

# RBC SERVICES UPDATE

RBC Services  
Division of McNish Corporation

Phone: 630-264-5241 Fax: 630-892-7951

---

## RBC AERATION - WHY & HOW

Issue 1, 2000

Since we distributed the RBC Service UPDATE Issue 1, 1998 - CONTROL RBC BIOMASS WITH THE SideCar SYSTEM, we have received many calls questioning the background and importance of RBC aeration. So I thought this would be good information to pass along.

In 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 problems with equipment failures.

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 developed by Autotrol Corporation in the late 1970s, which suggested the ideal loading rate to the first stage was 2.5 pounds of SBOD per day, per 1,000 square feet of surface area. The loading rate is increased for aerated RBCs, to 3.5 pounds.

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 within the manufacturer's recommended weight limits. It has been realized that controlling biomass thickness can assure equipment longevity while alleviating failures.

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, in a healthy, aerobic environment.

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. A thick growth is not a healthy growth.

The recommended operating weight limit of a full size Autotrol RBC with a 1" shaft is 42,000 pounds, which equates to .090" biomass. (Other manufactured RBCs have limits of up to 50,000 pounds.) At this thickness however, process efficiency is all but lost. Generally speaking of the physical equipment, any RBC operated in a range of 60% to 80% of its recommended weight limit is unlikely to experience problems regarding structural failures.

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 two stages of RBCs. For complete biomass control and process enhancement of SBOD removal and nitrification, aeration should be installed under all RBC treatment stages.

Fine bubble aeration for RBCs is *not recommended*. Coarse bubble diffusers are recommended for RBCs. Reason being, the solids produced in the RBC process have proven to clog fine bubble systems and require cleaning procedures on a closely scheduled basis, which is both time consuming and costly.

Concerning required air rates, total cfm should be determined under the supplemental aeration mode. Each RBC should receive approximately 125 cfm on a constant basis, which will also be the gauge of properly sizing the motor/blower combination.

Regarding air rates for biomass control however, 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.

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 or stage until excess biomass is stripped 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 air is applied too quickly, the initial “blast” of air may cause large amounts of biomass to slough too quickly which may in turn cause plugging of the media passages. Once the air rate is at its maximum, it should remain so for a period of no longer than 18 to 24 hours, after which another RBC can be controlled or normal operations can resume.

A properly installed in-tank air header 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” to 8” intervals at the 12 o’clock position. Also very important is the size of the supply piping to allow unrestricted air flow. Inadequate pipe sizing is a common error committed by the inexperienced designer.

If you have any questions regarding aeration for your RBCs, would like to receive another copy of the **SideCar** information booklet or have questions about RBC operations in general, please do not hesitate to give me a call.