

# Fixed Grid Aeration Systems

## Bulletin Brief

Fixed grid systems offer significant improvements in performance when properly designed and applied. Grid configurations for fine bubble systems can be employed with a wide range of products. Application of fixed grid systems is generally limited to concrete floor basins with either concrete or steel tank construction. Special installation procedures can be employed to allow installation of membrane diffuser components and systems into earthen basins or lined earthen basins when necessary.

## Technical Presentation

### Comparison of Aeration Device Configurations

In aeration mixing systems, both coarse bubble and fine bubble diffusers can be applied to the aeration basin in many configurations. It has been effectively demonstrated in test data by the U.S. EPA and Los Angeles County Sanitation District that proper distribution of aeration into a biological reactor can result in significant improvements in performance. Side-by-side tests of various methods for distributing diffusers including single roll from one side, center roll down the middle, swing diffuser type systems, etc. were compared vs. full floor coverage or grid type configurations using coarse bubble and fine bubble diffusers. A summary of those results suggest the following:

1. Aeration devices either fine bubble or coarse bubble can be applied in any of the above configurations involving roll or full floor coverage grid type systems.
2. Full floor grid configurations consistently deliver energy savings of 20 to 25% vs. exactly the same diffuser system applied in a less effective mounting configuration. As an example, fine bubble diffusers mounted along one wall of the tank are substantially less efficient compared to the same fine bubble diffusers properly distributed in a grid configuration over the floor of the basin.

A full floor cover grid configuration will consistently deliver 20 to 30% improved oxygen transfer efficiency using the same type and the same number of diffusers. It is of interest to note that a grid configuration of coarse bubble diffusers offers the same gain in efficiency (20 to 30%) vs. coarse bubble units with the side or roll configuration.

3. Fixed grid installations typically must be installed within 6 inches to 2.5 ft of the floor (0.15 to 0.76 meters of the floor) in order to deliver proper mixing in addition to oxygen transfer capability. Please note the desire to

install the units as close as possible to the has to be considered in conjunction with any existing or new blower system capabilities.

4. Fixed grid applications are suitable for most types of diffuser installations.

### Coarse Bubble Grid Systems

For coarse bubble applications, please refer to EDI product literature on the following products:

- a. MaxAir™ wide band diffuser assemblies with Spectrum™ Saddle Mount
- b. EDI PermaCap 5™ coarse bubble unit
- c. EDI 9 inch Disc coarse bubble diffuser unit.

Each of the above coarse bubble diffuser systems has slightly different mounting arrangements or proper piping considerations. EDI's technical support group can supply proper design criteria for application and design of coarse bubble diffuser systems using either the wide band or the disc configuration as manufactured by EDI.

### Fine Bubble Grid Systems

Grid configurations for fine bubble systems can be employed with a wide range of products. Request information on EDI FlexAir™ diffuser units of the following types for specific applications:

- A. 2 inch or 3 inch (62 mm or 91 mm) diameter tube diffuser units with threaded 3/4-inch male connection. EDI FlexAir™ T series is available in multiple lengths and diameters to meet specific piping objectives.
- B. EDI 9 inch (230 mm diameter) disc diffuser unit. The EDI FlexAir™ disc can be employed using direct piping mounts or using special saddle mount assemblies for the diffuser units.
- C. EDI Model 84P tube diffuser units with integral Spectrum™ saddle factory assembled. This unit has the largest capacity and the lowest installed cost of any flexible membrane diffuser units.
- D. EDI FlexAir™ Mini Panel designs. These units also employ the saddle mounted tube diffuser concept; however, the Mini Panel tube diffusers are perforated on the top only in order to produce the effectiveness of a rectangular disc diffuser unit.
- E. FlexAir™ Micro Pore Mini Panel design – similar to the mini panel described above, however, much smaller openings in the membrane are employed to produce different oxygen transfer and operating pressure characteristics for specific high efficiency applications.

- F. EDI REEF® aeration unit. This unit is designed with rigid porous polyethylene media and has been a favorite in many applications over the last 20 years. EDI technical support group can offer sizing and performance information on the REEF applications.

#### **Fixed Grid Primarily Installed in Concrete Floor Basins**

Application of fixed grid systems is generally limited to concrete floor basins with either concrete or steel tank construction. Special installation procedures can be employed to allow installation of EDI advanced technology membrane diffuser components and systems into earthen basins or lined earthen basins when necessary. These fixed grid applications require special techniques for protection of the liner or protection of the earthen basin itself. Please contact EDI for those specialized applications where fixed grid would be preferred in earthen and/or lined basins.

#### **Summary**

Specification of grid type diffuser systems is a key function in the selection and installation of the most efficient and durable system. EDI suggests you request technical specification details on these various components and diffuser assemblies in order to allow engineering judgements be properly made. Please contact either EDI directly in order to obtain those specification techniques and features and complete the project Data Sheet.

For specific information on proper design and evaluation of your existing system contact Environmental Dynamics, Inc. at 573-474-9456.