Guidance notes
Economy of flow velocities

Fact sheet
May 2021

Background

Economic design velocity relates to the effects of pipeline length, static load, capital recovery factors, flow discharge (energy), pipeline equipment and installation methodology on the annual cost of pipelines.

Discussion

The design of a pipe's diameter is based on its volumetric capacity. The hydraulic design engineer must produce a design that is of lowest capital and operational cost. This is usually based on frictional losses that contribute to energy or head loss in the system. Defining what the economical flow velocity is makes the selection of the pipe diameter more practical.

Local economic factors such as supply and manufacturing capabilities of pipe material can also influence the economical flowrate.

Some studies have shown that the material and diameter of pipe used in different economical environments (countries) may influence the optimal flowrate. These studies have demonstrated a typical flow velocity bandwidth where pipe diameters are most economical. For a particular design the bandwidth can be narrowed by applying local conditions, installation methodology and optimising material selection using mathematical models.

The economical flowrate in pipes is typically 1m/s to 2m/s. Pumped mains become inefficient over 3m/s.

Other factors to consider

- ! Water quality and age
- ! Septicity (wastewater)
- ! Material carbon footprint
- ! Service life expectancy, the nature of the installation (temporary versus permanent works) for short term savings over longer term economic loss
- ! System expansion and the economical flow velocity buffer.

References

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- CoP-01 Code of practice for land development, water
- CoP-01 Code of practice for land development, wastewater
- DP-07 Design principles for transmission water and wastewater pipeline systems
- 40:20:20 Strategy to reduce carbon footprint, cost and improve health and wellbeing

Other

- *Hydraulic Services Design Guide*, Chapter 17, First Edition, April 2014
- Economical velocity through pipeline networks, case studies of several different markets, *Alexandria Engineering Journal*, 2018
- Model for determining flow diameter and economic velocity in water elevating systems, Sao Paulo State University, 2006.

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