

Exhalation Valve V1.3 - in progress - DL and SN

Bicycle tube style exhalation valve passing 350K cycles as of 4/8/20

Materials: Description **Part Letter**

- Butyl rubber tube:
Bontrager 700 x 35-44C bicycle Tube (27 in., Schrader Valve) **M**
Alternative: Bell 700 x 35-44C **M**
- Delrin Plug: Outer Diameter (OD) 0.8in. Length 0.5in. **TBD**
- Delrin sleeve: Outer diameter (OD) 0.7in. Inner Diameter (ID) 0.54in. Length 0.5in. **TBD**
- Nylon line: 15lb test fishing line **TBD**
- CA Adhesive: CyanoAcrylate (Super Glue) **TBD**
- Elbow: ½ in. Plastic PEX Barb 90-Degree Elbow **R**
- 2 O rings: #6 O rings Outer Diameter 7/16in. Inner Diameter 3/8in Wall 1/16in **TBD**

Notes: Orientation relative to entire assembly. One-way airflow valve that will restrict airflow via inflation of inner tube during exhalation. The entire assembly will fit within parts O, T, and U of the OS-Vent V1.2 assembly (April 2). The elbow will connect into O and the Tube portion will extend into T and U.

Testing: Yet to fail, currently on Day 8 approx 350K cycles

Assembly Instructions:

Seal butyl rubber tube end with Delrin plug. Plug OD will be greater than butyl tube ID unstretched, tied with 20 wraps of nylon line. CA adhesive holds nylon line in place. Use of additional CA adhesive where the plug and rubber meet on the outside edge:



On other side of tube segment Delrin Sleeve inserted into the tube and secured with 20 wraps of nylon string and CA Adhesive.



2 #6 O rings marked Q1 and Q2 will fit around the elbow that will secure the elbow and sleeve in place via friction



Completed Assembly of Valve that will sit within Sections **O T** and **U** of the ventilator assembly



Version Control:

Changes from 1.2 to 1.3

- Change to an oversized plug that will fit in the tube
- Sleeve fits over the elbow
- No Groove in Delrin plug

Previous Designs – included to add insight



Groove on plug = 1/32" deep, 1/8" wide, chamfered and smoothed. We no longer use a groove in the plug, it may have caused a failure.



this image shows a nylon wrap that is too tight with a groove that is too deep, and may have caused premature failure