

½ inch PVC Irrigation Full Sliding Coupler, Round 2, version 1.5

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I have reissued this article because I found a much easier way to make the sliding coupler. Please see <http://rick.sparber.org/SCAP.pdf> for background.

Here is the problem that is solved with the Full Sliding Coupler.



Down in the bottom of the hole is this pipe. With some effort, I was able to expose about a foot of it. I want to install a T.

In the past, I have dug about 5 feet on either side so the pipe can be bent. I would use a standard T and coupler to finish the job.



Instead, I cut the pipe on the right and cemented in my T. Then I cut the pipe to the left and shortened it so when cemented into the left side of the T, there was a ¼" gap.

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The final step was to apply primer and cement to the pipe ends plus to the sliding coupler. Deflect the pipe, slide on the coupler on the right pipe end, release the deflection, and slide it to the left until it is centered over the gap. With fresh cement, the coupler slides smoothly and with little resistance.

Sure beats digging the longer trench!

There is a lot of variation in outside diameter of PVC pipe yet we want a close sliding fit between pipe and coupler. The best method I have found so far is to first use some 1/2" Schedule 40 PVC pipe as a mandrel and then use the same piece of pipe down in the hole. This way we are sure it will fit.

You will need some 3/4 inch schedule 40 PVC pipe and a hot air gun. A lathe is handy for evenly heating the plastic but is not essential.



I took a 5 inch length of scrap 3/4 inch schedule 40 PVC and held it in my lathe chuck. The lathe was set to run at 26 RPMs. Next, with the lathe turning, I used my heat gun to warm about 2 inches of the end of this pipe. Since it was constantly turning, the heat was evenly distributed.

It took about 20 seconds for the plastic to go from hard to the consistency of leather. Then the lathe was turned off.



Using the pipe that will later be used in the repair, I slightly expand the ID of the heated pipe. Push the tool in at least 3 inches.

The pipe should slide in easily at first. I twisted it while the 3/4 inch pipe cooled. This reduces the chance of seizing up. Wiggling the 1/2" pipe also helps.

After about 30 seconds, I pulled the pipe out. Wait at least another 30 seconds.

And finally, I cut off about 2 inches of the newly enlarged 3/4 inch pipe and deburred as necessary.

Don't be tempted to first cut off a 2 inch piece of pipe and then enlarge the ID. The pressure you apply on the OD of the coupler will cause it to grab the pipe tightly. Assuming you can get it off, it will be too tight for the 1/2 inch pipe.

The newly minted coupler should be a close sliding fit on the ½ inch pipe that you just used to expand it. If you can't slide the coupler on the pipe, try sanding the inside of the coupler or make a new one. The PVC Cement will help it slid smoothly but if too tight, it will all freeze up.



It is possible that a steel mandrel can be made with a diameter equal to the maximum diameter of ½" PVC pipe. According to one source, this pipe is 0.840 ± 0.01 inches. Therefore, a mandrel 0.850 inches in diameter would pass all pipe. However, in the worst case, there could be a gap of 0.02 inches between the resulting coupler and the smallest diameter pipe (0.830 inches). My concern is that it might leak.

Ready to try out the new coupler.

My PVC Cement always dries out before the can is empty. Someone on line suggested storing it upside down. Made sense but time has shown that it doesn't help. **What is absolutely essential is that the cement be fresh. If it is starting to gel, do not use it on these sliding couplers.**



I primed the coupler and 3 inches of the pipe. Then I applied PVC cement over the same areas. In one quick move, I slid the coupler down the ½ inch pipe about 3 inches and then slid it back up to near the end. This simulated how it would be used to join two pipes. Not a lot of extra work time was available.

If the PVC cement is starting to gel in the can, you may find that there is not enough time to slide the coupler back and then forward. Time to buy another can. I suggest you buy the smallest can possible and don't open it until needed to use these couplers.

Given how close a fit the coupler is to the pipe, I expect it to seal better than my bored out coupler. Sure is easier to make.

I strongly recommend you **do not** use this repair methods on inside plumbing. If the repair fails outside, it will cost you some water and having to dig a new trench. If inside, the damage could be extreme.

Consider the entire family of schedule 40 PVC pipe:

PVC and CPVC Pipes - Schedule 40					
Nominal Pipe Size (inches)	Outside Diameter (inches)	Minimum Wall Thickness (inches)	Inside Diameter ^{*)} (inches)	Weight (lb/ft)	
				PVC	CPVC
1/2	0.840	0.109	0.622	0.16	0.17
3/4	1.050	0.113	0.824	0.21	0.23
1	1.315	0.133	1.049	0.32	0.34
1 1/4	1.660	0.140	1.380	0.43	0.46
1 1/2	1.900	0.145	1.610	0.51	0.55
2	2.375	0.154	2.067	0.68	0.74
2 1/2	2.875	0.203	2.469	1.07	1.18
3	3.500	0.216	3.068	1.41	1.54
4	4.500	0.237	4.026	2.01	2.20
5	5.563	0.258	5.047	2.73	
6	6.625	0.280	6.065	3.53	3.86
8	8.625	0.322	7.981	5.39	5.81
10	10.750	0.365	10.020	7.55	8.24
12	12.750	0.406	11.938	10.01	10.89
14	14.000	0.438	13.124	11.80	
16	16.000	0.500	15.000	15.43	

The coupler presented here uses 3/4 inch pipe with a nominal ID of 0.824 inches that is stretched 0.016 inches to fit around 1/2 inch pipe with an OD of 0.840 inches. If I look at 3/4 inch OD versus 1 inch ID, I see that the stretch only needs to be 0.001 inches. I don't need one but it would be fun to try.



Here is a length of 1 inch schedule 40 PVC in my lathe chuck. It was heated for about 45 seconds. I forced a piece of $\frac{3}{4}$ inch schedule 40 PVC into the bore. After waiting about a minute for it to cool, the mandrel was removed. I cut off about 2 inches of the 1 inch pipe.



On top is the resulting 1 inch full slide coupler with a piece of $\frac{3}{4}$ inch Schedule 40 PVC inside of it. By comparison, a $\frac{1}{2}$ inch full slide coupler is below it along with some $\frac{1}{2}$ " Schedule 40 PVC pipe.

Acknowledgments

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I welcome your comments and questions.

If you wish to be contacted each time I publish an article, email me with just "Article Alias" in the subject line.

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