

Plumbing Part V - Fittings

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There are no Live Steam suppliers in the local area (central Ohio) where one can go and examine various products. There are several Live Steamers in the area and they have been more than willing to explain the choices they made in selecting various components. The data these guys provided has been very useful. I've found the plumbing fittings particularly fascinating, more so after I was able to examine the variations in detail. The purpose of this note is to share with others photos of some of the fittings because there seems to be no other source of comparison data.

A general plumbing plan was developed several months ago ([Plumbing I](#)). Next, each plumbing run was sketched and all the required fittings itemized. The fittings were then ordered ---- several months before they were required in case some were temporarily out of stock ---- which indeed turned out to be the case.

The fittings are from LS Manufacturing, Coles and Superscale . There are differences in the fittings supplied by each which is why the multiple sources were selected. During this process I had a conversation with John at LS Manufacturing and several conversations with a gentleman at Coles (I failed to write down his name --- my fault). Both LS Manufacturing and Coles expressed a genuine interest in satisfying my needs and I plan to deal with both in the future. I'll make references to these conversations as I discuss the specific fittings. After the initial purchase from Coles, LS Manufacturing and Superscale I became aware of the PM Research line of fittings and bought a few for a comparison--- and to cover those fittings that were out of stock at Coles.

I had no direct communication with anyone at SuperScale. However, they shipped my order quickly and all fittings were as described in their catalog. The SuperScale prices are a bit higher than the other two suppliers and they charge both a shipping and a handling fee that comes to \$22.25 minimum per order. That seems a bit steep ---- but I was willing to pay it because I wanted some things that only they supply. Hope the fitting count was accurate ---don't want pay the fees on a second order

Size Comparison: The initial plan was to use only 1/4" and 1/8" sizes. After looking at photos of the blower and water feed pipes running parallel down the side of the boiler I decided to make the blower line 3/16". After that decision several other runs were also made 3/16" rather than 1/4". The photo shows a comparison of 1/8", 3/16" and 1/4" fittings. The elbows are Cole's TrueScale. The nipples are also from Coles. The 1/8" and 3/16" unions are from SuperScale and the 1/4" union is from LS Manufacturing.



Type of castings: The TrueScale castings from Coles have a rougher exterior (left in photo) than those supplied by LS Manufacturing (right in photo). LS Manufacturing makes only 1/4" fittings while Coles supplies TrueScale fittings in 5/16" through 1/8" sizes. I didn't buy any elbows or tees from SuperScale however, the check valve I bought (see later photo) suggests that the SuperScale fittings are similar to the castings from LS Manufacturing.

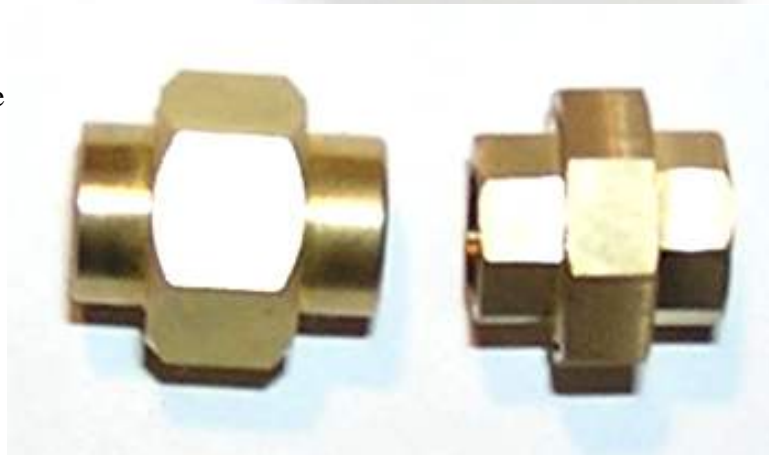
Note that the elbow and tees supplied by both LS Manufacturing and SuperScale are unthreaded whereas the TrueScale fittings from Coles are all threaded.



PM Research Fittings: This photo shows a 5/16" elbow and a 1/4" fitting tree from PM Research. The elbow was supplied with threads. The trees are available in 1/8", 3/16", 1/4" and 5/16" with a price range from \$2.90 for 1/8" to \$5.25 for the 5/16" They also sell single unmachined castings. Note that these castings are not cored ---- they must be drilled before threading whereas the SuperScale and LS Manufacturing unthreaded fittings are cored and don't need to be drilled.



Unions: The unions supplied by Coles, LS Manufacturing and SuperScale are all machined from brass stock. The Coles 1/4" union shown on the left side of the photo uses round stock for the end pieces whereas the LS Manufacturing (on right in photo) are from hex stock.



The SuperScale unions also use hex end pieces. The first photo above shows 1/8" and 3/16" unions from SuperScale. SuperScale makes unions with two female ends like those shown on right and also unions with one male and one female end like shown in the first photo. In some applications the male- female type will eliminate the need for a short nipple ---- very handy and economical.

Valves: The photo on right shows a 1/4" globe valve from Coles on the left and one from LS Manufacturing on the right. The castings types seem to be the same as each company uses for their tees and elbows discussed earlier. While the LS Manufacturing tees and elbows are unthreaded, their valves are threaded as are those from Coles.



I didn't purchase any globe valves from SuperScale. However, based on the SuperScale check valve shown later, I suspect that the SuperScale globe valves are similar to the LS Manufacturing globe valves shown here.

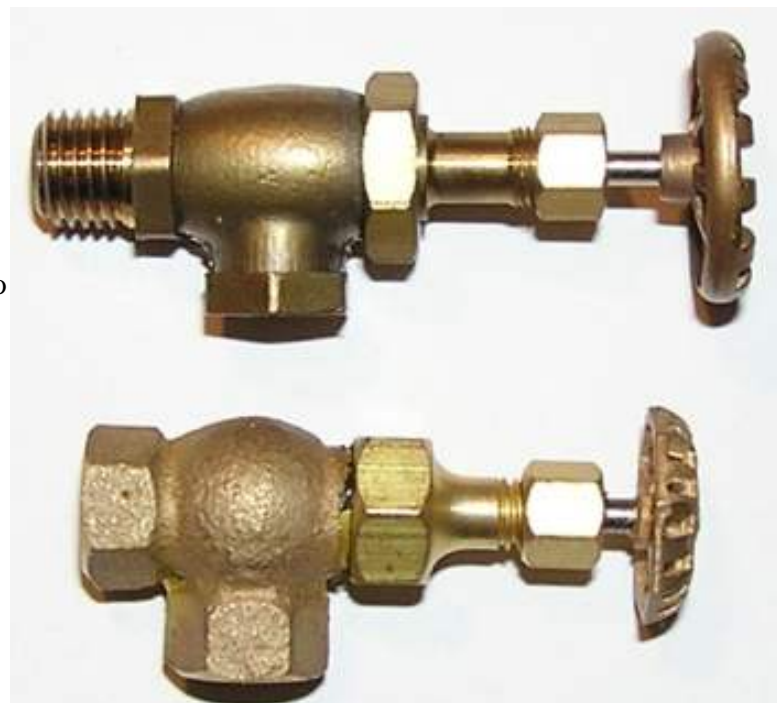
This shows the valve handles, Coles TrueScale on the left and LS Manufacturing on the right. The fittings are used to hold the valves upright for the photo.



Yep, had to take the valves apart



This photo shows the angle valves, LS Manufacturing on the top and Coles TrueScale on the bottom. When I received the LS Manufacturing valve I was surprised to find that the male end is 5/16" MTP since the valve is 1/4" and the female side is threaded 1/4". I dropped an email to Jim at LS Manufacturing and suggested that the description on the webpage be modified to include the male thread size. A few hours later Jim gave me a call and apologized for the description omission. I had already concluded that there was insufficient material to turn the male part down and thread 1/4". I had also concluded that I could easily cut off the male end and thread the valve body female 1/4". Jim confirmed both these points and said they had just made a run of these valves with the male part replaced with 1/4" female ends. Apparently it's difficult to make a 1/4" male part on these valves without restricting the full open flow rate.



This is another 1/4" LS Manufacturing angle valve with a union one side. I intend to use this style valve on the steam manifold. I purchased a 5/16" MTP tap (I'm well on the way to a full set of MTP taps and dies, now lacking only the 5/32" tap and die and the 5/16" die ---- talk about a slippery slide). I understand that 1/16" NPT is the same as 5/16" MTP. I'll have to get a 1/16" NTP tap and die the next time I order something from Enco.



Check Valve: This is the SuperScale 1/4" globe type check valve I selected to use with the water feeds to each side of the boiler.



The inside of the check valve showing the poppet.



The following photos show the water feed on Cass No 5 on the left and the fittings I plan to use to duplicate Cass No 5 on the right. The street elbow and short nipples are from Coles, globe valve and union are from LS Manufacturing and the check valve is from SuperScale. None of the fittings have been tightened --- once that is done the setup on the right should be nearly identical to the Cass No 5 water feed. The only remaining difference is the Valve handle. Live Steam Models Ltd (UK) carries several sizes of lost wax casting 5 spoke hand wheels very similar to the handles on Cass No 5. Live Steam Models lists a number of other interesting sounding parts, but there are no photos so a visit to get a hands-on view would be very helpful ----- and I have scads of frequent flyer miles. Hmmm, wonder if she'd notice if I was gone for a week or so??????



Water Gauge: The initial plan was to fabricate the water gauge. However, the design of the Coles *water gauge for large boilers* was appealing, especially the lower cutoff valve design that permits mounting directly to the boiler saving both space and a stack of fittings. The compact drain cock on the bottom is also handy. One concern was whether it would be the correct height but it appeared that the height could be adjusted if necessary. The nipple in the top part of the gauge is not part of the gauge unit --- it was inserted to show the position of the top port.

After the gauge arrived the visible part of the glass was found to be 2.625" --- about right since the space between the top of the crown sheet and the inside top of the boiler is a little over 3.5" (this is from drawings, will measure actual boiler when it arrives in a few weeks and correct this if necessary.) The distance between the centerlines of the top and bottom ports is about 3.6".

The male fitting on the bottom is 1/8" NPT that can be screwed into a mating hole in the boiler. The female port on the top piece is threaded 1/4" 32 TPI. The threads are not specified for the drain cock port on the bottom.

The four side rods are 1/8" brass with the ends turned down slightly and threaded 4-40 so it would be easy to cut down the rods or fabricate longer rods if necessary. Replacement 1/2" OD glass is available from both Coles and McMaster-Carr. O-rings are used to seal between the ends of the glass and the brass pieces.



One of the concerns I had is that the top port is threaded 1/4" 32 TPI and not tapered. Further, I don't have a 1/4"-32 die to make a mating fitting and didn't want to buy a die. One solution is to drill out the hole to 1/4" and solder in a piece of 1/4" tube and then thread the end of the tube 1/4" MTP. After looking at the top port I decided to just rethread it 1/4" MTP. If it doesn't seal, I'll solder it with 550 degree soft solder.

When the gauge arrived the little drain cock was missing. The water gauge had been on back order and I surmised that the gauges were supplied without the cocks and Coles added the cocks since they carry the cock (*straight nose cock*) as a separate item. I called Coles and that was exactly the case. They said they'd ship the missing cock immediately.

A couple hours later Coles called and said there was a problem ---- the port in the bottom of the water gauge is threaded 10-32 and the cock is threaded 3/16-40. The guy said that he assumed the manufacturer of the gauge had used the wrong thread but indeed the drawing said 10-32. (I assume the drawing will be changed to 3/16"- 40.) I thought about it a minute decided that since the #10 thread is 3/16" diameter I could rethread the cock 10-32. The 32 TPI thread is deeper than the 40 TPI so strength shouldn't be a problem. Since the threads are straight rather than tapered an aluminum or Teflon sealing washer is required in either case. (The Teflon washer didn't work very well --- it just squeezed out when tightened . A thin aluminum washer worked great.)

Note that both LS Manufacturing and Coles gave quick response to questions and were able to satisfy my needs. I will not hesitate to deal with both in the future. Also, I was very satisfied with the unions and check valves I obtained from SuperScale.

Some of the problems encountered involved the various thread standards. It could have been much worse if metric standards were added to the mix. On the other hand we should count our blessings that we don't have to deal with units such as furlongs and stones.

I'm an Electrical Engineer --- an area that had used the metric standard from WWII or before. It's a shame that the US didn't officially follow through with the plan to convert to metric in the 60s. The conversion has in fact taken place in many areas such as the auto industry. (The auto industry still has a problem with which side to mount the steering wheel). The major holdup was probably some powerful old folks who didn't want to have to deal with a new system.

I've observed one nonscientific not-so-young woman who has been able to cope when necessary with metric units when traveling outside the US. For example she has a simple approximation (double and add 30) to convert Celsius to Fahrenheit to determine whether she is hot or cold. The national conversion to metric would have happened overnight if the advocates had explained that a 150 pound person would weigh only 68 after the conversion.

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