

RBC SERVICES UPDATE

RBC Services
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R B C A E R A T I O N

As far back as the early 1980's, the EPA conducted studies regarding RBC operations. Their main concerns were first stage Soluble BOD loading and treatment staging. At existing plants, aeration was recommended for biomass control to alleviate concerns of equipment physical overloading.

In later years, EPA recommendations for new plants which incorporated RBCs, included the installation of aeration systems for mechanically driven units. Their findings were in agreement to those of Autotrol Corporation, the pioneer of the RBC process in the US, which suggested the ideal loading rate to the first stage was 2.5 pounds of SBOD per day per 1,000 square feet of treatment surface area per day. The loading rate is increased to 3.5 pounds for properly aerated RBCs.

Generally, full size RBCs have a nominal 100,000 square feet of treatment surface area for SBOD removal, and a nominal 150,000 square feet of treatment surface area for nitrification.

With the installation and proper operation of an aeration system for biomass control, the RBCs can be maintained well within the manufacturer's recommended weight limits. It has been realized that controlling biomass thickness can assure equipment longevity while alleviating mechanical problems.

The actual purpose of a recommended maximum biomass thickness limit on RBC media is based on process efficiency. The highest level of SBOD removal is achieved when biomass thickness is maintained between .030 and .050 of an inch. When biomass is thicker, the level of process begins to take a downward trend. Reason being, the excess biomass inhibits proper oxygen infiltration to the working layer of bacteria responsible for the treatment process.

The recommended operating weight limit of the Autotrol/Envirex 25' RBC with a 1" square shaft is 42,000 pounds, which equates to .090" biomass. (Other manufactured RBCs have limits of up to 50,000 pounds for 25' units.) At this thickness however, process efficiency is all but lost. Regarding the physical aspect of equipment, any RBC operated in a range of 60% to 80% of its recommended weight limit has no problems concerning process efficiency or structurally.

In many cases at RBC plants without Load Cells, it is not known whether RBCs have been operated within the weight limits in years past. Although controlling weights will help to provide the longest life possible from the equipment, the main point is to maintain the highest level of treatment.

From the general standpoint of biomass control, it is recommended that Load Cells and aeration be installed under the first stage RBCs. For complete process enhancement of SBOD removal, nitrification and biomass control, aeration should be installed under all RBCs.

Attached hereto is a copy of results from a study which was written and published in the WPCF Journal several years ago. The study was done at an RBC plant in Iowa. The main point of the article dealt with the effects of aeration on the nitrification process.

While the RBCs studied used a fine bubble aeration system, coarse bubble diffusers are recommended for RBCs. Reason being, the solids produced with the RBC process tend to clog fine bubble systems and will require cleaning procedures on a closely scheduled basis, which is both time consuming and costly.

In regard to air rates for biomass control, any given RBC should be able to receive up to 250 cfm. However, it is not necessary that each RBC receive this amount of air on a constant basis. This would mean installing large blower/motor combinations which would not be cost effective. Total cfm air rates should be determined under the basic aeration mode. Each RBC should receive between 125 and 150 cfm on a constant basis, which will also be the gauge of properly sizing the motor/blower combination.

When biomass control procedures become necessary, valves which are installed on each main air header can be adjusted to direct air to any given RBC until weights fall to a satisfactory level. However, it is very important for this procedure to be administered slowly - over the course of 6 to 8 hours. If done quickly, the initial "blast" of air may cause large amounts of biomass to slough too quickly which may affect the media passages with excess solids. Once the air rate is at its maximum, it should remain so for a period of approximately 24 hours, after which normal operations can resume.

A properly installed in-tank air header, such as SideCar, should be placed under the entire length of the media envelope, approximately 1 foot off center on the downward side of the rotation. Coarse bubble diffusers should be applied at approximately 6" intervals at the 12 o'clock position. Also very important is the size of the supply piping to allow unrestricted air flow. Inadequate supply pipe sizing is a common error committed by an inexperienced designer. To eliminate such errors, we will be glad to assist in recommending proper supply pipe sizing upon request.

As always, if you have any questions regarding aeration for your RBCs or their operation in general, please do not hesitate to give me a call.