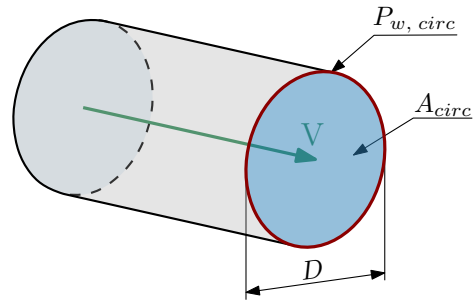
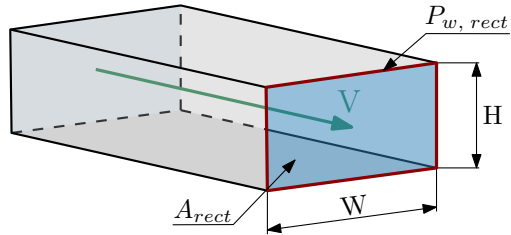


circular duct



$$P_{w, circ} = \pi D \quad \rightarrow \quad L_{c, circ} = D$$

rectangular duct



$$P_{w, rect} = 2H + W \quad \rightarrow \quad L_{c, rect} = \frac{2HW}{H+W}$$