



Smith & Loveless Inc.

**PROTECTING WATER.
PROTECTING PEOPLE.**



Issue #04-06-808

TREATMENT EQUIPMENT



Articles

Model R OXIGEST® with TITAN MEM-BOX™ Insert	3
Retrofitting Clarifiers.	4 - 6
Do You Have Emergency Back-Up?	7
TITAN MBR™ & MEM-BOX™	8 - 9
Green+Green™ Mobile Organic Biofilm™ Advanced Biofilm Technology.	10 - 11
Smith & Loveless MINI-JECT®	12
Protecting Equipment from Corrosion.	13
Smith & Loveless OBEX® Inlet Spiral Fine Screen System	14 - 15
Retrofitting Diffusers.	16 - 18
Local Contact Information	19



Smith & Loveless Inc.

Copyright 2018 Smith & Loveless, Inc. reserves all rights. No part of this catalog, or the catalog in its entirety, may be reproduced by any means, electronics, or otherwise, without explicit prior written authorization from Smith & Loveless, Inc.

Published by: After Market Division • Smith & Loveless, Inc. • 14040 Santa Fe Trail Drive • Lenexa, KS 66215-1234, USA • Ph: (913) 888-5201 • Fax: (913) 748-0106 • Toll Free: (800) 922-9048, Option 5.





The Smith & Loveless **Model R OXIGEST®** product line is comprised of systems installed all over the world in a variety of industrial and municipal applications. The Retrofit Department can now help you upgrade your **Model R OXIGEST®** or a similar style treatment plant by others with the **TITAN MEM-FRAME™** and **TITAN MEM-BOX™** technology. The system offers flexible process treatment options for all kinds of wastewater streams.

Design Benefits

The **Model R OXIGEST®** Treatment System provides stable operation and flexible process options for wastewater applications. Proven in hundreds of installations, it is the most popular treatment plant design for efficient treatment of complex waste streams. Best of all, it is located in one concentric footprint.

The **Model R OXIGEST®** smart-tank design encompasses complete aeration, clarification and advanced treatment technology in concentric tankage while allowing these unit processes to be individually separated and controlled. From design and engineering to a total turnkey field installation, Smith & Loveless' expertise comes with every **Model R OXIGEST®**.

In fact, more than 20 years after the equipment was originally designed customers frequently come to the Retrofit Division of Smith & Loveless and ask us to assist in not only rehabbing the equipment, but also switching zones around. We often add in features for dewaterability and most recently the addition of the **TITAN MEM-BOX™** and **TITAN MEM-FRAME™** technology. Whether your BOD is 200 mg/l or 22,000 mg/l, we can help you find a way to take your existing equipment, rehab it and expand its treatment capability to meet tomorrow's effluent limits. And we'll do it all for less than you would spend by tearing everything down and starting over new. For more information, contact your Smith & Loveless Representative.

Aging Clarifiers Retrofit to “Like New” with Smith & Loveless

Depending upon the condition of the clarifier, the retrofit can be one small component, shown in the photos, to a complete clarifier retrofit including internals, bridge, handrails, and control panel shown above.

Cities and municipalities are taking 20+ year old clarifiers and bringing them back to “like-new” condition. We can help you too.

Whether the clarifier was originally manufactured by Smith & Loveless or not, we can assist in everything from evaluation of the clarifier, to manufacture of new internal components that fit into the existing clarifier, to site supervision of the retrofit to a total turn-key project. Depending upon your expertise, time and budget, Smith & Loveless Retrofit is here to assist.

Common Clarifier Retrofits

- Anti-Rotation Arms
- Skimmer Arms
- Stilling Wells
- Drive Limit Switches
- Scum Beaches
- Bridges & Walkways

No matter the brand or model, we’re here to assist with:

- standard scraper type (Primary) clarifier and/or
- standard suction type (Secondary) circular or rectangular sludge removal clarifier
- flocculating clarifier scraper type (Primary) clarifier and/or
- flocculating suction type (Secondary) circular clarifier or
- high-rate, solids contact **CLAR-I-VATOR**® clarifier



New Clarifier Drives



New Scrapers



New Skimmer Arm



ORDER LOCALLY FROM YOUR **Smith & Loveless Representative**

5

Customer's have found that when they use Smith & Loveless' construction management team for site supervision of the retrofit using a local contractor, the customer saves time and money because S&L knows how the equipment goes together and how it works - that's our business.



Clarifier Rehabs? Think Smith & Loveless.

Do You Have Emergency Back-Up?

When Your Blower Goes So Does Your Treatment Process



Smith & Loveless Retrofit can assist you with all of your blower retrofit requirements, whether that includes adding a spare blower for emergency back-up, increasing the blower sizes for increased air demand for the treatment process, or looking at energy efficiency savings. Whatever your WWTP needs might be from small blower units for on site needs to large scfm requirements, think Smith & Loveless.

When was the last time you thought about your blowers? How old are your blowers? Do they feature new green energy efficiencies that may allow you to lower your yearly energy consumption?

Smith & Loveless Retrofit can assist you with upgrades on your blower, ranging from replacement to additional oxygen for improved D.O. (dissolved oxygen) levels. Smith & Loveless Retrofit can also add an additional backup blower to your system for emergencies with

automatic switching valves - so if you have a blower go down it does not put you out of the treatment process business. We can also assist you with all size range of blowers, from small blowers for on site treatment plants to large blowers for major municipal treatment plants.

Smith & Loveless Retrofit also offers replacement motors for most existing blowers. Don't forget that the functionality of your blower is vital for meeting required effluent

limits. Make sure that you are prepared for emergencies. Contact your local Smith & Loveless Representative to review your system for preparedness today.



Smith & Loveless Inc.

ORDER LOCALLY FROM YOUR **Smith & Loveless Representative**

7



TITAN

TITAN MEM-BOX™ Retrofit System

- Installs directly in existing aeration zone = No increase in plant footprint.
- Gravity flow operation for easy, low energy cost operation. No permeate pumps required.
- Designed to fit all tank heights and still allows for easy, low energy cost gravity flow operation.
- 2-2.5 times increased treatment capacity of plant after inserted.
- Meets lower discharge limits on Nitrogen, Phosphorous, BOD, TSS. (**Note:** if adding denitrification, it may impact the amount of increased capacity as a new zone in the existing tank will need to be created for the anoxic zone.)
- Superior membrane pore size: 0.08 micron. No biofilm needed to reach this level of filtration.
- Flat sheet membrane: durable, smooth surface, easy to maintain, no hair bundling issues, no air integrity testing or daily chemical dosing.
- Complete package from Smith & Loveless: MBR, piping, valves, meters, recycle pump, and controls.
- Clean in Place: Less chemicals needed. No impact on mixed liquor; chemicals can be cycled through plant so no waste disposal.
- Larger fine screen allowed for TITAN MEM-BOX™, 3 mm vs. 1-2 mm fine screen for other MBRs.
- Standard packages, plus Custom sizing and options available for most economical operator friendly system.

Other MBR Retrofit Systems

- Membrane tank outside of aeration zone – increases footprint of plant.
- Permeate pumps required, which means additional controls, pumps, valves, energy and operational costs.
- Competing MBR's do not have a nominal pore size of 0.08, rather they have a range from 0.08 to 0.4 micron. Some of these other systems also require “biofilm” to enhance filtration.
- Hollow fiber membranes require significantly more maintenance – air integrity testing, daily chemical dosing, hair bundling, and broken fibers must be plugged with epoxy and membranes must be soaked in a chemical bath to clean outside of the aeration zone.
- Hollow fiber needs 1 mm fine screening – more costly upfront and increased solids handling from the screenings and maintenance issues associated with small screen sizes.

MEM-BOX™

TITAN MBR™ Membrane Data (typical)

Design Flux: 13 gpd/sf
Pore Sizing: 0.08 microns

Transmembrane Pressure: 0.50 - 2.00 psi
Cleaning (In-tank): Semi-annual

Durable Membrane & Module Composition

- Composed of PVDF [polyvinylidene fluoride] and PET non-woven fabric
- Membrane Sheets never rub during operation
- Robust design prevents breakage experienced in alternatives
- Produces higher flux rates over the life of the membrane than others
- Gravity feed into system eliminates need for pumps and related energy costs

Flat-Plate Design Superior Alternative to Hollow Fiber

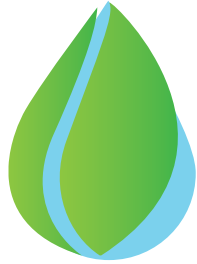
- Eliminates air integrity testing required by hollow fiber membranes
- Smooth, continuous surface negates bundling by stringy solids
- Facilitates more effective air scouring

More Economical Cleaning Method: Clean in Place (CIP)

- CIP reduces operating costs with less chemical usage
- Requires less chemicals and operator time
- No backpulsing is required; eliminates associated equipment



TITAN MEM-BOX™ is the ideal MBR retrofit for package plants like this as well as concrete basins. Its compact design facilitates insertion into the existing plant with minimal changes to the existing plant structure.



Green+Green™ Mobile Organic Biofilm™

Clean water treatment optimizes the natural process of bio-degradation to produce safe effluent for our environment and preserve the supply of water. It only follows, then, that our “environmental” task of treating the world’s water should always be progressing toward greener engineered processes that cost-effectively solve our water quality challenges. That’s why Smith & Loveless is introducing **Green+Green™** Treatment Technologies, beginning with patented **Green+Green™ Mobile Organic Biofilm™** processes.

Green+Green™ Mobile Organic Biofilm™ processes represent the next generation in emerging biofilm

process technology, featuring completely renewable and patented bio-carrier media that delivers the crucial bio-treatment results of conventional MBBR/IFAS processes and ballasted clarifier settling with a smarter, more cost-effective green approach.

Simple to implement into existing and newly designed WRRFs and treatment plants of all sizes, **Green+Green™ Mobile Organic Biofilm™** offers distinct applications for your effluent and cost-saving goals, including: Enhanced Clarifier Settling and Performance, BioMedia Treatment like IFAS/MBBR, and Granular Biomass.

End-User Benefits

- **Reduce Capital and Operational Costs**

Cost-effective solution versus conventional biofilm and ballasted technologies

- **Low Maintenance**

Self-regulating robust process requires minimal adjustments to variations of incoming contaminants resulting in minimal operator supervision and adjustment

- **Small Footprint**

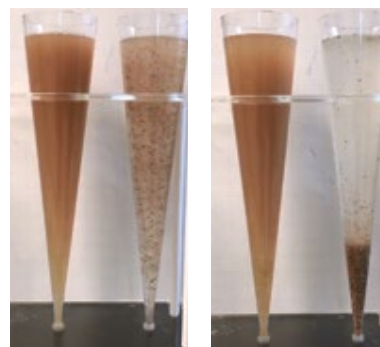
Green+Green™ Mobile Organic Biofilm™ Process reduces space required to implement

- **Expandable**

Progressive addition of media can easily grow with increased incoming substrate without the need for additional tankage and equipment

Superior Settling Provides Improved Capacities and Footprint

The superior settling rate of the **Green+Green™ Mobile Organic Biofilm™** versus typical activated sludge is illustrated at right. The left cone in each image is the activated sludge sample, while the right cone is the sludge sample from the **Green+Green™ Mobile Organic Biofilm™** process. The left image is at the start of the test. The right image is after 10 seconds has elapsed.



Process Applications

Simple to implement into existing and newly designed WRRFs and treatment plants of all sizes, Green+Green™ Mobile Organic Biofilm™ offers distinct applications for your effluent and cost-saving goals.

Enhanced Clarifier Performance



- Expand capacity of existing basins
- Enhance settling properties
- Reduce SVI for higher effluent quality
- Combat High Infiltration / Inflow (I/I)

BioMedia Treatment



- Apply as IFAS/MBBR application with superior biofilm media / retention
- Expand capacity to existing activated sludge systems
- Design new systems with space limitations
- Achieve superior nitrogen removal
- Improve shock load resistance

Granular Biomass



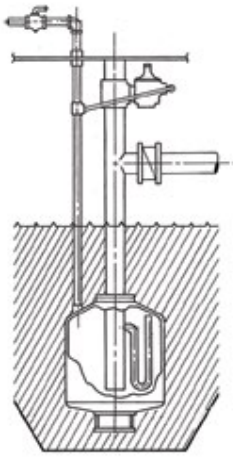
- Biological (BNR) nutrient removal
- Biological phosphorus removal
- Improved settling performance
- Space savings
- Energy Reduction



The Green+Green™ Mobile Organic Biofilm™ all-natural and renewable media is readily available from Smith & Loveless, and is packaged for simple addition into your system.

- All-natural alternative to petroleum-based carriers
- Derived from a renewable lignocellulosic plant fiber
- High effective surface area media
- Host for diverse biological growth
- Applied as ballast for settling, moving bed biofilm, or granular biomass

MINI-JECT®



Throw Away Your Flow Equalization Zone's Submersible Pumps

The Smith & Loveless **MINI-JECT®** is one of the best ways to control levels in the flow equalization zone of smaller WWTP's because it is so simple.

The **MINI-JECT®** simply sits in the flow equalization zone and uses air pressure to maintain the level in the flow equalization zone. If you need a little higher flow, you simply adjust the air flow to the **MINI-JECT®**. You need a little less flow, you again simply adjust the air flow. The air requirements for the **MINI-JECT®** are so minimal, that you will not see any additional air

requirements needed when installing the **MINI-JECT®**.

The **MINI-JECT®** is a very "green" product - especially when you consider power consumption savings, no guide rails or submersible pump maintenance.

The Smith & Loveless **MINI-JECT®** ties into the plant air line and uses a minimal amount of air to control the flow equalization zone.

The **MINI-JECT®** uses air pressure to build up inside of the **MINI-JECT®** ejector and then discharges the flow.

The fill cycle of the **MINI-JECT®** is very short (from 3 to 7 seconds depending on the liquid level in the flow equalization zone) so that for practical purposes, the discharge is almost at a steady rate.

For more information on how to retrofit your flow equalization zone with the Smith & Loveless **MINI-JECT®**, contact your local Smith & Loveless Representative.



Smith & Loveless Inc.

Protecting Equipment From Corrosion



The Smith & Loveless Sacrificial Anode Pack effectively stops corrosion in its tracks on all types of buried or partially buried treatment plants.

Whether your equipment is by Smith & Loveless or another manufacturer, we can help you calculate how many anodes are required and will send you instructions on where to place the anode packs for maximum corrosion protection effectiveness. Protect your WWTP equipment from corrosion by installing corrosion protection.

The Ultimate Monitoring Unit - Anode Test Box

The Smith & Loveless Anode Test Box was designed to monitor the current flow in each Sacrificial Anode surrounding the treatment plant. The amount of current flowing in the anodes depends on the bare steel of the structure, plus any bare steel such as the connecting piping. The flow of current is also effected by the electrical ground at the service pole.

The Smith & Loveless Anode Test Box provides a single measuring point to monitor the current flow and subsequent amount of anode migration.

Smith & Loveless' Anode Test Box works well with not only Smith & Loveless equipment, but also on all underground steel structures such as water booster pump stations, valve vaults, and treatment plants.

ANODE TEST BOX SIZING INFORMATION	
Large Circular Steel Tanks: Model R Treatment Plant, CLAR-I-VATOR®, Clarifiers, and other circular tanks.	
MAXIMUM TREATMENT PLANT DIAMETER*	MINIMUM NUMBER OF ANODES
10'-0" Diameter	2
13'-0" Diameter	3
18'-0" Diameter	4
24'-0" Diameter	5
30'-0" Diameter	6
37'-0" Diameter	7
45'-0" Diameter	8
50'-0" Diameter	9
55'-0" Diameter	10
60'-0" Diameter	11
65'-0" Diameter	12
70'-0" Diameter	13
75'-0" Diameter	14
80'-0" Diameter	15
* For larger diameters, call your local Representative or the Smith & Loveless After Market Division.	
Rectangular Steel Tanks: ADDIGEST®, FAST®, Model V, Model CAP, and all other Rectangular Treatment Plants	
MAXIMUM 12'-0" WIDE*	MINIMUM NUMBER OF ANODES
0 to 26'-0" Length	4
26'-01" to 44'-0" Length	6
44'-01" to 66'-0" Length	8
* For longer treatment plants, call your local Representative or the Smith & Loveless After Market Division	



S&L OBEX™ Inlet Spiral Fine Screen System



Smith & Loveless now offers a new **OBEX™ Inlet Spiral Fine Screen** system, complete with PLC controls and a color HMI screen to complete its headworks offering. As more and more wipes, rags and general trash are dumped into toilets for final disposal, the importance of having an **OBEX™ Inlet Spiral Fine Screen** at the head of the treatment plant becomes greater and greater. An **OBEX™ Inlet Spiral Fine Screen** protects the treatment plant from these trash items by screening them out before the flow reaches the treatment system.

The S&L **OBEX™ Inlet Spiral Final Screen** comes in two models: an inlet channel mounted spiral screw screen assembly and a spiral screw screen assembly with self-contained tank and flanged connections, which mounts to a solid surface. Because screen opening requirements vary greatly depending upon the application, Smith & Loveless offers a wide size range of screen opening diameters from .0098" (.25mm) to .394" (10mm). Smith & Loveless uses wedge wire material for openings sized .0098" (.25mm) to .118" (3mm) and perforated plate for openings sized .118" (3mm) to .394" (10mm).

Main Advantages:

- Robust Stainless Steel (304 or 316)
- Construction Low rotational speed
- Easy maintenance
- Self-cleaning
- High capture rate

Type of Equipment	Screen Size Opening
TITAN MBR™	.118" (3mm), Perforated
TITAN MEM-BOX™	.118" (3mm), Perforated
TITAN MEM-FRAME™	.118" (3mm), Perforated
Hollow Fiber MBR System	.079" (2mm), Perforated
Other Flat Sheet MBR Systems	.118" (3mm), Perforated
PISTA® Grit Removal System	.25" (6mm), Perforated
Other grit removal systems	.25" (6mm), Perforated
FAST® Process	.35" (9mm), Perforated
BioFicient®	.25" (6mm), Perforated
Other fixed-film aerobic treatment systems	.25" (6mm), Perforated
Model R OXIGEST®	.25" (6mm), Perforated
ADDIGEST®	.25" (6mm), Perforated
Other aerobic treatment systems	.25" (6mm), Perforated



Depending on the type of equipment, Smith & Loveless recommends specific **OBEX™ Inlet Spiral Fine Screens**. Smith & Loveless also recommends one be used in front of any wastewater treatment and any type of grit removal equipment. Above you will find a table noting the type of equipment and the **OBEX™ Inlet Spiral Fine Screen's** recommended screen size opening.

Each unit comes equipped with a stand-alone PLC control panel with color HMI touch screen mounted in either a NEMA 4 or NEMA 4X enclosure. Options include:

Compactor Module – located at the discharge end of the auger; the compactor module reduces the volume and weight of the screening by up to 40%.

Bagger System – added to the discharge or to the discharge end of the chute, the bagger system collects screening for disposal in water-proof poly bags.

Spray Wash Systems – provided in the screenings area, transport tube, and/or the compaction area; each Spray Wash System consists of a solenoid valve and spray header mounted to the screen. The wash water requirements: 15 GPM @ 35 psi (1L/sec @ 2.5 Bar) minimum.

Discharge Chute – mounted to the discharge section of the spiral screen, the length can vary to the customer's needs.

Bypass – available on the spiral screw screen assembly with self-contained tank, the bypass allows all unscreened water to flow around the spiral screen assembly and into the downstream treatment process.

NOTE: The bypass option is not recommended for the **Titan MBR™, Titan Mem-Box™, Titan Mem-Frame™** or any other MBR system.

Flow rates are contingent upon screen size opening.

For more information on the Smith & Loveless **OBEX™ Inlet Spiral Fine Screen** system, please contact Smith & Loveless' After Market Division. They can assist with sizing for your application today.



Retrofit from Coarse Bubble to Fine Bubble Diffusers

Improve your aeration efficiencies by retrofitting from coarse bubble to fine bubble diffusers. In some mixing applications, coarse bubble diffusers still work as the best method of oxygen transfer. But in many applications, aeration efficiencies greatly improve by upgrading from coarse bubble to fine bubble diffusers.



Close-up view of a circular fine bubble diffuser recently installed on a retrofit project.

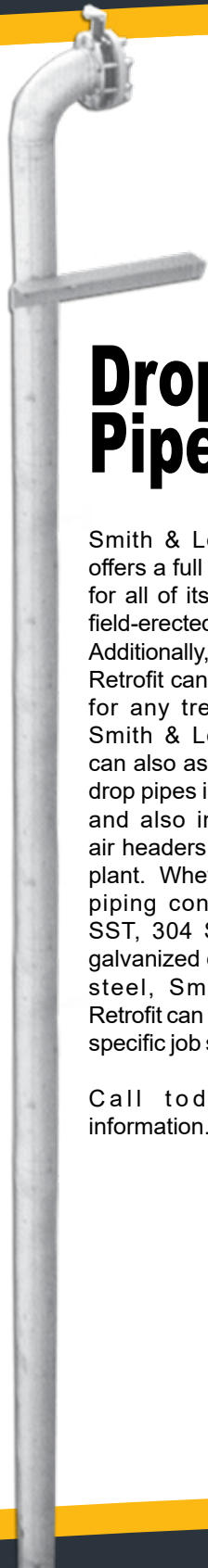


Replacement circular fine bubble diffusers were installed during this retrofit project.

Smith & Loveless Retrofit can assist you in selecting and providing the best type of fine bubble diffuser for your specific application. No matter what type of fine bubble diffuser or type of WWTP, Smith & Loveless Retrofit can assist. Call today.



Tubular fine bubble diffusers were installed during this Retrofit that also included replacement air header, drop pipes and blowers.

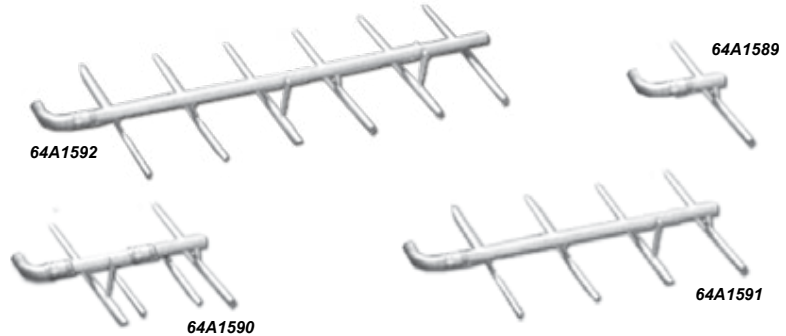


Drop Pipes

Smith & Loveless Retrofit offers a full line of drop pipes for all of its factory-built and field-erected treatment plants. Additionally, Smith & Loveless Retrofit can make drop pipes for any treatment system. Smith & Loveless Retrofit can also assist with tying the drop pipes into the air header and also in supplying new air headers for the treatment plant. Whether you want the piping constructed of 316 SST, 304 SST, hot dipped galvanized or painted carbon steel, Smith & Loveless Retrofit can assist you for your specific job site requirements.

Call today for more information.

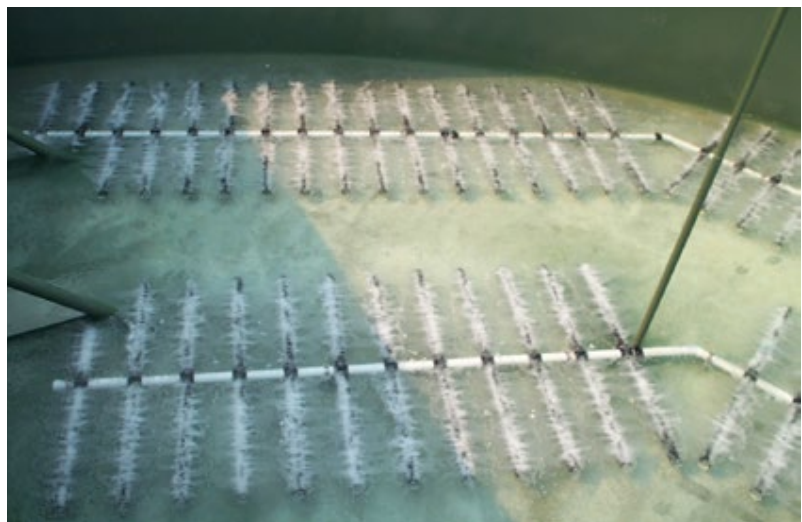
Diffuser Assemblies



Smith & Loveless Retrofit offers a full range of diffuser assemblies for its field-erected and factory-built package treatment plants and WWTP by others. If your treatment plant's diffuser assemblies require replacement, call your local S&L Representative for assistance. Includes: One Diffuser Assembly (see chart below for type), associated Boots and Clamps.

Diffuser Assemblies.

TYPE	# BOOTS SHIPS WITH	# CLAMPS SHIPS WITH	USED IN PLANT MODELS	PART #
1 - Diffuser Assembly	2	2	26R50-29R70	64A1589
3 - Diffuser Assembly	6	6	31R80-58R350	64A1590
4 - Diffuser Assembly	8	8	63R400-84R750	64A1591
6 - Diffuser Assembly	12	12	97R1000	64A1592



New drop pipes, drop pipe assemblies and fine bubble diffusers were installed at this Georgia treatment plant during this retrofit project.

Coarse Bubble Boot Diffusers & Clamps



The 54A5 Coarse Bubble Boot Diffuser through the years has been used on S&L's full line of factory-built and field-erected Treatment Plants. The Boot Diffuser assists not only in the oxygen transfer, but also in the mixing action of the treatment plant - especially popular in applications with heavy solids where potential plugging is an issue. The 1L102P Diffuser Clamp holds the boot on the Diffuser Assembly.

Coarse Bubble Diffuser Boot and Boot Diffuser Clamp.

PART #	DESCRIPTION
54A5	Coarse Bubble Diffuser Boot
1L102P	Boot Diffuser Clamp

Retrofitting Diffusers



New stainless steel drop pipes, stainless steel drop pipe assemblies and MULTIFUSER™ diffusers were installed at this Illinois treatment plant during this retrofit project.



MULTIFUSER™ Diffuser Assemblies

The Smith & Loveless MULTIFUSER™ features a non-clog design that prevents plugging. With solid one-piece construction and no caps or other pieces to replace, the MULTIFUSER™ is held in place by a U-Bolt Connector 64A2080. This prevents the MULTIFUSER™ from blowing off during pressure surges.

Constructed of noncorrosive material which is chemical and abrasion resistant, the MULTIFUSER™'s high alpha factor produces wire to water efficiencies equal to fine bubble diffusers.

PART #	DESCRIPTION
64B622	MULTIFUSER™ Diffuser
64A2080	Aluminum U-Bolt/Nuts & Washers

Order from Smith & Loveless for all of your Treatment needs



Smith & Loveless, Inc.

14040 Santa Fe Trail Drive

Lenexa, KS 66215

Ph: (800) 922-9048

Fax: (913) 748-0106

Smith & Loveless Inc.

Smith & Loveless offers a complete range of aerobic, biological wastewater treatment systems to meet the varied needs of industry, commercial facilities, municipalities, and private development. Our broad system list ranges from innovative membrane bioreactors, fixed bed biological reactors and complete extended aeration plants. Our pre-engineered systems come in factory-built and field-erected configurations, handling capacities from 1,000 GPD (3.8 m³/d) to 5 MGD (18,900 m³/d). All systems are tailored to meet design requirements for centralized and decentralized, off-grid applications.



ORDER LOCALLY FROM YOUR **Smith & Loveless Representative**

19



Advanced Biofilm Technology

pg. 10 - 11