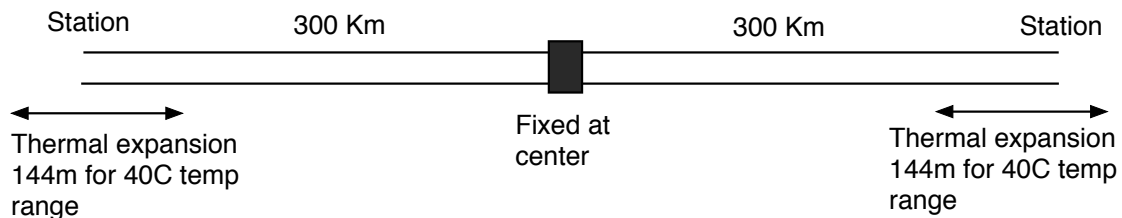


Thermal expansion of the tube

Hyperloop Alpha proposed that the tube would not have expansion joints, but that the ends of the tube would move to allow for the thermal expansion.

But the distance is too great, with a 600km tube fixed at the centre, and a 40C temperature range, the ends would move 150m, and all the tube sections would need to be on rolling supports. And the longitudinal force to move 300km of tube would be impossible, only 1 -2km of tube can be moved by its own expansion.

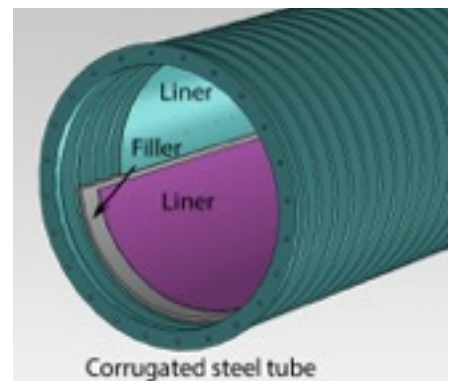


Expansion joints

Expansion joints could be used, the best option would be a joint at each 25m section of tube, the gap then only needs to move 10mm, acceptable for a flexible or finger-type joint.

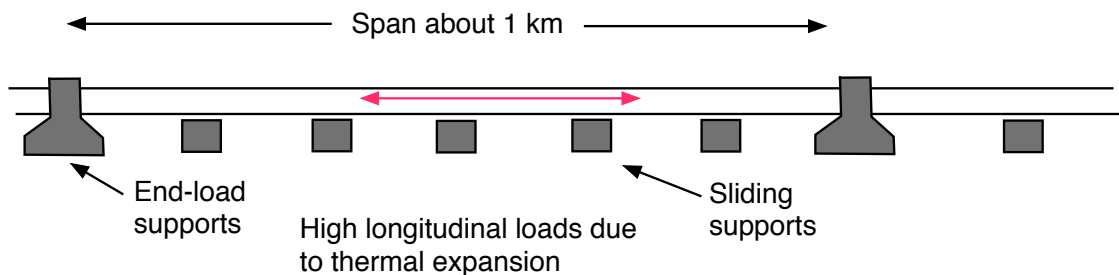
Flexible tube

The tube could be slightly flexible, made of spiral-wound corrugated steel like some culvert tubes. This is an effective way to achieve the tube strength against the vacuum loads, while still allowing flexibility to take up thermal expansion.



Fixed tube

The tube could be fixed, with no expansion joints like modern railways and pipelines. A solid steel tube would place considerable longitudinal loads on the support structures, particularly if one section is accidentally fractured.



A good solution is to have a support about every km, which is capable of taking the maximum longitudinal loads. The intermediate supports then can have sliding connections, and only need to support the sideways and vertical loads.