

NOTES - CO₂ Mechanical Design Considerations

The volume of the experimental chamber and the pH depression desired for a test have effect the overall system design and CO₂ required. Various tools presented here, 2 interactive excel files and a Tau graph, will be a large help in this regard.

Low pH seawater is piped to a section of ducting of sufficient length to allow mixing of the low pH seawater with ambient seawater which is then admitted into a test enclosure at a desired flow rate, usually controlled by a thruster and/or a pump.

The CO₂-Use Calculator assumes the CO₂ saturated seawater is pH 4.75 and calculates the volume of CO₂ gas required to depress the pH to various levels in a 0.5 meter x 0.5 meter cross section test enclosure at various flow rates.

The Tau graph gives an estimation of the time needed to mix low pH seawater with ambient to 1 Tau at various ambient temperatures and various pH depression. This time is **required** as an input into the Design of Mixing Section.

The xFOCE Mixing Section Calculator can predict the length of the mixing sections required for any size enclosure, any diameter of mixing ducting at any flow velocity.

Tau from the graph is an input and 2 Tau time constants are used as a minimum time required to reasonably mix low pH seawater with the ambient seawater.

A higher flow velocity and/or a large test section requires very long mixing sections so this tool is very helpful in overall system design.