

Hydraulic Diameter is Appropriate to Calculate Pressure Drop

Chapter 7: Fluid Characteristics and Properties

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where f is the average friction factor flowing through the test sample, q is the volume flow, C is the discharge coefficient and A_0 is the total flow area defined as:

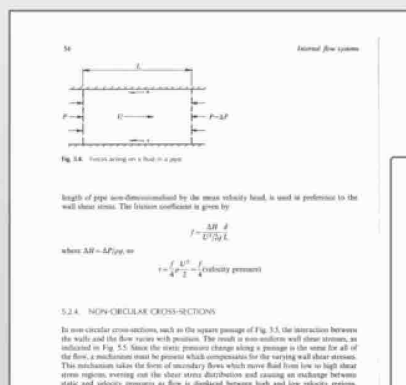
$$A_0 = \sum A_i \quad (2.146)$$

where A_i is the flow area of the i^{th} orifice and N is the number of orifices.

Comments to the use of a discharge nozzle: this equation provides the pressure drop of the pipe directly and turbulent pressure can therefore be avoided.

The use of the Darcy friction factor for high rate most flows can be questionable and for these cases the simplified model described here is recommended.

A single pipe with a corresponding flow area is assumed, and in addition the wall interfacial friction is calculated based on a **hydraulic diameter**....



For many non-circular cross-sections a satisfactory procedure for calculating head losses is to replace the pipe diameter in the friction and Reynolds number equations by the **hydraulic diameter**.

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Equivalent diameters of rectangular and oval ducts

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To help engineers predict the pressure drop of a fluid flowing along ducts of non-circular cross-section, the concept of hydraulic diameter of a circular duct has been generalized. This paper re-evaluates the value of hydraulic diameter for non-circular ducts, based on studies using water flow in the area of the original research (1988 and 1995). The new study made clear that the equivalent diameter of non-circular ducts filled from the two primary sources are highly improvable, in order they are better which should be larger be indicated. By studying the experimental results in combination, it is possible to extend a more appropriate and correct relationship, the authors believe that the experimental results are not sufficient to establish a more reliable quantitative conclusion. Thus the experimental work needs to be repeated to verify whether hydraulic diameter can be used as an equivalent diameter of arbitrary an elongation.

Until a proven relationship for 'equivalent diameter' is forthcoming, there is no other choice than to use the **hydraulic diameter**.