

Quite a Sight

Installing a sight glass on your kettle

Projects

story and photos by Thom Cannell



Using simple tubing for illustration, here's how our sight glass will look. The tube is held with Oeticker clamps.

Don't you hate it when you empty your boiling kettle and come up short? Do you envy your pals who have nifty sight glasses attached to their kettles? Wouldn't you like one of your own? Those are all questions I've answered for myself with a resounding yes!

What's a SIGHT GLASS?

Sight glasses are columns that attach to your kettle and are open at the top and bottom — open to the interior of the kettle, that is. Liquid flows in from the bottom opening and equalizes at the same level as the liquid in the kettle. Before describing no-weld and welded options, we should mention the cheapest measurement tool, a story pole. This is simply a long spoon or thick dowel calibrated for each of your pots. Markings at every half-gallon level will yield a good approximation of how much liquid your kettle or sparge-water pot contains. Elegant? Sure, but with a coolness factor of zero.

Selecting the SAFEST TUBING

Professional-grade sight glasses are just that — glass. However, the way I bumble around in the brewhouse, even tough borosilicate glass won't work. In typical homebrew fashion, most homebrewers have turned to the ubiquitous Tygon tubing. In theory, this is a very bad idea, even though thousands of brewers get away with it. Regular clear 3/8-inch Tygon is rated at 26 psi at 73 °F (22.8 °C). Go on, read that again: 26 psi won't blow up a balloon and 73 °F (22.8 °C) — that's pitching temperature!

Tygon formulation B-44-4X IB — that's Internal Braid and the specification number, it's printed on the tubing — is rated to handle four times the pressure of non-reinforced Tygon tubing. This kind of Tygon is a 3/8-inch tube with a 5/8-inch outside diameter (OD) and is rated to handle 100 psi at 160 °F (71 °C). That's about 88 psi more than our application requires, so it can safely handle the job.

While the temperature rating will be exceeded by boiling wort at 212–216 °F (100–102 °C), the reduction in maximum pressure to atmospheric makes this a very reasonable option when the tubing is properly installed and tightly clamped.

Just remember that there is hot liquid in the sight glass. Like your kettle spigot, which gushes when you twist it open, you need to be careful with the sight glass and keep it protected.



If you don't want to weld, you can make a no-weld sight glass from compression fittings like these.

SUPPLIES (WELDED)

Parts:

Stainless steel tubing	\$5.00/foot (1')
Tubing bender	\$11.00
Brazing rod (used 1/10)	\$15/oz.
Brazing flux (used 1/1,000)	\$12.00
Braided tubing	\$0.60/ft. \$0.90

Tools:

Tubing bender, oxy-acetylene (or TIG or MIG) welding equipment.

SUPPLIES (WELDLESS)

Parts (bushing-based)

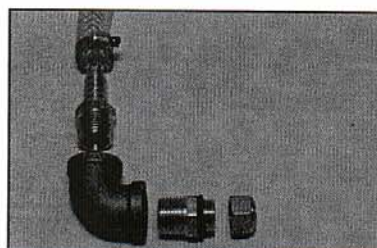
Male pipe-to-FIP bushing 1/2 x 3/8"	\$1.00
3/8" FIP-to-MIP street elbow	\$2.75
1/2" female pipe coupling	\$1.75
3/8" barbed fitting	\$1.50
1/2" clamps	\$1.00
Braided tubing	\$0.60/foot
Heatproof O-ring	\$1.00

Parts (compression-based)

1/2" cast FIP-to-FIP elbow	\$2.50
1/2" x 1/2" MIP compression connector	\$1.70
1/2" barbed fitting	\$1.70
1/2" clamps	\$1.00
Braided tubing	\$0.60/foot
Heatproof O-ring	\$1.00

Tools and miscellaneous:

wrenches, screwdriver, drill bits and motor, Teflon tape or Teflon pipe dope.

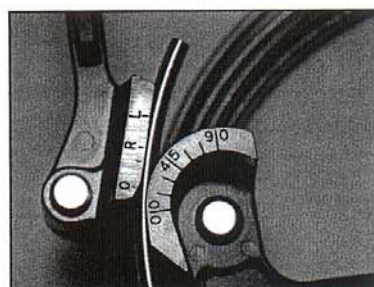


Here's an exploded view of a weldless assembly showing the fitting, O-ring, elbow, barbed fitting, hose and clamp.

Projects



Here's a tubing bender and a coil of thin stainless-steel tubing the author purchased at an Internet auction.



Use the tubing bender to make 90° bends in the stainless-steel tubing. You'll need a top and bottom bent tube.

Step-by-Step NO-WELD FIT

There are several ways to make a weldless bulkhead fitting; all are very similar. First you have to punch or drill a hole in the kettle, insert a threaded fitting, install a rubber O-ring to prevent leakage, and attach two "nuts" to secure the whole thing. In all cases, stainless-steel materials are preferred over brass. You could use a close nipple (pipe threaded at either end), an interior O-ring (available from many retailers for under a buck), and a female coupling inside with a brass elbow and barb fitting outside. However, experts say compression fittings are less likely to leak than this arrangement.

The first photo on page 49 shows a compression fitting pulled from just such a weldless fitting; the compression nut goes on the inside of the kettle and you'd attach a brass or stainless steel elbow to the external male fitting. The second photo shows an exploded view of a similar compression-fitting

system. Another version is using (from left to right) a brass barb fitting, a FIP-to-MIP street elbow, a bushing (a fitting that is threaded internally and externally), an O-ring and a female coupling. Of course in either case you need a pair of these parts, one at the bottom and one at the top!

Drilling your kettle will require the correct-sized drill bit, which will add another \$10-\$15 to the cost. Still, at \$6 per assembly, your total is less than \$30 for a solid sight glass system.

Step-by-step CONSTRUCTION

Each weldless connection begins by marking points perpendicular to the pot's bottom, 1-2" from the bottom and top, and then marking the points for a 1/8" pilot hole. With a punch, dimple the pilot hole mark; drill bits skate on stainless steel. Drill a hole sized for your connectors (3/8-1/2"), then insert the close nipple or small end of the compression fitting. From the inside, fit a heat-resistant O-ring and tighten the



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nut (for compression fittings, it may be better to fit the O-ring from the outside.) Using two wraps of Teflon tape or pipe dope, seal external threads and attach an elbow. Using the same technique, attach a barbed fitting. Then install braided tubing and clamp.

Step-by-step WELDED FIT

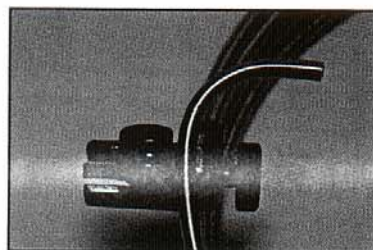
Another way of making a sight glass is with stainless-steel tubing. Gather two right-angle tubes, two Oetiker tubing clamps, 12–18 inches (30–46 cm) of heat-resistant tubing and you're almost done. Finding stainless tubing, bending it and joining the metal is the skilled part.

Stainless-steel tubing is available in many grades and wall thicknesses. Wall thickness is not an issue for us, nor is internal diameter, as long as the tube is large enough that it won't clog up with debris from the kettle; 1/8–3/8" should be sufficient. Grade is important; you must use 304 or 316 grade tube. The 300 family of stainless steel

is used for brewery equipment: 304 is the most commonly used; 316 offers improved corrosion resistance. Most high-quality brew kettles are 304 and 316 is the best steel for fittings and tubing. Plus, they are easy to weld.

I've reached the conclusion that brazing skills are more common than shielded gas (Metal Inert Gas or Tungsten Inert Gas) welding knowledge. After playing with an inexpensive TIG rig from HTP America ("TLC for Stainless," November 2001), I returned to brazing. Not because I wasn't a good welder; I just didn't have the time to devote to learning this tool. Pity.

So I'm back to brazing, which produces a bond that is almost as strong as welding. The difference? In welding, two metals are made liquid; they commingle and become one. Brazing heats surfaces to red heat and joins them with a filler metal that melts at a lower temperature. Brazing requires skill, the correct brazing rod, and the proper flux. Our research says that



This type of tubing cutter works better than a hacksaw because it leaves a smoothly beveled edge.



You can make a selection of bent tubes to choose among, then trim the selected tubes to their final size.

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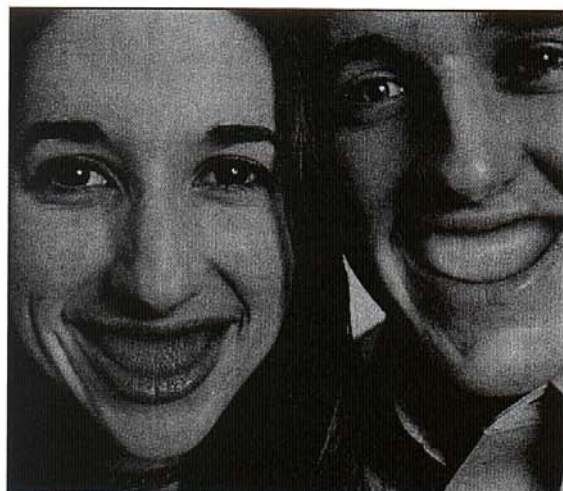
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A close-up of the silver brazed fitting. Brazing uses a filler metal to join two metal surfaces together.



Once the tubes are welded to the kettle, insert the tubing. The final step is to secure the tubing with Oeticker clamps.

brazing requires a high silver-content rod and specific flux. Flux cleans and protects metals as they are joined.

Welding equipment supplier Harris Welco recommends a brazing rod containing 56% pure silver plus copper and nickel, SafetySilv 56, with a low 1205 °F (651.6 °C) melting point. As you'll see, it produces a connection (fillet) that's comparable to TIG welding. Compared to more common SafetySilv 45, SafetySilv 56 matches stainless steel coloration better. It's not as expensive as the silver content makes it sound, but it may require a special order. For brazing stainless steel use Stay-Silv Black Flux.

For experienced welders, regular white flux is for lower-temperature applications; stainless steel takes more heat to braze than copper or steel, and the flux has a tendency to burn up because its active range is lower. Black Flux has a greater range and the alloy will "wet out" easily. This particular flux cleans up with soap and hot water.

Step-by-step WELDING OPTION

Using a tubing bender, bend two 4" (10 cm) lengths of stainless-steel tubing at 90° and cut the tube after bending. Then cut or trim to length with a tubing cutter.

Drill two holes in your kettle, each approximately 1.5" (3.8 cm) from the top and bottom. Hole diameter should equal the internal diameter of your stainless-steel tubing plus approximately 1/32" (0.79 mm). Fit the prebent tubing and hold at 90° to kettle surface at both axis: up-down and side-to-side. I jammed a wire into the tube from beneath and used sand bags to locate the wire. Brush on flux and braze using a very small tip on your torch. Then wash the cooled weld with soap and water and green 3M scrubbing pad. Attach your internal-braided Tygon tubing and clamp it tight (see photos at left and on page 49). ■

Thom Cannell writes "Projects" in every issue of *Brew Your Own*.

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