction. Media flow in the opposite direction can easily cause damage to both the hose and to abrasion sensitive media, such as plastic pellets. Flow arrows are painted on all smoothbore hose to indicate the correct flow direction. In specific high-velocity applications, the flow direction can also become a factor in roughbore interlock hose. Flow arrows can be provided on roughbore hose upon customer request.

Stripwound Metal Hose (Accessories)



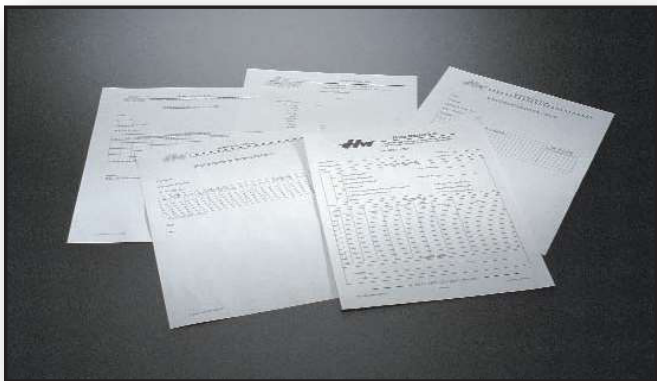
Square Cutting - If the hose service requires a smooth transition from the hose to the fittings, the end of the hose must fit flush against the fitting shoulder. The only way to provide this kind of fit between hose and fitting is to square cut the end of the hose.



Braid - For higher than normal working pressures, or for critical safety situations, a stainless steel braid can be installed and welded over a stripwound hose assembly. The braid serves to prevent the hose from overextending and damaging the hose wall.



Tagging - A variety of tags (metal, plastic, or cardboard) is readily available to record hose identification, service information, or any customer specific information.



Certifications - Standard written certifications for materials or inspections can be supplied for stripwound hose or assemblies. Certifications of conformance to specific customer requirements are also available.