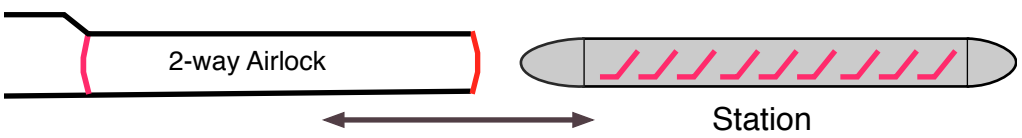
Station Airlock Options

Hyperloop offer high speed and low energy due to the vacuum, by it is a challenge getting passengers in and out of the pressurised pod. Here are some options for the airlocks.

The in-out single airlock

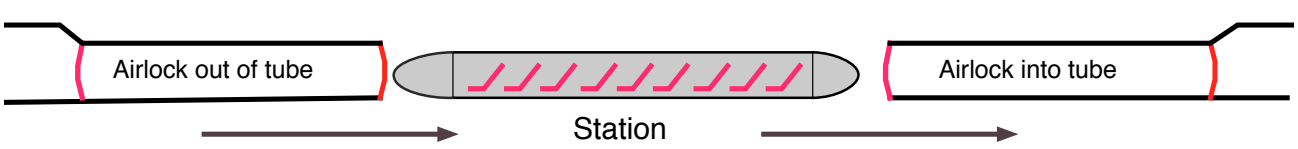


This arrangement uses only one airlock, the pod reverses into the tube through the same airlock. It is the favoured system for a full-sized pod airlock.

The volume that needs to be vacuum-pumped is 20 cu M, the volume of the airlock with a pod inside. The vacuum pumping power increases the energy cost for the whole trip by about 10%

This method works well for a terminal station, an intermediate station would need a place for the pod to reverse direction to continue on its way.

High energy cost of the drive-through airlocks pair



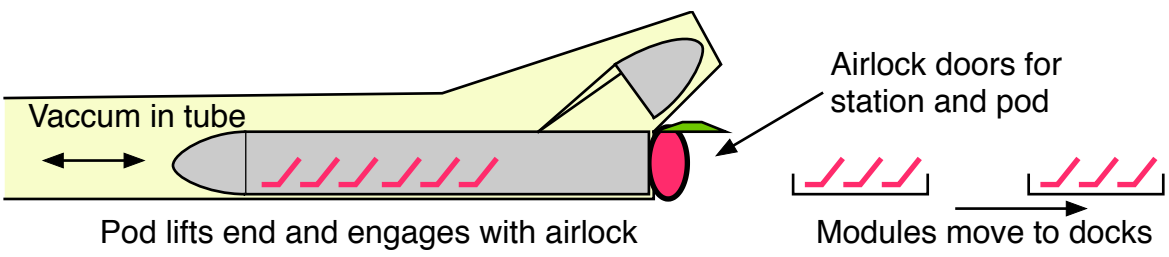
This is the classic station as shown in all vacuum-tube drawings. The pod behaves like a normal train, with the addition of two airlocks. It seems to be the simplest and most obvious solution, but it has serious problems with vacuum-pumping energy and change-over time.

The pumping time and energy is high. For each cycle, the first airlock needs to be pumped out with no pod inside, and the second pumped with the pod reducing the volume. The total volume to be vacuum-pumped is 80 m3 for the two airlocks. the energy cost of this is about 75 kWHr. The energy cost for the whole trip is increased by about 45% by this additional pumping energy.

The total time for the airlock pumping, and passenger changeover would be about 7 minutes. For a 30-second pod frequency, 14 airlocks would be required, leading to a large station and long walking distances for the passengers.

This airlock system is rejected due to the complexity of two airlocks, and high pumping energy.

The End Door airlock system



The pod stays in the vacuum, and engages with the airlock door at the station, The seating modules then drive out of the pod and go to the passenger loading docks.

There is virtually no vacuum-pumping, as the pod and station doors match.

- The nose/tail cone of the pod disengages from the hull, and lifts up
- The pod is moved into contact with the station airlock, and locks in place
- Both the airlock doors can now be opened
- The seating or cargo modules are driven out to their loading docks.

Autonomous seating modules

We can turn the necessity of seating modules into an advantage, in that we can now move the modules to the passenger area, rather than make the passengers walk to the pods.