EFFECTS OF TEMPERATURE ON AERATION PIPING

Technical Presentation

Proper design of aeration systems requires use of reliable materials of piping to deliver the desired service at economical cost. It is recognized that plastic piping systems are very desirable for aeration system service because of many features including:

1. Ease of installation.
2. Corrosion resistance.
3. Easy to handle and/or repair.
4. Economical cost.
5. Widely available.

Because of the many benefits of plastic piping systems it is necessary to be sure and recognize the limitations of plastic piping as well. For proper service it is necessary to utilize engineered plastic piping systems; particularly to withstand the heat load generated by blowers in aeration systems. Compressing air increases air temperatures dramatically. This temperature is controlled by site locations, ambient air temperature, basin depth or discharge pressure, blower efficiency and locations of blowers (distance) with respect to plastic pipe.

Air temperature must be considered in all aeration piping designs. Engineered aeration systems using plastic piping are very desirable but must be engineered for every system.

General engineering criteria can be applied to assure successful and economical aeration piping systems using Engineered Plastic Piping solutions.

I. Metal piping generally recommended for all applications between the blowers (highest heat) and the aeration basins.

II. For very shallow aeration basins (low pressure air & low temperature) conversion to the high temperature plastic may be possible above the waterline at the aeration basin. Must use great care with engineering evaluation of temperature and air with respect to plastic pipe design limits for temperature.

III. Metal piping typically used from top of aeration basins to a point 3 ft to 1 meter above basin floor. This metal drop pipe offers major cooling of the air allowing better use of plastic beginning near the basin floor.

IV. For aeration piping in-basin and for diffuser components engineering review of the design includes;
   a. Temperature air discharged from the blowers.
   b. Cooling of air to point of conversion to plastic pipe. Using the air temperature calculated at the plastic pipe/air interface proper plastic piping materials can be selected.

V. For proper engineering the basic thermal characteristics of the plastic piping must be considered. General design temperatures fro plastic piping are listed below:

   Maximum air temperature at plastic pipe
   UPVC = 70˚ C
   ABS = 100˚ to 105˚ C (resin varies)
   CPVC = 110˚ C to 125°C
   Polypropylene = 110˚ C to 125°C
   Polyethylene = 80°C to 105°C

VI. Clearly engineered high temperature plastic piping systems are a significant tool for optimum design of quality aeration systems.

   EDI aeration systems are available with any type piping system and EDI will assist in selection of proper materials for your projects.

For more detailed analysis or assistance visit the EDI website at www.wastewater.com or contact your EDI Representatives or office.

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