

# Cell Construction

- Christophe's Test Cell
  - Construction Method & Details

# 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

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<br>Image not found or type unknown              | Example 1<br>Example 2 |
| Waterproof cable gland M8*1.5.   | Screenshot from 2022-06-29 21-32-23.png<br>Image not found or type unknown | Example                |
| Optional Nylon Pneumatic Blanking Plug 4mm Hose Tube Push Fit Connector Air Line | Screenshot from 2022-06-29 21-32-30.png<br>Image not found or type unknown |                        |

|   |   |  |
|---|---|--|
| MPX5500DP PACKAGING SIP 6 pressure sensor.  | <p>Screenshot from 2022-06-29 21-32-35.png</p> <p>Image not found or type unknown</p> |  |
| 6*4mm polyurethane pneumatic hose .   | <p>Screenshot from 2022-06-29 21-32-39.png</p> <p>Image not found or type unknown</p> |  |
| Various 1/4" BSP Thread Tee Type 3 Way Brass Pipe Fitting   | <p>Screenshot from 2022-06-29 21-32-45.png</p> <p>Image not found or type unknown</p> |  |
| Brass Hex Bushing Reducer Pipe Fitting 1/8" -> 1/4"   | <p>Screenshot from 2022-06-29 21-32-52.png</p> <p>Image not found or type unknown</p> |  |
| 4mm Long Hose Barb x 1/4" Male BSP Thread Brass Barbed Pipe Fitting   | <p>Screenshot from 2022-06-29 21-32-57.png</p> <p>Image not found or type unknown</p> |  |
| 0~30psi 0~2bar 40 Diameter Fuel Air Compressor Low Pressure Meter.  | <p>Screenshot from 2022-06-29 21-33-03.png</p> <p>Image not found or type unknown</p> |  |
| 1/4" mini brass ball valve BSP male to female.  | <p>Screenshot from 2022-06-29 21-33-12.png</p> <p>Image not found or type unknown</p> |  |
| 1/4" 8KG BSP Air Compressor Safety Release Valve Pressure Relief  | <p>Screenshot from 2022-06-29 21-33-29.png</p> <p>Image not found or type unknown</p> |  |
| DS18b20 Stainless steel package Waterproof (These will have to be adapted to improve waterproofing see below) | <p>Screenshot from 2022-06-29 21-33-34.png</p> <p>Image not found or type unknown</p> |  |
| Heat shrink tube  | <p>Screenshot from 2022-06-29 21-33-39.png</p> <p>Image not found or type unknown</p> |  |

|   |   |                |
|---|---|----------------|
| 4mm Banana Plugs Socket Connector   | <p>Screenshot from 2022-06-29 21-33-44.png</p> <p>Image not found or type unknown</p> |                |
| Thread sealant  | <p>Screenshot from 2022-06-29 21-33-52.png</p> <p>Image not found or type unknown</p> |                |
| Teflon tape   | <p>Screenshot from 2022-06-29 21-33-57.png</p> <p>Image not found or type unknown</p> |                |
| Epoxy resin.  |   |                |
| <p>Stainless steel tube 304L or 316L:<br/>Outer tube 16x2mm or 14x1mm ;<br/>100mm length.<br/>Inner tube or rod ext diameter 10mm<br/>; 110mm length.<br/>The goal is to get a 1 mm gap<br/>between outer and inner tube.</p> | <p>ZqyFDr5Sv2aNmcVR-download-3.jpeg</p> <p>Image not found or type unknown</p>        |                |
| <p>T33 cell : Bottom, Stand and cap<br/>spacer<br/>The bottom and the tubes cap spacer<br/>have been designed for 16x2mm<br/>outer tube and 10mm inner tube. Ask<br/>for different dimensions.</p>                            | <p>Screenshot from 2022-06-29 21-43-42.png</p> <p>Image not found or type unknown</p> | 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

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

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

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**3 - Once dry, remove the masking tape.**

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

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

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

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

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

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## 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

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### **2 - Remove the bottom layer.**



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

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**3 - Pour the cap with epoxy resin.**

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

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**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

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**5 - Allow it to harden completely before attempting to use it.**

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

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**6 - Install the different connections and fittings.**

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

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

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

|   |   |   |
|---|---|---|
| <div>Screenshot from 2022-06-30 17-06-07.png</div> <div>Image not found or type unknown</div> | <div>Screenshot from 2022-06-30 17-07-03.png</div> <div>Image not found or type unknown</div> | <div>Screenshot from 2022-06-30 17-06-44.png</div> <div>Image not found or type unknown</div> |
| <div>Screenshot from 2022-06-30 17-06-51.png</div> <div>Image not found or type unknown</div> | <div>Screenshot from 2022-06-30 17-06-53.png</div> <div>Image not found or type unknown</div> |   |