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Is there a minimum value of L/D, below which Darcy-Weisbach equation is usually not applied for pressure drop calculation? Please share your viewpoint.

Waqas Manzoor

PROCESS ENGINEER (Design & Optimization)

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Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

The Darcy equation has been developed for incompressible fluids (liquid services) and in industrial application it is applicable to pipes with any L/D, length or diameter.

Darcy equation can be used for compressible fluids (gas service) if the pipe pressure drop is relatively low and the density and velocity do not change appreciably. According to Crane, this equation can be used for gas lines if the calculated pressure drop is less than about 10% of the absolute inlet pressure. This is because a reasonable accuracy will be obtained if the density used in the equation is based upon either the upstream or downstream conditions, whichever is known.

In other words, if pipe length (pressure drop) is too high, you need to cut the pipe in pieces, perform the pressure drop calculation for each section, obtain the outlet pressure of one section and use that (along with the corresponding density and velocity) as the inlet pressure for downstream pipe.

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Wilfredo

Wilfredo Garcia

Process Specialist at Ecopetrol

Excellent explanation Mofrad

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QAMAR
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QAMAR RAZA P.Eng.

Sr.(Lead) Process Engineer

Friction factor (used in Darcy equation) from moody chart takes Reynolds number which in turn is related to fluid density. So if density changes reasonably on the way, we will end up with wrong results as we assume constant Reynolds number while it is not. So better split pipe in small section so the density within a section remains reasonably constant, as mentioned by Mofrad.

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