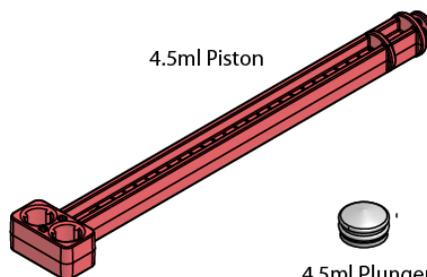
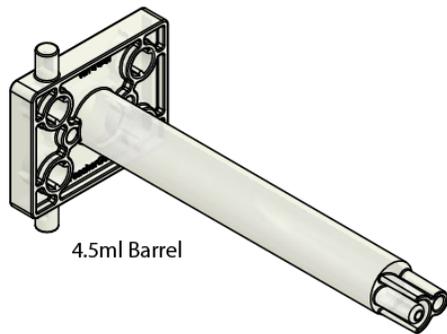


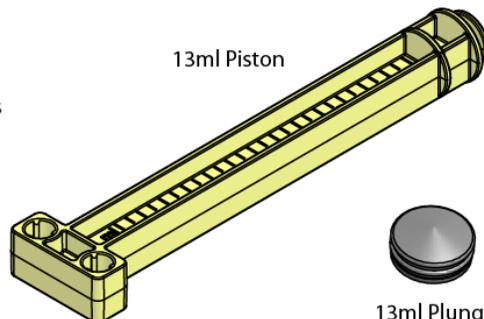
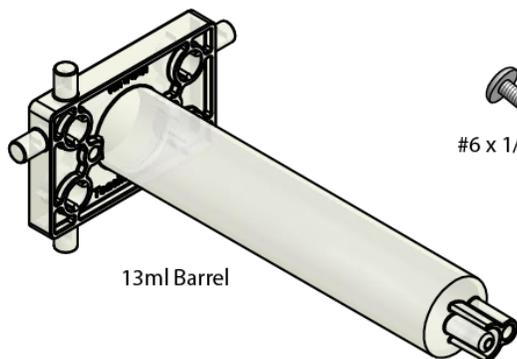
# Cylinder Assembly & Fill Guide

## Building Cylinders

### 4.5ml Cylinder Components



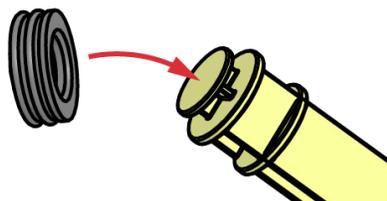
### 13ml Cylinder Components



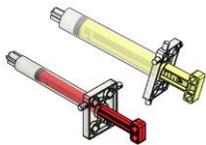
The following steps show construction of a 13ml cylinder. The same process can be used to create 4.5ml cylinders.

### Step #1

Place the plunger onto the piston.

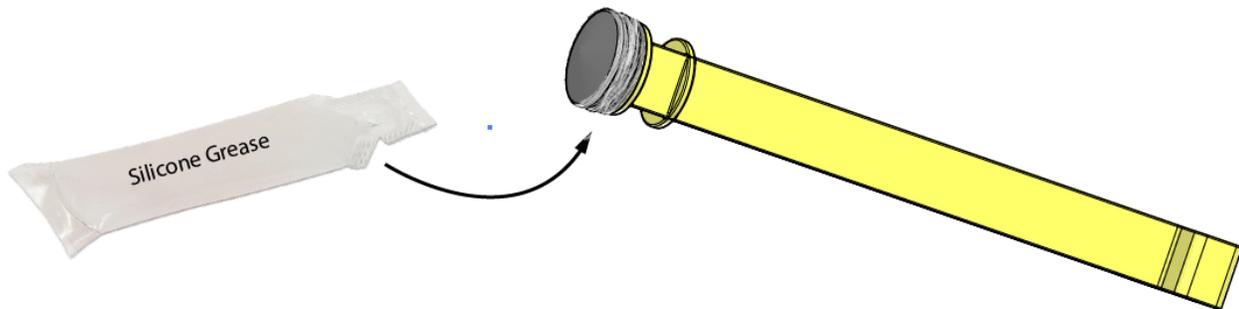


### Step #2



# Cylinder Assembly & Fill Guide

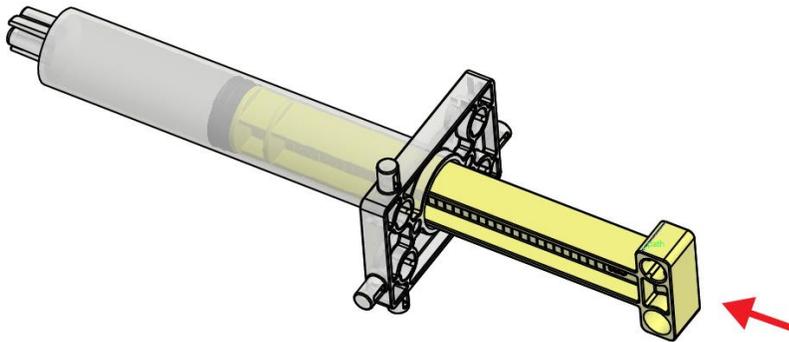
Apply a small amount of silicone grease (best) or vegetable oil around plunger.  
Note: Petroleum lubricants will cause the plunger to stick and fail.



A small amount of silicone grease will lubricate many plungers.

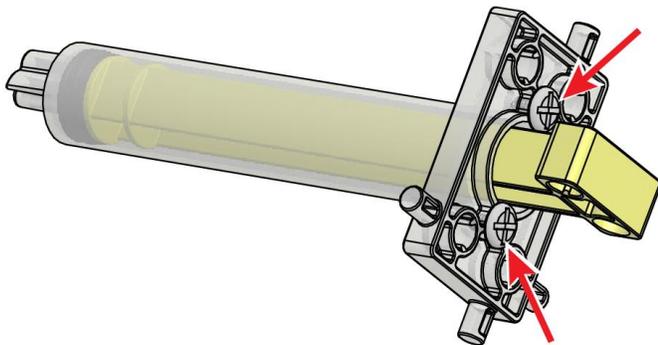
## Step #3

Insert the piston assembly into the barrel. Move it in and out to lubricate the barrel. Make sure the plunger is lubricated! If not, it will get stuck in the barrel.

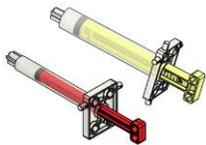


## Step #4

Use #6 screws to lock the piston into the barrel.

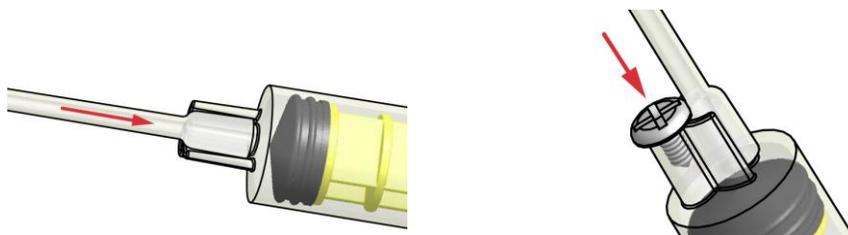


## Attaching Tubing



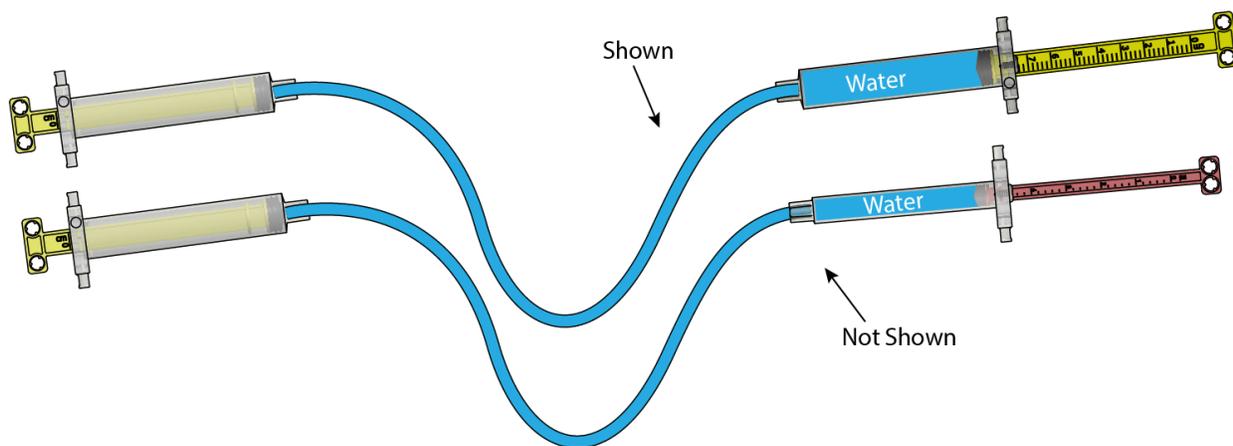
# Cylinder Assembly & Fill Guide

Attach tubing to cylinders pushing it down over the tip. Insert a screw into the hole aside the tip to keep the tubing from pulling off.



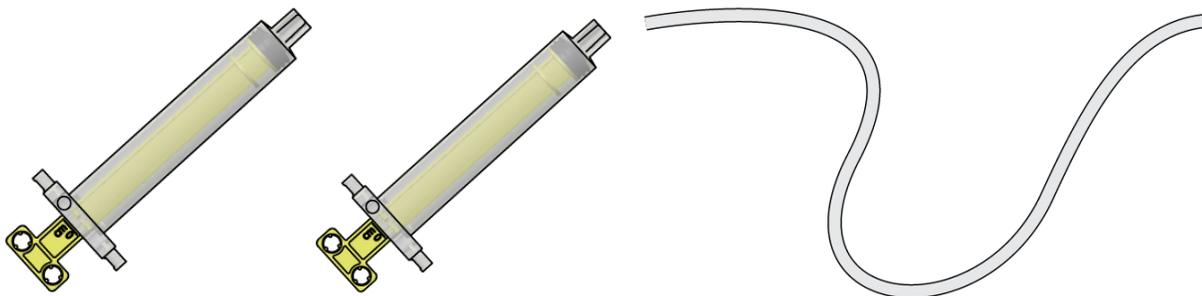
## Filling a Hydraulic System

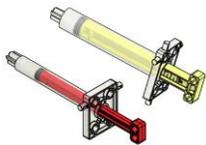
The following procedures will show you how to connect cylinders with tubing and fill them with water. Although the pictures show a 13ml cylinder, the same process can be used with 4.5ml cylinders.



### Step #1

Assemble the required cylinders and cut the appropriate length of tubing.

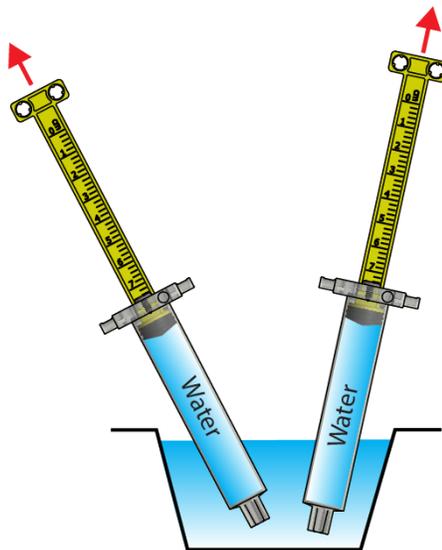




# Cylinder Assembly & Fill Guide

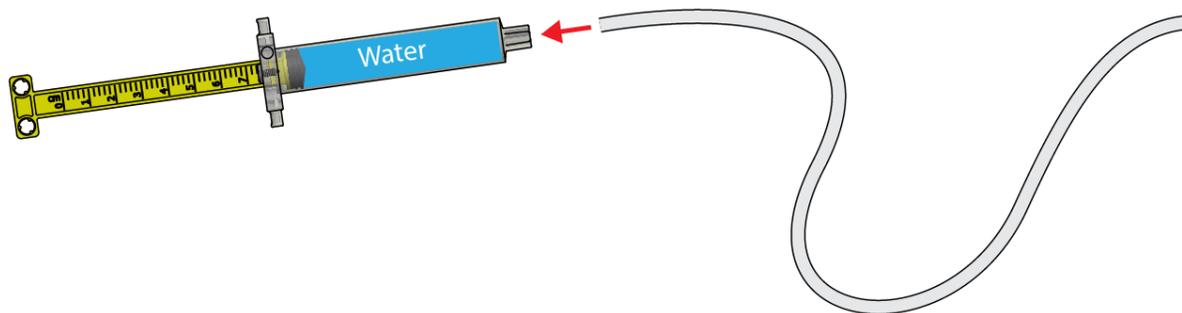
## Step #2

Completely fill the cylinders with water.



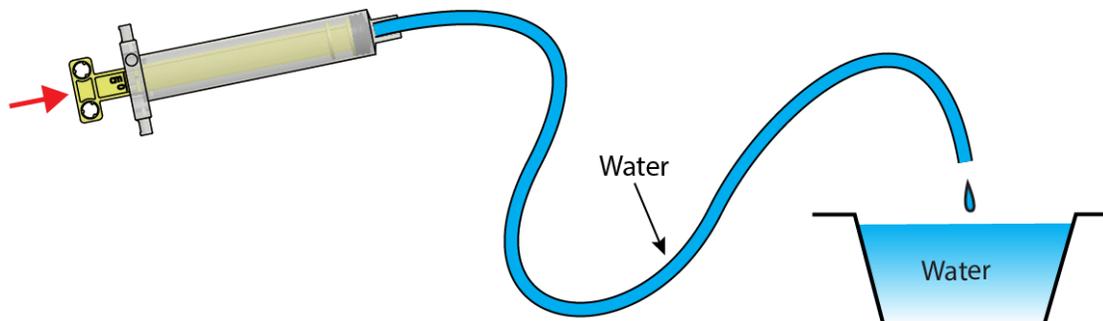
## Step #3

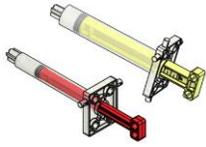
Attach the cut tubing to the first water filled cylinder.



## Step #4

Push the cylinder piston completely in to fill the tubing with water.

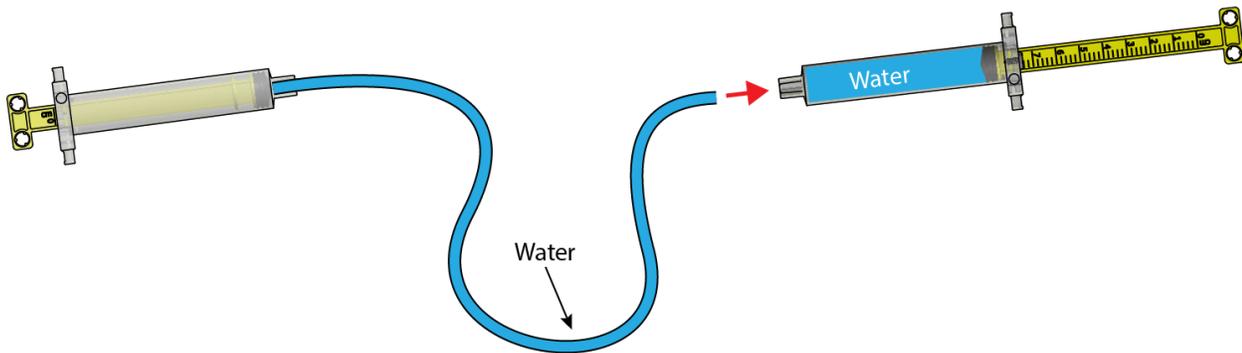




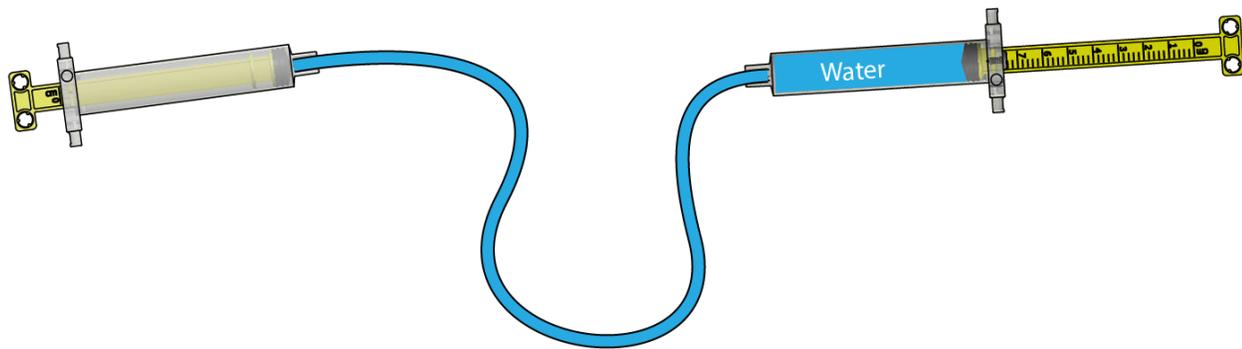
# Cylinder Assembly & Fill Guide

## Step #5

Attach the water filled tubing to the second water filled cylinder.



Your hydraulic system is finished.



No Bubbles

Keep the air out of your cylinders

Your hydraulic system will not work well if air is in the cylinders or tubes. You will periodically have to remove tubing from cylinders to bleed the lines (remove air from the lines).

Cylinder components and activities are available at [TeacherGeek.com](http://TeacherGeek.com)