



An Overview of Sanitary Fittings

A lot goes into creating and maintaining a sanitary process, regardless of whether you are in food, beverage or pharmaceutical manufacturing. The requirements to meet 3A, FDA and other sanitary guidelines are especially demanding. Everything that the product touches, from pumps to tanks to piping, must be engineered to eliminate crevices that can create and harbor bacteria. With that being said, let's tip our hat to the sanitary fitting— quite possibly the most used piece of equipment in your plant.

Sanitary Fittings

A sanitary fitting connects different sections of your process – piping to pumps to heat exchangers to tanks. A fitting is typically defined as 2 ferrules, a gasket and a tri-clamp to hold them together. A groove on the face of the ferrule provides a seat for the gasket. The clamp provides the mechanical force to compress the gasket between the 2 ferrules. The clamp is typically tightened by hand, but torque tools can be used to ensure a constant amount of force and eliminate over-tightening.



In sanitary processing, these fittings are preferred because they are easy to assemble, extremely easy to clean, leak-free and, when assembled correctly, have no small nooks or crannies to harbor bacteria.

Clamp Fittings

Clamp style fittings are most popular because they offer easy assembly and breakdown of process lines and equipment. Clamp fittings are available in 304 and 316L stainless steel in sizes ½" through 12".

The clamped union is the critical element for evaluating pipe pressure capacity. Be certain your pressure ratings are for the union – not just the clamp.

Weld Fittings

Weld fittings are used on permanent installations where process piping and equipment can be cleaned in place (CIP) and removal of the system components is not required. Weld fittings are offered in nominal tube sizes from ½" through 8" in both 304 and 316L stainless steel. Uniform wall thickness for ½" through 3" sizes measures 0.065. In 4" size, wall thickness measures 0.083. In both 6" and 8" sizes, wall thickness measures 0.109. Our weld fittings meet all 3A requirements.

Bevel Seat Fittings

Bevel seat fittings are used on process equipment and piping to ensure rigidity of the system. Bevel seat unions consist of a threaded bevel ferrule mated with a plain bevel ferrule. Both are offered in 304 or 316L stainless steel. Bevel seat fittings meet all 3A requirements and are available in 1" through 4" sizes.

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A Breakdown of your Tri-Clamp



The most common type of tri-clamp is a Single Pin Sanitary Hinge Clamp which has a single pin on one side with a single bolt used to tighten on the other side. The fastener bolt may be a wingnut or a wing nut with a hole. In sanitary processing, these clamps range in size from ½" up to 12" and may be either 304 or 316L stainless steel.



Double Pin Sanitary Hinge Clamps have two pins on one side with a single bolt used to tighten on the other side. Many state that the double pin configuration provides a more precise, sturdy fit over the joint and provides more uniform clamp pressure. These clamps are typically T304 stainless and range in size from 1" up to 10".



High Pressure Clamps are constructed of 304 or 316 stainless. They are recommended for high pressure systems and are typically capable of handling double the pressure of a hinged clamp. These clamps are typically used when temperature fluctuations occur and PTFE gaskets are installed. Sizes range from ½" up to 12".



A less common but very practical alternative is the Single Pin Squeeze Clamp. These sanitary clamps allow for a quick and easy installation with one hand. They are excellent choices for flow panels or tight spaces. These clamps are constructed of 304 stainless and range in sizes from ½" up to 4".

Potential Issues with Tri-Clamps

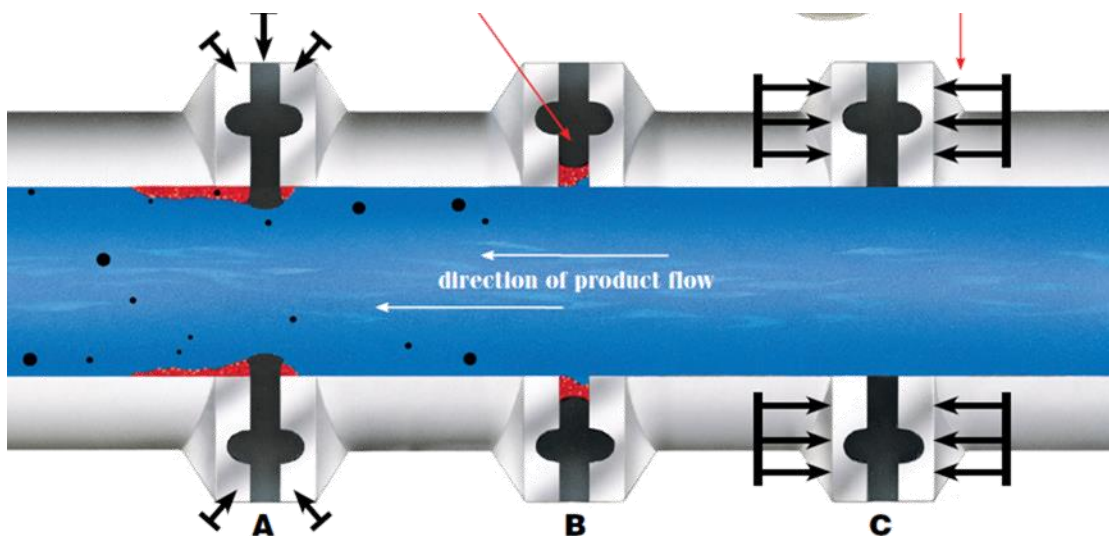
As mentioned earlier, tri-clamp fittings are made up of 2 ferrules, a gasket and a clamp. Gasket selection is key to ensuring a leakproof connection. The most common gasket materials are:

- BUNA – nitrile rubber (NBR); a copolymer of butadiene and acrylonitrile
- EPDM – ethylene propylene diene rubber
- FPM – flourinated propylene monomer, commonly sold under the trade name Viton®
- PTFE – polytetrafluoroethylene elastomer, commonly sold under the trade name Teflon®

For additional information on gaskets, check out our [Elastomer Compability Guide](#) and our [Basic Elastomer Characteristics Guide](#).

Before tightening the clamp, make sure the gasket is seated properly into the seats of both ferrules. Misalignment of the gasket is one of the main causes of leaks in tri-clamp fittings.

Typically, hand tightening is all that is required for a secure connection. Options are available using torque nuts or other torquing devices to prevent over- or under-tightening of the clamp; another issue that can damage the fitting and/or the gasket and create a foothold for bacteria to build up in your system. Over-tightening will pinch the gasket and force it to extend beyond the ferrule. Under-tightened clamps create openings in the seat and will lead to leaks.



An over-tightened gasket intrudes into the pipe, damming system flow, preventing proper draining and allowing deposits to build up behind the gasket.

An under-tightened gasket may allow leakage and forms a negative recess at the product side, allowing deposits to collect and affecting drainage and cleaning.

Establishing a flush seal eliminates the concerns associated with over and under tightening a gasket. Insures seal I.D. matches pipe I.D.

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