Christophe's Test Cell

A working test cell utilizing a T33 water filter tube and a 3D printed base. Additional support for pressure, temperature sensors and pressurization gauges and safety valves.

- Construction Method & Details

Construction Method & Details

PDF Download: Procedure for manufacturing a standard tubular test cell (1).pdf

> Procedure for manufacturing a standard tubular test cell.

Parts List

T33 Water Filter Cartridge Housing	51oXO1VpUYL._AC_SX522_.jpg	Example 1 Example 2
Waterproof cable gland M8*1.5.	Screenshot from 2022-06-29 21-32-23.png	Example
Optional Nylon Pneumatic Blanking Plug 4mm Hose Tube Push Fit Connector Air Line	Screenshot from 2022-06-29 21-32-30.png	
MPX5500DP PACKAGING SIP 6 pressure sensor.	Screenshot from 2022-06-29 21-32-35.png	

6*4mm polyurethane pneumatic hose .	Screenshot from 2022-06-29 21-32-39.png	
Various 1/4" BSP Thread Tee Type 3 Way Brass Pipe Fitting	Screenshot from 2022-06-29 21-32-45.png	
Brass Hex Bushing Reducer Pipe Fitting 1/8” –> 1/4”	Screenshot from 2022-06-29 21-32-52.png	
4mm Long Hose Barb x 1/4" Male BSP Thread Brass Barbed Pipe Fitting	Screenshot from 2022-06-29 21-32-57.png	
0~30psi 0~2bar 40 Diameter Fuel Air Compressor Low Pressure Meter.	Screenshot from 2022-06-29 21-33-03.png	
1/4" mini brass ball valve BSP male to female.	Screenshot from 2022-06-29 21-33-12.png	
1/4'' 8KG BSP Air Compressor Safety Release Valve Pressure Relief	Screenshot from 2022-06-29 21-33-29.png	
DS18b20 Stainless steel package Waterproof (These will have to be adapted to improve waterproofing see below)	Screenshot from 2022-06-29 21-33-34.png	
Heat shrink tube	Screenshot from 2022-06-29 21-33-39.png	
4mm Banana Plugs Socket Connector	Screenshot from 2022-06-29 21-33-44.png	
Thread sealant	Screenshot from 2022-06-29 21-33-52.png	
Teflon tape	Screenshot from 2022-06-29 21-33-57.png	
Epoxy resin.		

Stainless steel tube 304L or 316L: Outer tube 16x2mm or 14x1mm ; 100mm length. Inner tube or rod ext diameter 10mm ; 110mm length. The goal is to get a 1 mm gap between outer and inner tube.	ZqyFDr5Sv2aNmcVR-download-3.jpeg	
T33 cell : Bottom, Stand and cap spacer The bottom and the tubes cap spacer have been designed for 16x2mm outer tube and 10mm inner tube. Ask for different dimensions.	Screenshot from 2022-06-29 21-43-42.png	ThingVerse STL

Sealing of the DS18b20 temperature sensor:

> The DS18b20 must be sealed with epoxy resin otherwise, the water will leak throw the cable due the pressure inside the cell chamber.

1- Remove the heat shrink tube protection.

Screenshot from 2022-06-29 21-45-41.png

2 - Protect the stainless tube with masking tape and pour the tube with epoxy resin.

Screenshot from 2022-06-29 21-45-49.png

3 - Once dry, remove the masking tape.

Screenshot from 2022-06-29 21-45-57.png

4 – In order to keep it clean replace the heat shrink tube.

Screenshot from 2022-06-29 21-48-21.png

5 – The DS18b20 is now ready to be used in a pressurized vessel.

Screenshot from 2022-06-29 21-48-27.png

T33 Bottom waterproofing:

> In order to resist to the pressure and avoiding leaks, the bottom need to be filled with epoxy.

> The printing wall thickness needs to be 5 walls in order to get a strong threaded part.
> It needs only one 1st layer because it will be removed later. (But at least 1 layer for bed adhesion
> purpose). To improve bed adhesion, print with an additional skirt.

1 - Print the bottom.

> This type of infill is not necessary. Any kind of infill will allow epoxy to flow and pour the part.

Screenshot from 2022-06-29 21-50-18.png

2 – Remove the bottom layer.

Screenshot from 2022-06-29 21-51-12.png

3 – Pour the cap with epoxy resin.

Screenshot from 2022-06-30 17-11-29.png

4 – Take care that the epoxy doesn't leak through the holes. In some cases, it will be useful to plug the orifices with silicone which can then be removed.

Screenshot from 2022-06-30 17-05-26.png

5 – Allow it to harden completely before attempting to use it.

Screenshot from 2022-06-30 17-05-40.png

6 – Install the different connections and fittings.

Screenshot from 2022-06-30 17-05-49.png

Screenshot from 2022-06-30 17-05-59.png

> There’s many way to connect each components, here is an example of the parts I used:

Screenshot from 2022-06-30 17-06-07.png	Screenshot from 2022-06-30 17-07-03.png	Screenshot from 2022-06-30 17-06-44.p
Screenshot from 2022-06-30 17-06-51.png		Screenshot from 2022-06-30 17-06-3