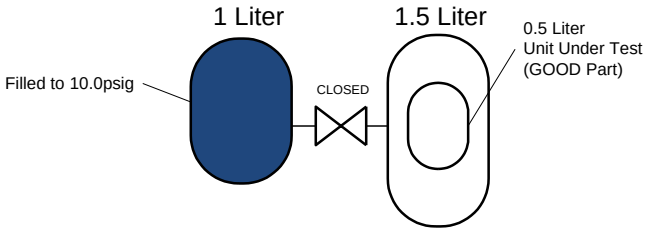
Chamber Test – Testing Theory

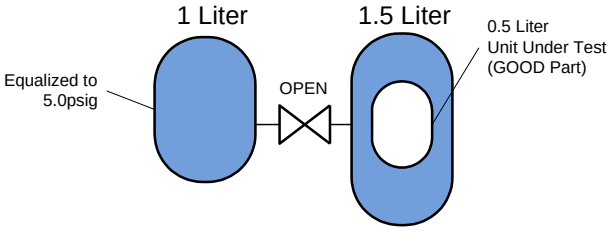
A chamber test is used to find leaks in sealed packaging or sealed devices without an opening to use for filling. To test the part a technique called metered volume fill must be employed. A reference volume is filled to a pressure, after pneumatic isolation the volume is then introduced to the test chamber. A know good part will fill to the desired test pressure, while a gross leaking part will not reach this same value due to a change in total volume. This difference between the test pressures will be set as the pressure tolerance. A part that doesn't fill to the test pressure within the pressure tolerance is a gross leak and will fail the test.
If the part passes this gross test, the testing will continue with the typical pressure decay test steps.

For example:

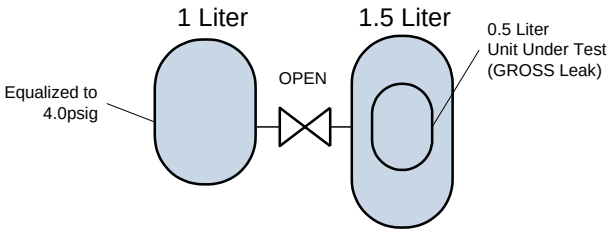
A reference volume of 1 liter, test chamber with a volume of 1.5 liters, and a part with a volume of 0.5liters isolated by a valve. The reference volume is pressurized to 10psig.



The valve separating the two chambers opens. With a good part in the test chamber the both chambers equalize to 5psig.

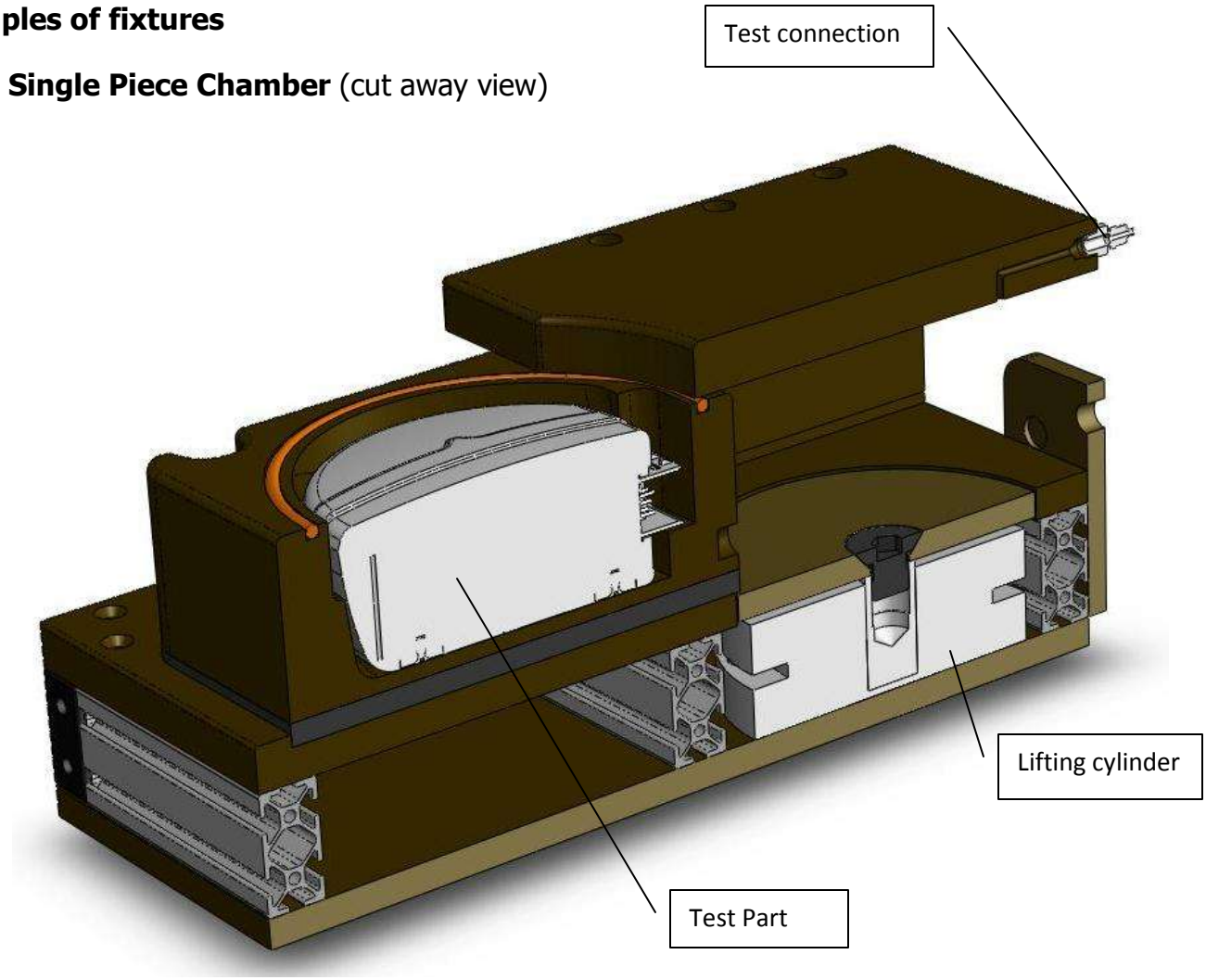


With a gross leaking part in the test chamber, and the equalization valve open, both chambers equalize to a lower pressure due to the change in volume.



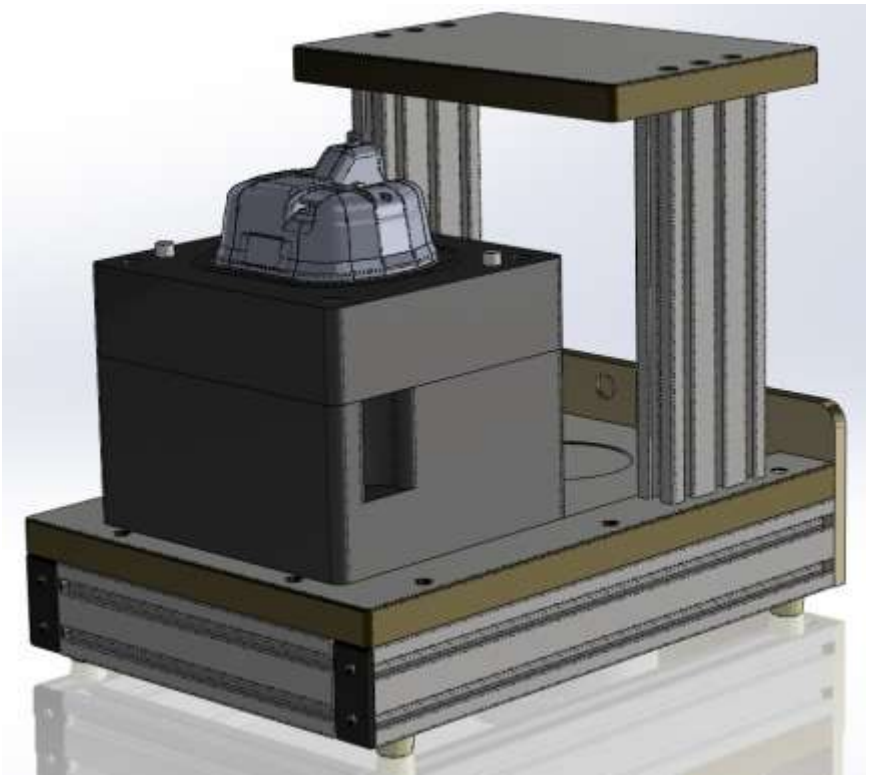
Examples of fixtures

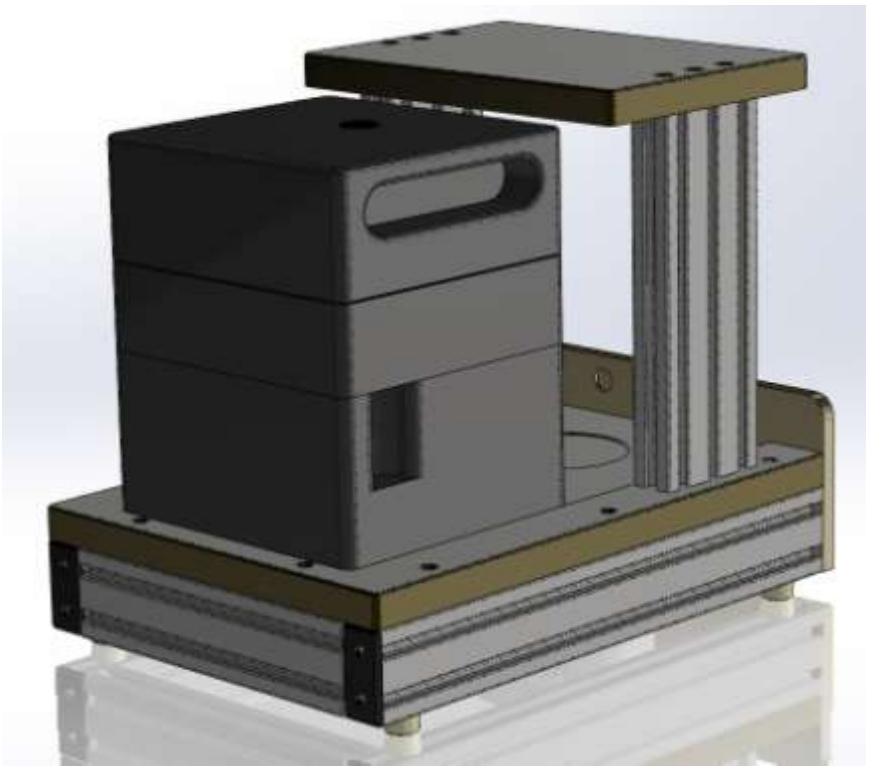
Single Piece Chamber (cut away view)



The part is loaded into the nest and slid into test position. The lifting cylinder seals the test chamber against the top plate.

Multi-Piece Chamber





Leak testing of carbon canisters can be difficult due to the way the carbon elements react to being pressurized. This proposal tests the part from the outside. This will cancel out any effects from the carbon element.

The part will be placed in a two part nest and sealed similar to the two examples above.

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