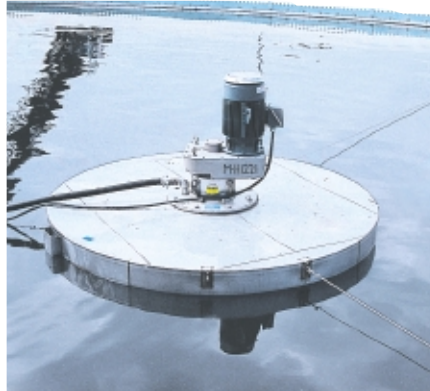


Praxair® In-Situ Oxygenation (I-SO™) System for Municipal Wastewater Treatment

System Features

- Higher wastewater treatment rates
- Lower power consumption
- Lower odor and VOC emissions
- Lower capital investment
- Higher dissolved oxygen levels
- Improved process control
- No compression requirement
- Transportable, floatable units – no support structure required



Operational Issues/Solutions

The capacity-limiting factor for conventional air-based aerobic biotreatment of municipal wastewater is usually the aeration system. Air-based aeration systems generally cannot dissolve more than about 25 percent of the available oxygen into the wastewater. Also, although the oxygen demand for bio-treatment varies during the day and from day to day, conventional air-based aeration systems generally offer only limited energy turndown when the oxygen demand is low. Many plants do not take advantage of even the limited turndown available because of the requirements for mixing, or the costs and problems associated with oxygen monitoring equipment.

Retrofitting existing air-based municipal systems with high-purity oxygen and the *Praxair®* In-Situ Oxygenation (I-SO™) System easily increases the oxygen dissolution capacity of the system by over 100 percent, consequently increasing the biotreatment capacity. Further, because the *Praxair®* I-SO™ System dissolves more than 90 percent of the high-purity oxygen into the wastewater, oxygen costs are low. In addition, the *Praxair®* I-SO™ System simultaneously provides excellent solids suspension, reduced foaming, and decreased emissions of

odors and Volatile Organic Chemicals (VOC), with no additional capital expenditures for cover and vent control options.

The *Praxair®* I-SO™ System is transportable, unlike other oxygen-based aerators. Its two major subassemblies are bolted together on site, and the complete assembly is lifted into the tank or lagoon, where it floats. No support structures are needed.

Meeting Customer Needs

Operators of secondary and advanced wastewater treatment plants currently using air-based diffused or mechanical aeration systems are faced with three general concerns: operating costs, operational flexibility, and control of undesirable emissions. The electricity required for the aeration system typically represents a substantial portion of the plant's total operating cost. Moreover, the aeration system capacity is often the primary limiting factor determining a treatment plant's overall capacity. Operational flexibility is limited in mechanical aeration systems by the constraint on the number that must remain in service, and in diffused aeration systems by the minimum flow rate required, for operation to provide sufficient mixing for solids suspension.

Experience from more than 100 installed units has demonstrated that the total power required to operate the *Praxair®* I-SO™ System, including the energy needed to generate oxygen, is as much as 60 percent less than the air system it replaces with no decrease in the wastewater system's ability to meet its peak oxygen demand requirements. Plants that are located near an oxygen pipeline-supply source can actually decrease power consumption by as much as 90 percent.

For a particular wastewater treatment plant, Praxair can determine the optimal oxygen supply and dissolution system by use of mathematical modeling, using the treatment plant's historical data as model inputs. Several case studies demonstrate that the combination of high-efficiency oxygen dissolution and aeration tank oxygen demand "load following" results in the most economical use of power.

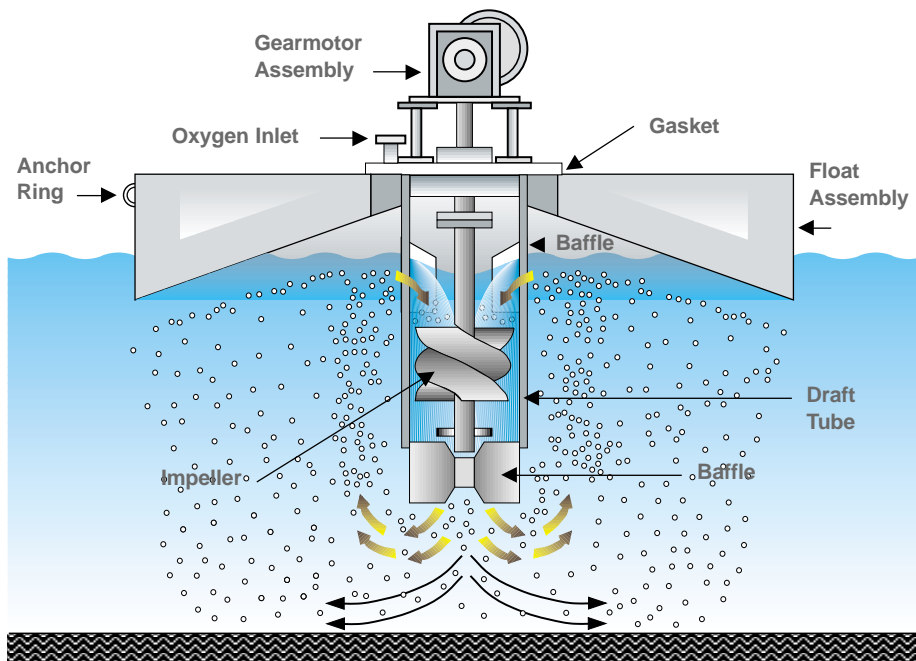
Commercial Experience

Over 100 Praxair® I-SO™ Systems have been installed in the U.S., Brazil, South America, Venezuela, Argentina, Mexico, Italy, Canada, China, and Spain, in both municipal and industrial facilities. In the U.S., units are immediately available to dissolve up to 240 lb/hr (109 kg/hr) of oxygen per unit. Oxygen transfer efficiencies are over 90 percent. Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) requirements are achieved with virtually no off-gas and minimal foam generation. The superior oxygen transfer efficiency of the Praxair I-SO™ System has been confirmed in both pilot tests and field-testing at operating installations.

Manufacturing Support

In the U.S. and Canada, Praxair® I-SO™ Systems are manufactured exclusively for us by Philadelphia Mixing Solutions, formerly Philadelphia Mixers, a leading manufacturer of mechanical mixing equipment and provider of mixing process and equipment solutions. In addition, the company assists Praxair in marketing the I-SO™ System to U.S. and Canadian facilities using wastewater aeration units.

They are an important complement to Praxair's reputation for innovative gas technologies and reliable oxygen supply in providing a total solution to the customer's needs.



Praxair® In-Situ Oxygenation (I-SO™) System



Contact Us

Call us at 1-800-PRAXAIR or visit us at our website, www.praxair.com.



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