

## Benefits of Swagelok® seamless tubing.

Locally stocked and available to ship, our tubing solutions deliver simplicity, cost-savings and superior performance.

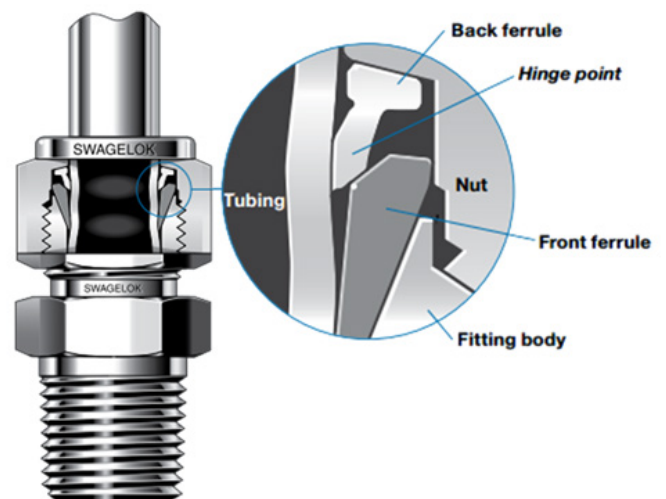
### Top reasons to choose seamless tubing from Swagelok Minnesota | North Dakota | Appleton

- **You need a fluid delivery component now:** Our tubing is available and ready to ship in 10 and 20' lengths.
- **Your system uses Swagelok® tube fittings:** Swagelok seamless tubing paired with Swagelok tube fittings has many advantages including ease of installation, maintenance and reliable performance.
- **You store tubing on site:** Custom stocking programs are available, and we offer volume/bulk order discounts. Talk to your sales rep or VMI rep for pricing information.
- **You want to minimize weight and cost:** Since tubing is bendable, it can greatly reduce the number of mechanical connections. Fewer individual components means a lighter system and a lower installation cost.
- **You're charged with simplifying plant maintenance:** Seamless tubing systems can be assembled and disassembled quickly and easily. In addition, tubing does not require a system flush prior to use, which reduces the amount of downtime.
- **You require reliable performance even with high vibration and temperature swings:** Design a tubing system with Swagelok tube fittings, and you'll have a solution that will not back off during thermal cycling or high vibrations.
- **Swagelok Minnesota | North Dakota | Appleton is ready to serve your tubing needs:** Contact us directly for a quote at [info@minnesota.swagelok.com](mailto:info@minnesota.swagelok.com) or call 800-422-6410. You can find additional information on our tubing solutions or make an online purchase by visiting our [website](#).

### Create an engineered fluid system with reliable tubing and fittings

Swagelok tube fittings have a grip-type design that uses a unique "hinging and colletting" action to achieve optimal performance in three key areas:

- **Tube grip:** Hinging colletting action provides more direct tube contact/gripping support.
- **Gas seal:** Burnishing/polishing action of the front ferrule creates concentrated zones of contact on the tube and on the body bevel for a stronger seal.
- **Vibration resistance:** The colletting region better isolates stress risers at the tube grip to resist bending, deflection and vibration.



## Combine Swagelok tube fittings with tubing for a simpler, safer and faster fluid system

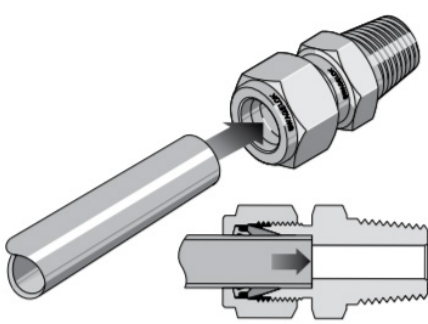
Utilizing Swagelok seamless tubing solutions can dramatically improve your productivity. Tubing systems are fast to install, and bending tubing, rather than installing elbow fittings, can improve performance and reduce the number of connections in a system. Further, Swagelok tube fittings are remakeable, which reduces the time required to maintain or modify systems. This means you can install more systems in less time, and re-allocate saved resources to other areas of your plant. If you are an engineer, manager, pipe fitter, or contractor who is feeling the squeeze of tight budgets, short staff and increasing workloads, we have three words for you: **simpler, safer, faster**.

- **Simpler:** In minutes, anyone in your facility can learn to assemble and install Swagelok tube fittings correctly the first time. Swagelok seamless tubing solutions eliminate the oils, sealants, dies, complicated equipment, fire boxes, air tests and threaded alignment issues. Properly installed Swagelok tube fittings can eliminate leakage. This means rework and clean up are minimized.
- **Safer:** Swagelok tube fittings will provide vibration-tolerant, leak tight seals to the working pressure of the tubing. Because seamless tubing systems use no heat or weld gases and are so simple and fast to install, they are well suited for installation in hazardous areas and confined spaces.
- **Faster:** Using Swagelok seamless tubing solutions can dramatically improve productivity. Tube fittings are fast to install. Bending tubing reduces the number of connections in the system. Remakeable Swagelok fittings reduce the time to maintain or modify systems. This means you can install more systems in less time.

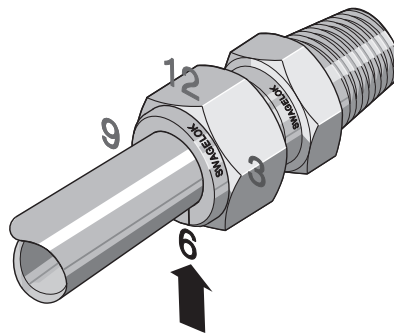
### Swagelok tube fittings: Three-step installation process

Quick assembly and reassembly using only standard wrenches make our fittings easy to install. Our expert training equips your workforce with essential skills for installing fittings across all your applications.

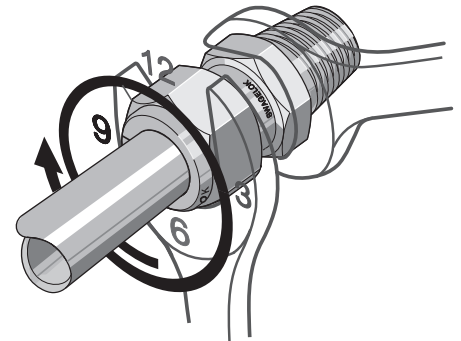
Swagelok tube fittings 1 in./25 mm and smaller can be installed quickly, easily and reliably with simple hand tools. Over 1 in./25 mm sizes require use of a hydraulic swaging unit to swage the ferrules onto the tubing. The tube fitting instructions below are for illustrative purposes only. For complete installation instructions, including instructions when using a hydraulic swaging unit, please reference the Gaugeable Tube Fittings and Adapter Fitters catalog on [swagelok.com](http://swagelok.com).



1. Fully insert the tube into the fitting and against the shoulder; rotate the nut finger-tight.



2. Mark the nut at the 6 o'clock position.

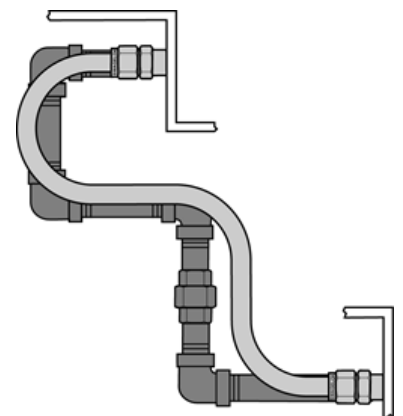


3. While holding the fitting body steady, tighten the nut one and one-quarter turns to the 9 o'clock position.

### The advantages of bendable tubing for your fluid system

One reason to choose tubing is because of its bendability and routing capabilities, which can help operators achieve more intricate and efficient fluid system design with fewer connection points.

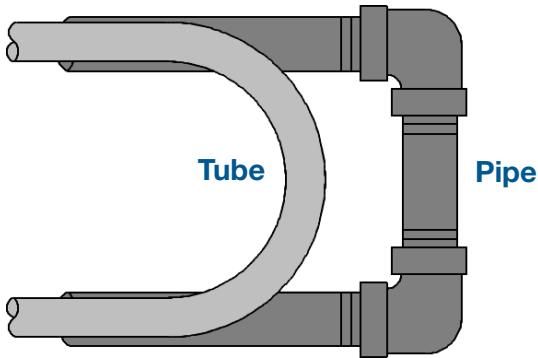
- **Fewer connections:** Fewer individual components means a lighter system and a lower installation cost.
- **Time savings:** Tube bends can save operators time by eliminating the need to cut, deburr and install a new fitting for every simple directional change.
- **Less turbulence:** Bends allow fluids to flow more easily than through a series of multiple fittings.



## Tubing vs. Piping

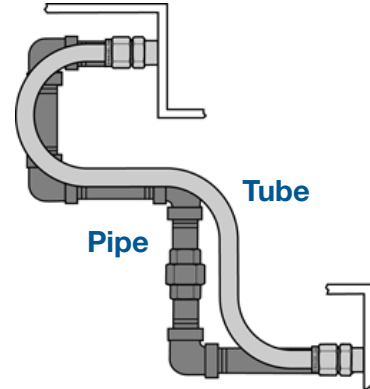
Many facilities depend on fluid delivery sent through piping systems. Unfortunately, cutting, welding and threading hard pipe is not a quick process. It is slow and labor intensive. A better alternative may be seamless tubing. Seamless tubing, instead of hard pipe, can greatly simplify installation and plant maintenance.

### Fewer connections needed



Fewer connections equals fewer potential leak points. Tubing is very adaptable and can be bent around many obstructions.

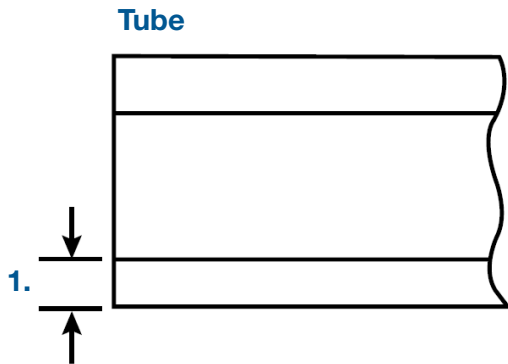
### Lower pressure drop



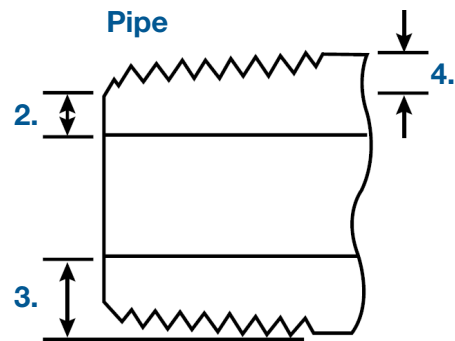
Sharp bends and discontinuities of piping systems are not present in the gradual bends of a tubed system.

### Better strength to weight ratio

Full wall thickness of tubing is used in containing pressure since no threading is necessary. Threading reduces effective wall thickness in piping. The lighter weight of the tubing provides many benefits. Tubing is less expensive to transport, is easier to assemble, requires less support and occupies less space.



1. Full wall thickness of tubing is used to contain pressure.

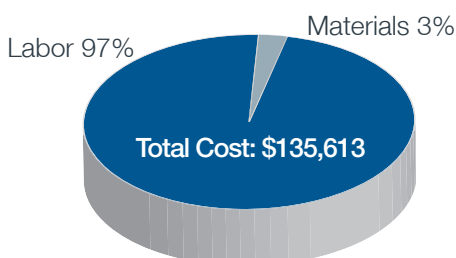


- 2. Wall thickness needed to contain pressure.
- 3. Wall thickness of pipe that must be used.
- 4. Extra pipe wall thickness required for threading.

### Lower total installed cost

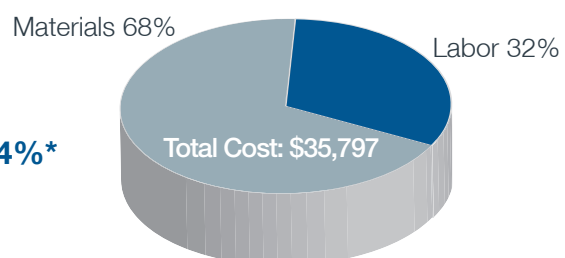
Seamless tubing can offer a significant reduction in time and labor. In fact, 74% of the overall installation costs can be saved by using tubing.\* Consider this example, which illustrates how tubing can be more cost effective even with greater up front material costs:

#### Traditional welded pipe solution



**A savings of 74%\***

#### Swagelok tube solution



\*Estimate performed by Mechanical Contractor for 150lb Stainless Steel Steam System.

## Tubing solutions

We have tubing to meet your fluid system needs including:

- 316 / 316L, 304 / 304L and other stainless steel alloys
- Standard instrumentation tubing
- 1/8 to 2 in. and 3 to 25 mm sizes
- Ultrahigh-purity and high-purity tubing, chemically cleaned and passivated tubing, thermocouple-cleaned tubing
- Marked to indicate size, material, specifications, and heat code

## Chemical composition

### 316 / 316L

Element	Fractional Sizes	Metric and Imperial Sizes
	Composition, wt. %	
Chromium	16.0 to 18.0	17.0 to 19.0
Nickel	11.0 to 14.0	12.5 to 15.0
Molybdenum	2.00 to 3.00	2.50 to 3.00
Manganese	2.00 max	2.00 max
Silicon	0.75 max	1.00 max
Carbon	0.035 max	0.030 max
Sulfur	0.030 max	0.015 max

### 304 / 304L

Element	All Sizes Composition wt. %
Chromium	18.0 to 20.0
Nickel	8.0 to 11.0
Manganese	2.00 max
Silicon	0.75 max
Carbon	0.035 max
Sulfur	0.030 max

## Tube pressure ratings

Allowable working pressures are calculated from an S value of 20 000 psi (137.8 MPa) for ASTM A269 tubing at -20 to 100°F (-28 to 37°C), as listed in ASME B31.3 and ASME B31.1. Tubing nominal length is 20 ft.

Tube OD in.	Tube Wall in.	Ordering Number	Weight lb/ft	Working Pressure psig
1/8	0.028	SS-T2-S-028-20	0.029	8 500
1/4	0.035	SS-T4-S-035-20	0.080	5 100
	0.049	SS-T4-S-049-20	0.105	7 500
	0.065	SS-T4-S-065-20	0.128	10 200
3/8	0.035	SS-T6-S-035-20	0.127	3 300
	0.049	SS-T6-S-049-20	0.171	4 800
	0.065	SS-T6-S-065-20	0.215	6 500
1/2	0.035 <sup>①</sup>	SS-T8-S-035-20	0.174	2 600
	0.049	SS-T8-S-049-20	0.236	3 700
	0.065	SS-T8-S-065-20	0.302	5 100
5/8	0.065	SS-T10-S-065-20	0.389	4 000
3/4	0.065	SS-T12-S-065-20	0.476	3 300
1	0.083	SS-T16-S-083-20	0.813	3 100
1 1/4	0.095 <sup>①</sup>	SS-T20-S-095-20	1.187	2 800
	0.120	SS-T20-S-120-20	1.473	3 600
1 1/2	0.120 <sup>①</sup>	SS-T24-S-120-20	1.792	3 000
	0.134	SS-T24-S-134-20	1.981	3 400
2	0.134 <sup>①</sup>	SS-T32-S-134-20	2.705	2 500
	0.188	SS-T32-S-188-20	3.686	3 600

<sup>①</sup>Not recommended for use with Swagelok tube fittings in gas service.



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