Positive Ending Expiratory Pressure (rev. 2)

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Disclaimer

Valve has not been tested and certified for medical use, however it has been designed to be safe. Author takes no responibility for failure of the device. Be aware, that homemade production with a use of 3D printer is charged with imperfections and can't be validated.

Introduction

Positive Ending Expiratory Pressure (PEEP) valve can be used as well as **safety valve** for ventilator failure protection or air **humidifier**. Valve uses basic hydraulic formula **P=ρgh** (pressure at the bottom of liquid column is equal to the product of density, gravity and height of the column). Measurement unit is cm H2O. Regarding action-reaction rule, pressure above the surface of water is equal to the pressure at the bottom of liquid column, so the height of the column is equal to pressure given in cm H2O.

Production

Valve is designed to be printed with 3D printer. 4 elements need to be printed. There are needed too:

- bottle with wide cap **high enough to provide required pressure at the bottom**
- o-ring: 13x2,5 or 2x 12x2-2,5
- o-ring: 2x 22x2,5 or 2x 22x3
- 13x1,5 or 13x1 pipe
- 4x M2,5x14 bolt + 4x M2,5 nut or 4x M3x10 bolt

Technical data

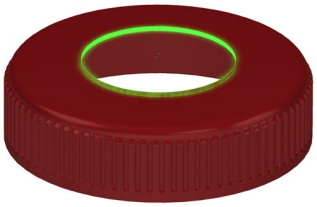
ISO 5356 F15 connector for expiratory air supply from patient
ISO 5356 F22 connector for air outlet

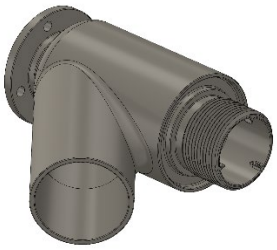
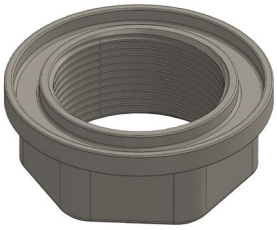
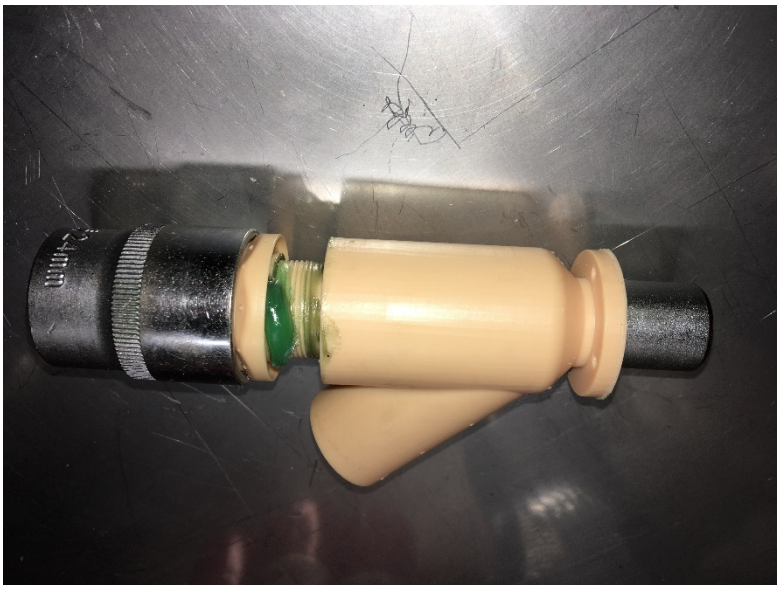
Valve is watertight and can be sealed with ISO 5356 end plugs for neutralization issues.

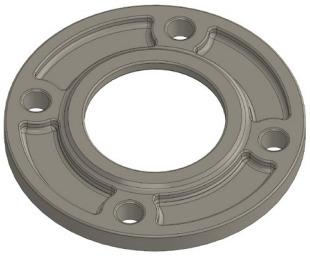
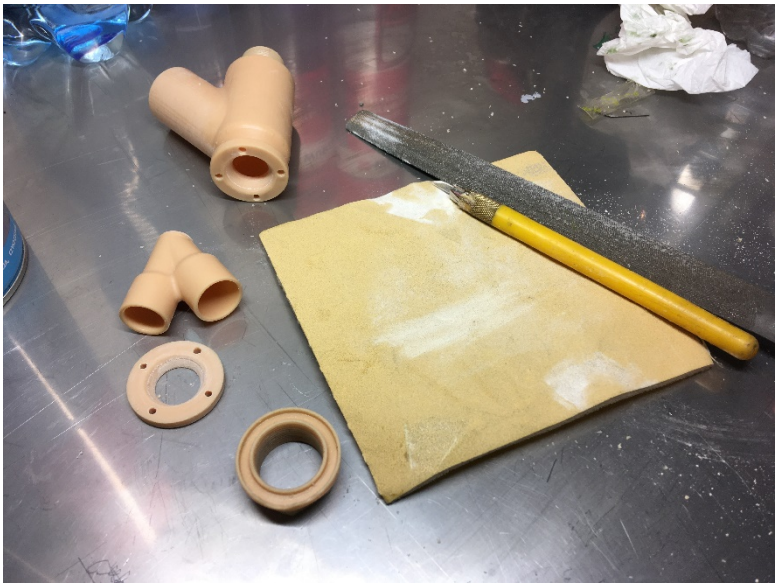
Assembly

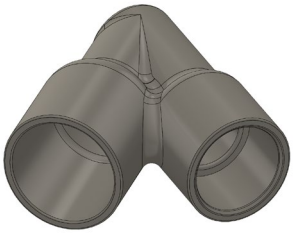
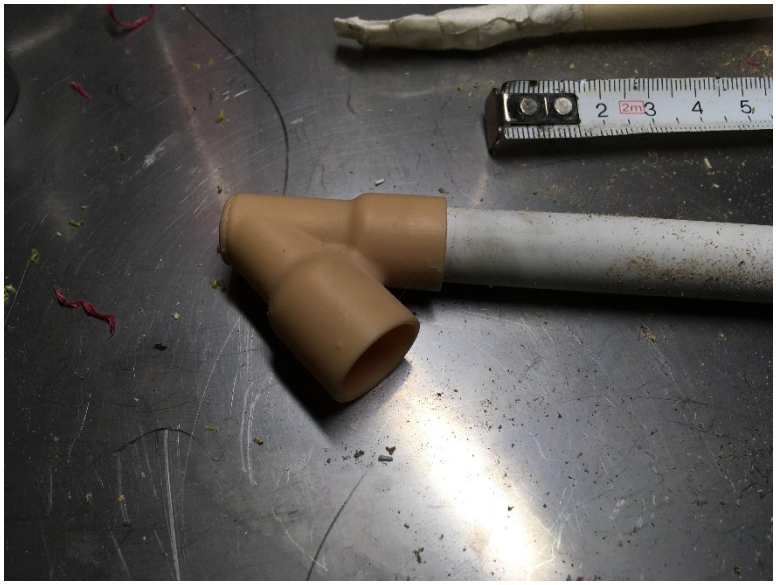
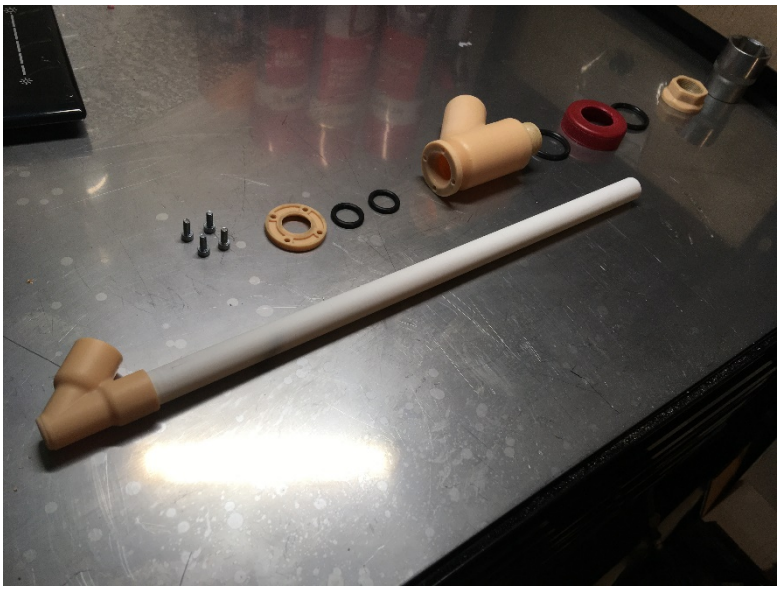
Valve needs to be assembled by a person who has some hands-on expirience with basic workshop operations.

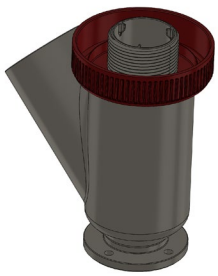
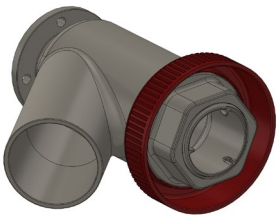
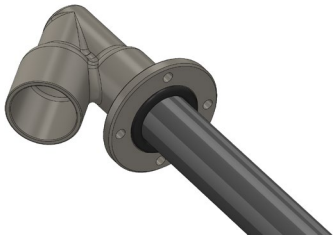
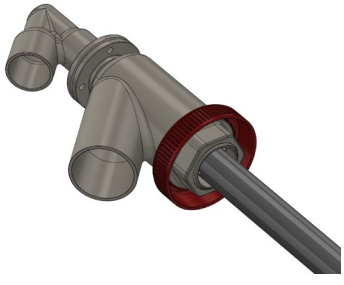
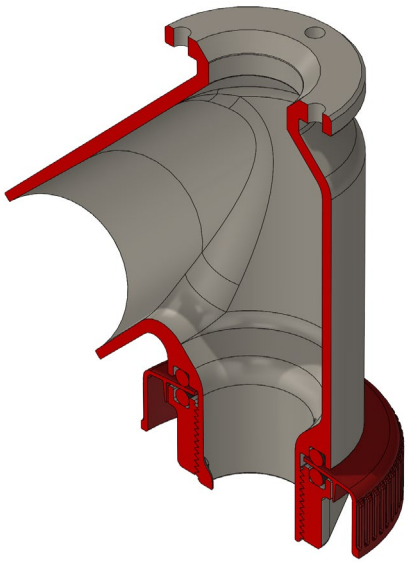
1-liter bottle is good enough to provide pressure range 0-11 cmH2O.

1.	Drill 20-21mm hole in a cap. Multistage drill is recommended as well as making a template with it.	
		 

2.	Grind, die or tap the M20x1 thread till it will run smoothly. Nut is compatibile with 24mm socket key.	
	 	  

3.	Smoothen sharp edges and remove suport from the print. Use 3mm drill and M3 tap for M3 bolts. For M2,5 bolts use nuts.	
		  

4.	Cut the pipe for demanded pressure range. Use sealant to lock pipe in inlet connector.	
	  	  

5.	Place O-rings in grooves and assemble screw-connection for Bottle Cap. Put inner pipe in pressure plate and use one or two o-rings to set point of sealing the pipe. Use 4 bolts (M3, tapped body) or bolts with nuts (M2,5) and screw pressure-plates to main body. O-ring will expand in its grove and seal the connection.	
	     	 

6.	Fill the bottle with water to create pressure range, mount PEEP valve on top and glue the pressure set-up sticker to the valve. Stricker is attached in PDF file in folder „Printable Measure”.