# Automatic Buttweld Fittings

September 2010

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## Automatic Buttweld Purpose

Parker Buttweld fittings are designed for applications requiring the reliability of a welded tubing system. They were developed specifically for installation using automatic, orbital TIG (Tungsten/ Inert Gas) welding equipment. These fittings offer the easiest, fastest and most reliable way to fabricate welded systems.

Automatic Buttweld fittings are available in 316, and 316L stainless steel in straight unions, tees, 90° elbows, and crosses. Automatic Buttweld ends are also available with male pipe and compression tube connections.

## Pressure

Pressure ratings will be governed by the tubing wall thickness selected for a particular application.

Working pressures are rated at room temperature based on a 4 to 1 design factor. Pressure ratings are calculated in accordance with ANSI Power Piping Code B31.1.

## Automatic Buttweld Principles of Operation

In an orbital welder, the electrode is contained and shielded within the head (see Figure 1). The head itself does not rotate; rather, the electrode rotates 360° within the head.

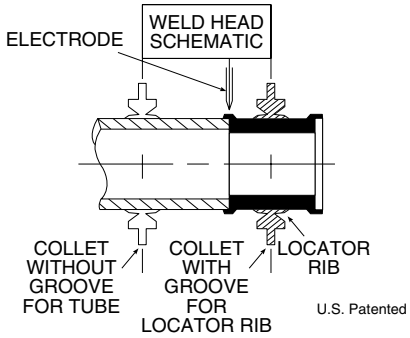


**Figure 1 –** The orbital welder electrode is shielded within the stationary head and rotates 360° to produce uniform, accurate welds.

An orbital-type welder utilizes high-frequency current pulses, producing low-frequency arc pulses. These yield considerable arc penetration into the metal at low current values. As a result, arc-pressure variations are kept low and the resulting agitation of the weld puddle eliminates porosity and refines the grain structure at the weld area.

**To operate a TIG welding machine:**

1. Place the Automatic Buttweld fitting into the weld head, placing the locator rib in the corresponding locator groove.
2. Bottom the tubing (square cut, deburred) in the fitting end collar and close the second collet, which locks the tubing to the weld head. Engage the second collet.
3. Close the weld head. Press the “Start” button.

**Note:** Depending on the size and wall-thickness of the tubing, the welding machine parameters can be programmed to make one or more 360° passes. Once programmed, the machine will repeat the operation precisely, within very close tolerances and in areas too tight for manual welding.

## Automatic Centering of Electrode

Each Parker Automatic Buttweld fitting has an external locator rib (patented) situated a fixed distance from the end welding collar (see Figure 2). When the welder-head clamping collet is applied, the rib fits snugly within a corresponding annular groove in the collet.

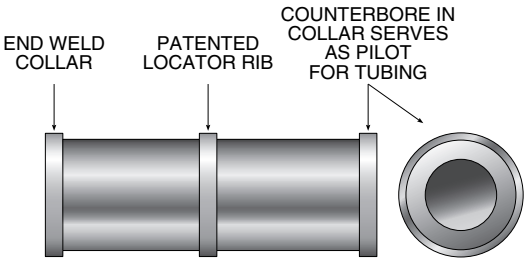


**Figure 2 –** The Automatic Buttweld fitting has a locator rib positioned a fixed distance from the end weld collar.

As the electrode orbits, the collet follows the rib, maintaining precise positioning of the electrode, over the end collar (see Figure 3). Thus, electrode and welding positioning are always accurately aligned.

## End Weld Collar

On the O.D. of each Automatic Buttweld fitting end, there is an end collar. During welding, the electrode tip is positioned directly over this end collar. As the electrode orbits, a uniform bead on the butt-seam is achieved.



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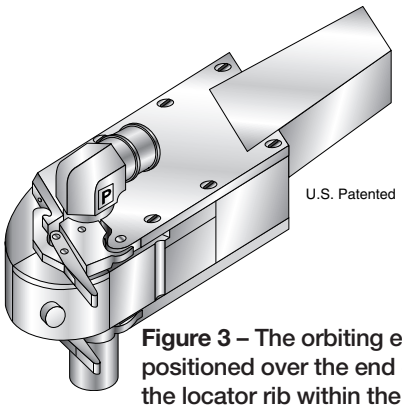


**Figure 3 –** The orbiting electrode is precisely positioned over the end collar by engaging the locator rib within the weld head.

**Note:** The weld head shown is for illustration only.

## Piloted Mating of Tube to Fitting

The end collar of the Automatic Buttweld fitting is counter bored. This serves as a pilot for the tube end, guiding it accurately into the fitting end.

This feature provides for accurate alignment and consistent welds every time.

## Compensation for Tube-Thickness Variations

The outside diameter of the end collar is designed to compensate for normal variations in the nominal O.D. of instrumentation tubing.

In addition, each fitting is machined for the specific wall thickness being specified.

These two features allow for the fitting bore and tube I.D. to be carefully matched. Thus, an ABW connection will allow for full flow, with no protrusions extending into the flow path. This will reduce a major cause of turbulence.

## Backing Gas

Backing gas is an inert gas used to flood the interior of the fittings and tube system during welding. By reducing the interior oxygen level to as low as practicable, it also serves to control the combustion of contaminates that could affect weld quality.

When a backing gas is not used and nearly 100% weld penetration is achieved, blisters will tend to form on the internal tube wall. This will result in scale which may later break loose.

In most cases the backing gas will be argon or helium connected to the system through a control regulator. Flow rates, while small, should be high enough to purge the system. Welds should be made in downstream sequence from the gas connection.

Note that the entire system should be purged to insure that there are no openings that will allow air to be drawn into the system.

The use of backing gas, while often not mandatory, will give a better weld joint. This is because the welds are made and cooled under a shielded atmosphere, thus eliminating internal scaling or blistering.

## Materials

Automatic Buttweld Tube Fittings are available in stainless steel (Type 316 and 316L – AOD/VAR and 316L VIM/VAR). Straight fittings are machined from cold finished bar stock and shaped bodies are machined from close grain forgings. The raw materials used for fittings fully conform to the chemical and mechanical requirements of one or more of the specifications listed in the table on page 11. For nuclear and other critical applications, Automatic Buttweld fittings are available with documented heat code traceability.

# Visual Index

## Automatic ButtweldFittings





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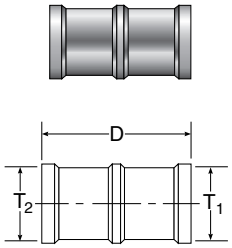
# Automatic Buttweld Fittings

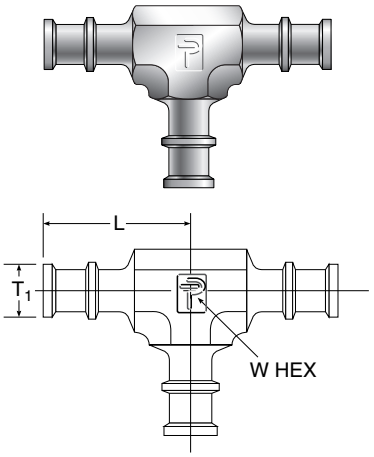
## Automatic Buttweld Union




| Part Number | Inches | | | |
|---|---|---|---|---|
| | D | $T_1$ | $T_2$ | *Auto-Buttweld Wall Size |
| **4-4 YHY** | 0.77 | 1/4 | 1/4 | .035-.035 |
| **6-4 YHY** | 1.34 | 3/8 | 1/4 | .035-.035 |
| **6-6 YHY** | 0.77 | 3/8 | 3/8 | .035-.035 |
| **8-4 YHY** | 1.48 | 1/2 | 1/4 | .049-.035 |
| **8-6 YHY** | 1.48 | 1/2 | 3/8 | .049-.035 |
| **8-8 YHY** | 0.77 | 1/2 | 1/2 | .049-.049 |
| **12-12 YHY** | 1.07 | 3/4 | 3/4 | .065-.065 |
| **16-16 YHY** | 1.07 | 1 | 1 | .095-.095 |

*Other fittings and wall sizes available upon request.

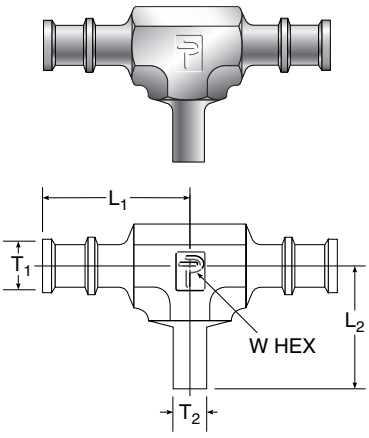
## Automatic Buttweld Union Tee




| Part Number | Inches | | | |
|---|---|---|---|---|
| | L | $T_1$ | *Auto-Buttweld Wall Size | W Hex |
| **4-4-4 YJY** | 1.06 | 1/4 | .035 | 7/16 |
| **6-6-6 YJY** | 1.19 | 3/8 | .035 | 9/16 |
| **8-8-8 YJY** | 1.44 | 1/2 | .049 | 3/4 |
| **12-12-12 YJY** | 1.64 | 3/4 | .065 | 1-1/16 |
| **16-16-16 YJY** | 1.81 | 1 | .095 | 1-5/16 |

*Other fittings and wall sizes available upon request.

## Automatic Buttweld Manifold Branch Tee




| Part Number | Inches | | | | | |
|---|---|---|---|---|---|---|
| | $L_1$ | $L_2$ | $T_1$ | $T_2$ | *Auto-Buttweld Wall Size | W Hex |
| **4-4-4 YJT3** | 1.06 | 1.03 | 1/4 | 1/4 | .035 | 7/16 |
| **6-6-4 YJT3** | 1.19 | 1.15 | 3/8 | 1/4 | .035 | 9/16 |

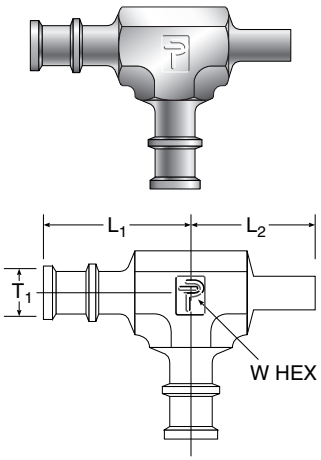
*Other fittings and wall sizes available upon request.

Dimensions for reference only, subject to change.

## Automatic Buttweld Manifold Run Tee

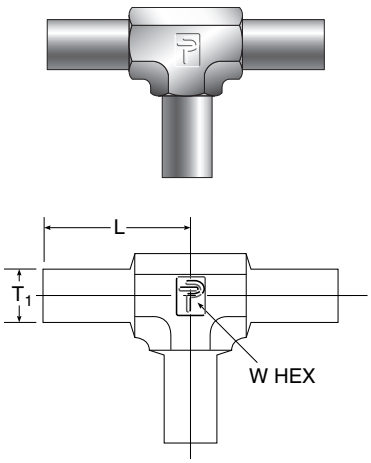
| Part Number | Inches | | | | |
|---|---|---|---|---|---|
| | $L_1$ | $L_2$ | $T_1$ | *Auto-Buttweld Wall Size | W Hex |
| **4-4-4 YJT3Y** | 1.06 | 1.03 | 1/4 | .035 | 7/16 |

*Other fittings and wall sizes available upon request.




## Automatic Tube Buttweld Manifold Tee

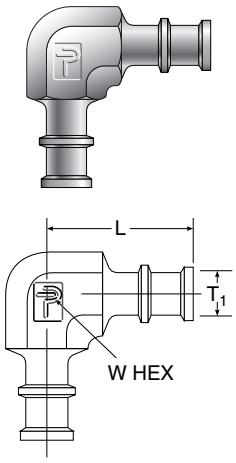
| Part Number | Inches | | |
|---|---|---|---|
| | L | $T_1$ | W Hex |
| **4-4-4 T3JT3** | 1.03 | 1/4 | 7/16 |




## Automatic Buttweld Union Elbow

| Part Number | Inches | | | |
|---|---|---|---|---|
| | L | $T_1$ | *Auto-Buttweld Wall Size | W Hex |
| **4-4 YEY** | 1.06 | 1/4 | .035 | 7/16 |
| **6-6 YEY** | 1.19 | 3/8 | .035 | 9/16 |
| **8-8 YEY** | 1.44 | 1/2 | .049 | 3/4 |
| **12-12 YEY** | 1.64 | 3/4 | .065 | 1-1/16 |
| **16-16 YEY** | 1.81 | 1 | .095 | 1-5/16 |

*Other fittings and wall sizes available upon request.




Dimensions for reference only, subject to change.



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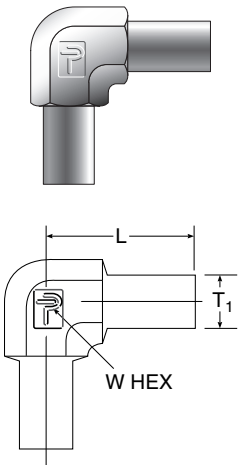
# Automatic Buttweld Fittings

## Automatic Tube Buttweld Manifold Elbow

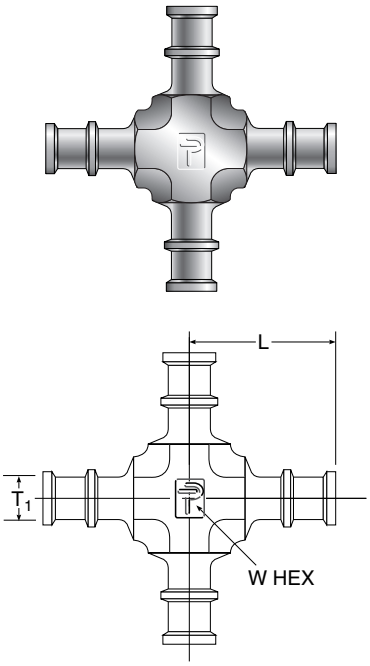
| Part Number | Inches | | |
|---|---|---|---|
| | L | $T_1$ | W Hex |
| **4-4 T3ET3** | 1.03 | 1/4 | 7/16 |




## Automatic Buttweld Cross

| Part Number | Inches | | | |
|---|---|---|---|---|
| | L | $T_1$ | *Auto-Buttweld Wall Size | W Hex |
| **4 YKY** | 1.06 | 1/4 | .035 | 7/16 |
| **6 YKY** | 1.19 | 3/8 | .035 | 9/16 |
| **8 YKY** | 1.44 | 1/2 | .049 | 3/4 |

*Other fittings and wall sizes available upon request.

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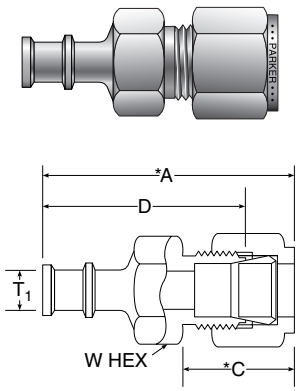
## Automatic Buttweld to Tube Union

### CPI™

| Part Number | Inches | | | | | |
|---|---|---|---|---|---|---|
| | D | $T_1$ | *A | *C | **Auto-Buttweld Wall Size | W Hex |
| **4-4 YHBZ** | 1.42 | 1/4 | 1.71 | .70 | .035 | 1/2 |
| **6-6 YHBZ** | 1.51 | 3/8 | 1.80 | .78 | .035 | 5/8 |
| **8-8 YHBZ** | 1.71 | 1/2 | 2.11 | .91 | .049 | 13/16 |

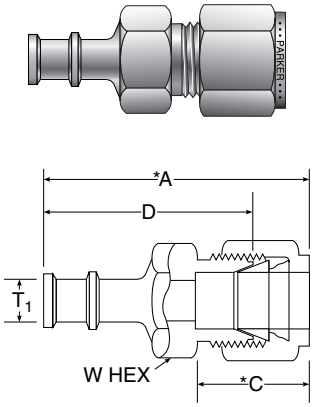
Silver plated nut and single ferrule are provided as shown.
*Dimensions shown with nut finger tight
**Other fittings and wall sizes available upon request. Silver plated nut and single ferrule are provided as shown.




### A-LOK®

| Part Number | Inches | | | | | |
|---|---|---|---|---|---|---|
| | D | $T_1$ | *A | *C | **Auto-Buttweld Wall Size | W Hex |
| **4-4 YHLZ** | 1.42 | 1/4 | 1.71 | .70 | .035 | 1/2 |
| **6-6 YHLZ** | 1.51 | 3/8 | 1.80 | .76 | .035 | 5/8 |
| **8-8 YHLZ** | 1.71 | 1/2 | 2.11 | .87 | .049 | 13/16 |

Silver plated nut and single ferrule are provided as shown.
*Dimensions shown with nut finger tight
**Other fittings and wall sizes available upon request. Silver plated nut and single ferrule are provided as shown.




Dimensions for reference only, subject to change.



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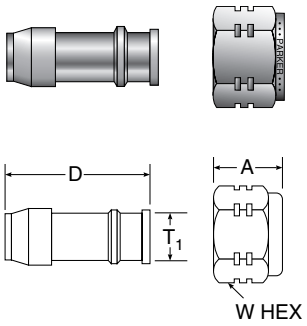
# Automatic Buttweld Fittings

## Automatic Buttweld Adapter to Compression Port Connector

| Part Number | Inches | | |
|---|---|---|---|
| | D | $T_1$ | *Auto-Buttweld Wall Size |
| **4-4 ZPY** | 1.12 | 1/4 | .035 |
| **6-6 ZPY** | 1.09 | 3/8 | .035 |
| **8-8 ZPY** | 1.52 | 1/2 | .049 |
| **12-12 ZPY** | 1.50 | 3/4 | .049 |
| **16-16 ZPY** | 1.71 | 1 | .083 |

*Other fittings and wall sizes available upon request

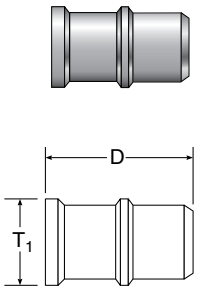
| Part Number | Inches | |
|---|---|---|
| | A | W Hex |
| **4 BY** | 0.50 | 9/16 |
| **6 BY** | 0.56 | 11/16 |
| **8 BY** | 0.69 | 7/8 |
| **12 BY** | 0.69 | 1-1/8 |
| **16 BY** | 0.81 | 1-1/2 |




## Automatic Buttweld Plug

| Part Number | Inches | | |
|---|---|---|---|
| | D | $T_1$ | *Auto-Buttweld Wall Size |
| **4 PNY** | 0.72 | 1/4 | .035 |
| **6 PNY** | 0.72 | 3/8 | .035 |
| **8 PNY** | 0.72 | 1/2 | .049 |
| **12 PNY** | 1.02 | 3/4 | .049 |
| **16 PNY** | 1.02 | 1 | .083 |

*Other fittings and wall sizes available upon request




Dimensions for reference only, subject to change.

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## Nomenclature

Parker Automatic Buttweld Tube Fittings part numbers are constructed from symbols that identify the size and configuration of the fittings and material used.

## How To Order

Parker Buttweld components are easily derived from the following example and ordering chart. The seven product characteristics required are coded as shown in the chart.

The example below describes an elbow fitting going from 1/4" tubing to 1/4" tubing, .035 wall thickness.

**Example: 4-4YEY-SS.035**

| 4 | – | 4 | Y | E | Y | – | SS | .035 |
|---|---|---|---|---|---|---|---|---|
| Fitting Size | | Fitting Size | Machining Type | Fitting Type | Machining Type | | Material | Wall Thickness |

| Fitting Size | Fitting Size | Machining Type | Fitting Type | Machining Type | Material | Wall Thickness* |
|---|---|---|---|---|---|---|
| The first two numbers denote the fitting size which matches the tubing O.D.<br>**4** 1/4" tube<br>**6** 3/8" tube<br>**8** 1/2" tube | | **(First End)**<br>**Y** ABW | **H** Straight<br>**J** Union Tee<br>**E** Union Elbow | **(Second End)**<br>**Y** ABW<br>**F** Male Pipe<br>**CPI™** BZ<br>**A-LOK®** LZ | **SS** Stainless Steel 316L<br>**SSR** AOD/VAR (316R)<br>**SSV** VIM/VAR (316V) | **.035** Sizes 4 and 6<br>**.049** Size 8<br>Other wall thicknesses available upon request. |

*Fittings must be specified to match the corresponding tube wall thicknesses.

**Special fittings:** If a special fitting configuration is required, it is suggested that a sketch or drawing be submitted for review.

**Availability:** Only items listed in current price list are carried in stock. Customer Specials may be quoted through Parker Veriflo Division Customer Service.

### Typical Raw Material Specifications

| Fitting Material | Bar Stock | Forgings | Recommended Tubing Specifications |
|---|---|---|---|
| Stainless Steel 316L<br>Stainless Steel 316L (AOD/VAR)<br>Stainless Steel 316L (VIM/VAR) | ASTM A-276 TYPE 316LSS<br>ASME SA-479 TYPE 316L-SS | ASME SA-182 GRADE 316L | ASME SA-213<br>ASTM A-213<br>ASTM A-249<br>ASTM A-269<br>MIL T-8504<br>MIL T-8506 |

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