

Technical Guide

The Single Barb Concept

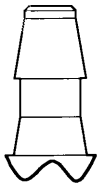
Due to the shape of a barb, it is impossible to injection mold any but the first barb without a parting line. Multiple barbed plastic fittings then necessarily have a parting line on the extra barb and thus have potential leak paths molded into the part. The parting line becomes more pronounced as the tooling wears, resulting in components with increased likelihood of failure.

There are two other problems with multiple barb fittings. First, it is impossible to fabricate tooling that creates a perfectly sharp edge on each barb of a molded multiple barbed fitting, a feature critical to the performance of the connection. Second, multiple barb fittings don't allow the tubing to relax behind the first barb. The tubing "bridges" from barb to barb, never being allowed an uninterrupted interface with the fitting. The results are compromised pressure and tensile capacities.

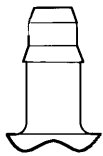
Our single barb design avoids these shortcomings. Expert tooling design assures the sharpest edge possible. And the straight cylindrical surface behind the single barb works together with the sharp barb edge. By forcing the tubing over the barb and then letting it relax behind it, the sharp edge is able to "bite" into the tubing. The result is a connection with excellent tensile and pressure performance.

Available Barb Designs

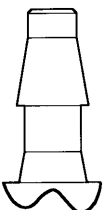
There are three different barbed Instrument Quality fitting designs: 200 Series, 400 Series, and Classic Series. Each of these offers different advantages.



The 200 Series design offers outstanding performance characteristics and easier assembly with tubing such as Polyurethane and PVC, when compared directly with our Classic Series barb design. Over the size range in which this barb style is available, the tubing inside diameter is expanded 50% above its nominal size. This permits high pressure capabilities in the larger sizes while ease of assembly is increased in the smaller barb sizes, relative to the graduated tube expansion used in the Classic Series. Additionally, the through-bores are relatively larger in the smaller size 200 Series barbs than in their Classic Series counterparts, offering improved flow efficiency. This design also has excellent tensile strength of the tubing interface.



The 400 Series design is characterized by a distinct barb shape which provides easy assembly while maintaining a high percentage of the pressure and tensile capabilities of our other designs. Originally created for use with semi-rigid tubing such as Polyethylene, the 400 Series design is preferred for applications in which Engineering specifications for the barb joint properties are not highly critical or in which ease of assembly is desired. The tubing ID is expanded 25% above its nominal diameter for all sizes in which this barb is available.



The Classic Series is characterized by a longer barb than either of the other two designs. This feature aligns the tubing ID with the barb tip at assembly and extends the sealing surface of the fitting for very soft tubing materials such as Silicone or latex rubber. Over the size range in which this barb style is available, the tubing is expanded from 42% to 69% above its nominal inside diameter. The "10" barb for 1/16" ID tubing expands the ID the most, while the "60" barb for 1/4" ID tubing expands it the least. This allows greater sealing capability as the nominal strength of the tube/barb joint is reduced with smaller nominal size and easier assembly as nominal size increases.

The X Thread

The X Series components have a tapered #10 thread form that functions much like a pipe thread. This design works better with oversized ports and ports which are not perpendicular to the face of the component than do straight 10-32 UNF threaded fittings.

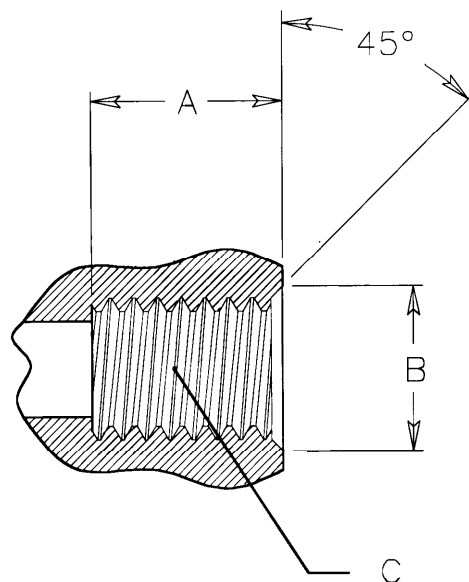
The 120° angle under the hex provides a seal when the fitting is tightened into a threaded port with a countersink, as shown below. For applications using either an Elbow or Tee where orientation of the barb is important, the tapered thread will tighten radially.

Other Thread Series

Our K, B, C, and D Series fittings designed for use with 10-32 UNF ports are straight-threaded components. These fittings are intended to be sealed against the 120° angle under the hex on the fitting and therefore do not tighten radially as they are assembled. Our S Series fittings are straight-threaded components for use with 1/4-28 UNF ports.

Our part numbers for fittings with pipe threads are very easy to follow. Those for use with 1/16-27 NPT ports have part numbers prefixed with 16; those for use with 1/8-27 NPT ports have part numbers prefixed with 18; and those for use with 1/4-18 NPT ports have part numbers prefixed with 14.

It is important that the features shown below are incorporated into the port when using the X, K, and S Series fittings. Failure to do so will jeopardize the performance of the threaded or tapered seal. We also recommend that you contact a specialist for advice on thread sealants for applications in which the port/fitting seal is highly critical or is subject to adverse conditions.



Value Plastics Thread Series	Dimension A Minimum Full Thread Length	Dimension B Countersink Diameter	Feature C Internal Screw Thread Series
X	.250 in	.210-.230 in	10-32 UNF 2B
K	.200	.210-.230	10-32 UNF 2B
S	.250	.270-.290	1/4-28 UNF 2B

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Ultimate Tensile Strength Of Barb /Tubing Connections

Tubing I.D. x O.D.	Classic series with Tygon R-3603 Tubing	200 Series with Tygon R-3603 Tubing	400 Series with Tygon R-3603 Tubing	400 Series with Flex LDPE Tubing
1/16" x 1/10"	—	—	—	6.96
1/16" x 1/8"	6.50	4.15	1.45	8.30
3/32" x 5/32"	9.84	7.69	2.99	15.6
1/8" x 3/16"	12.4	11.0	4.45	19.6
1/8" x 1/4"	17.4	15.2	5.47	—
5/32" x 7/32"	16.4	13.4	11.2	—
.170" x .250"	—	—	—	30.1
3/16" x 1/4"	15.9	18.0	13.1	—
1/4" x 3/8"	21.7	21.4	—	—

Values are expressed in Pounds Force (LBF).

Absence of entry indicates test not performed.

Testing was conducted with a United FM-30 Tensile Testing machine. Specimens were mounted and pulled at 20 inches per minute. Failure mode was tubing pulling off barb in every specimen.

Value Plastics barbed fittings designed for use with the tubing size shown were used in these tests. No oversized barbs were used to increase tensile values.

The data presented in this publication is for reference only. It has been compiled from various information sources, primarily the resin manufacturers, to provide our customers with a means of comparing the characteristics of resins used by the manufacturers at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their suitability for your application. All information is provided without implied or expressed warranty by the parts manufacturers guarantee or the resin manufacturers. None of the information provided constitutes a recommendation or endorsement of any kind. If you have any additional questions regarding the resins used in our products, we will be happy to refer you to the resin manufacturer(s) for further information.