

Myths of Diffuser Design

Aeration Systems

Bulletin Brief

Technical Presentation

Myth Number 1 - Tube Diffusers Create Coalescing

Properly designed tube diffusers systems at proper airflows do not coalesce. Maximum efficiency requires low flux rates of air per sq. ft. of active membrane surface area and proper numbers of engineered membrane openings. Properly designed systems produce discreet bubbles separated by vertical liquid pumping from the diffuser units.

Myth Number 2 - Tubes use Only the Top 1/2 of the Surface

Properly engineered tubes use the entire surface of the membrane. Engineered slits and air distribution features such as the full support frame with bottom outlets in the EDI diffuser design produce proper utilization of the ENTIRE surface. Note: Systems with 1/2 support frames may not utilize the entire surface so equipment design is important.

Myth Number 3 - Tube Diffusers are Structurally Weak

The EDI diffuser assembly is an engineered system and is the STRONGEST diffuser system available. EDI assemblies can support OVER 4800 inch lbs. of force. This strength using the Spectrum saddle mount is stronger than any other system of tubes or disc units.

Myth Number 4 - Disc Diffusers are more Efficient Than Tubes

Performance of any membrane system depends on proper engineering of the specific system. Actual performance of any geometry diffuser is the SAME when properly engineered and properly applied or installed. Diffuser geometry is not a controlling factor in the efficiency of the system. Geometry of the diffuser is NOT a performance criterion. Specify the oxygen transfer efficiency desired and confirm with a test, why argue about "best"; just specify SOTE.

Myth Number 5 - Brand "X" Can Handle Much More Air Flow Per Unit than Any Other Diffuser

Actual air handling capacity of all membrane diffusers is the same to produce SIMILAR performance. Air flux rate (cfm of air per sq. ft. or NM³/M² of active surface area) will absolutely control diffuser efficiency and will absolutely control membrane life. Systems which propose high airflow rates or high flux rates through their membrane systems with high cfm per square foot (NM³/M²) reduce efficiency and increase stress i.e., reduce the life of the unit. All membrane diffusers require similar air flux rates for similar long term performance.

Myth Number 6 - Ceramic Diffusers are more Efficient Than Membranes

Ceramic diffusers and membrane diffusers can offer identical oxygen transfer efficiencies in clean water. In field performance, membrane diffusers can offer as much as 50% greater efficiency than ceramic diffusers because membranes can operate at less airflow per sq. ft. Ceramic diffusers will clog when operated below the critical airflow for flushing and utilizing the entire diffuser surface. Membranes can run at very low air flux rates in dirty water and improve oxygen transfer efficiency versus ceramic.

Myth Number 7 - Membranes Require Substantial Maintenance and Must Be Replaced Every Three Years

Actual performance of EDI advanced technology EPDM or urethane membranes has been excellent in the field. Properly engineered membrane systems should not require significant maintenance. Membranes properly designed at reasonable air flux rates should provide five to ten years of membrane life.

Myth Number 8 - Piping Systems Should Use 2% TIO₂ FOR UV Protection

Standard plastic pipe institute specifications for all PVC piping requires use of TIO₂ for aesthetic appearances. Some manufacturers have specified special percentage of TIO₂ as part of their standard equipment spec. This is to obscure the fact they are using extremely thin wall PVC pipe that is vulnerable to mechanical damage, vulnerable to UV degradation and/or heat. Addition of proper amounts of TIO₂ could be helpful for UV protection but pipe manufacturers recommend that at least 7 to 10% TIO₂ if any significant UV protection is to be achieved. Unfortunately the addition of 7% to 10% TIO₂ creates substantial negative characteristics in piping systems, i.e., brittle. Based on pipe manufacturer recommendations, EDI recommends standard heavy wall Schedule 40 PVC pipe in place of special concentrations of TIO₂.

Myth Number 9 - Coarse Bubble Diffusers are Better Mixers

Mixing is a term that must be defined. If mixing is described as blending, coarse bubble diffusers are more efficient because they create a mass displacement at the diffuser assembly itself. If mixing is defined as liquid pumping and circulation, fine bubble diffusers are superior mixers. Fine bubble diffusers will mix biological systems at airflows substantially below the air flow rate required for coarse bubble diffusers. Coarse bubble diffusers demonstrate substantial turbulence; fine bubble diffusers demonstrate superior liquid flow or pumpage. See Technical Bulletins: Number 103 - Coarse Bubble, Number 104 - Fine bubble; and, Number 105 - Converting from Coarse Bubble to Fine bubble

Myth Number 10 - Coarse Bubble Diffusers Require Less Maintenance

History would suggest that coarse bubble diffusers may require less maintenance than the application of rigid media fine pore diffusers in the past. Advanced technology flexible membrane diffusers generally require less maintenance than coarse bubble diffusers as they exclude solids and liquids from the system. If you exclude solids and liquids you do not have to be concerned about being able to blow those solids and liquids back out of the system. EDI is successfully replacing coarse bubble diffusers with membrane diffusers to reduce maintenance and clogging from rags etc. Membrane diffusers require less maintenance.

Myth Number 11 - Surface Aerators are the Lowest Cost Aeration Systems

High efficiency EDI FlexAir membrane diffusers and efficiently designed blower systems are the most economical aeration systems currently available. The high capacity magnum diffusers by EDI and ability to use floating laterals or fixed header systems to meet the engineering needs of each project allow the system to be economical. Not only is the EDI system economical on a capital cost basis but it operates at approximately 1/2 the energy cost. Present worth cost or evaluated cost of the aeration system over life of the project will always result in selection of diffused aeration systems! See Technical Bulletin Number 101 - Proper Design Considerations.

For specific information on aeration system selection considerations, contact EDI at 573-474-9456.