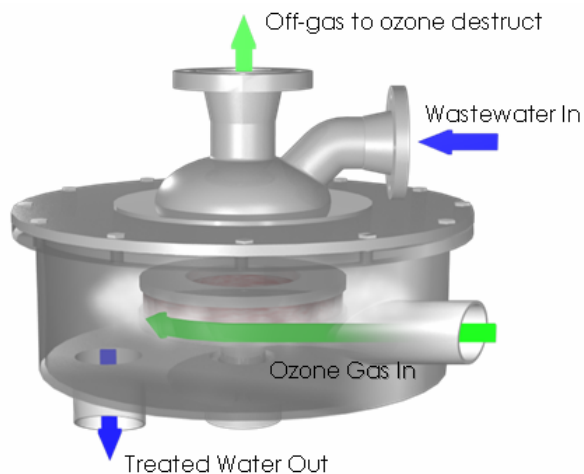


## GasTran™ Systems

GasTran Technology is the first commercially available solution to cost effectively treat waste streams with high doses of ozone. The technology was developed in the 1990's by two professors from Case Western Reserve University. In 2004 GasTran Systems was formed in Cleveland, OH to commercialize this technology for a wide range of applications, including ozone injection ([www.gastransfer.com/eapplications.php](http://www.gastransfer.com/eapplications.php)). Spartan Environmental Technologies supplies complete chemical oxidation and disinfection systems and is an authorized distributor of GasTran ozone injection systems.

### GasTran Rotating Packed Bed Technology

GasTran Units use specially engineered materials to shear an incoming fluid stream into ultra fine droplets. This process dramatically increases the surface area of the fluid to facilitate proven chemical processes. GasTran Technology is significantly more efficient than current alternatives because it is continuously shearing and coalescing the liquid, exposing surface area to the gas medium. The drawing below illustrates the principal of operation of the GasTran system.



- 1) Wastewater is sheared into ultra-fine droplets by motor-driven, spinning rotor
- 2) Ozone gas passes counter-current to wastewater in rotor
- 3) Ozone surrounds droplets and is absorbed into the liquid
- 4) Ozone reacts to oxidize the chemical and biological contaminants
- 5) Treated water discharges from the system

GasTran is a Trademark of Cleveland Gas Systems, Patent Pending

GasTran Ozone Injection System are available from Spartan Environmental Technologies, LLC, Phone : 800-492-1252, Fax : 440-368-3569, e-mail : [info@SpartanWaterTreatment.com](mailto:info@SpartanWaterTreatment.com) , Web : [www.SpartanWaterTreatment.com](http://www.SpartanWaterTreatment.com)

## **GasTran Ozone Injection Systems**

Ozone has been used extensively in industrial wastewater treatment to reduce color, turbidity, COD and odor. At room temperature and atmospheric pressure, the half-life of ozone in water is less than 20 minutes, so achieving intimate contact with the wastewater is critical. Traditional ozone injection systems, while working well in low dosing application can encounter difficulties when high doses of ozone are needed.

Other ozone injector methods such as venturi injectors and fine bubble diffusers suffer from the following problems:

- Inability to deliver high doses of ozone
- Inadequate mixing of the ozone gas into the liquid stream
- Poor performance at variable flow rates
- High pressures and large holding tanks required to establish contact time with ozone
- Require additional equipment for ozone off-gassing

GasTran Technology combined with an ozone generator system is the first commercially available solution to cost-effectively treat industrial wastewater streams with ozone at high doses. The key is highly efficient mass transfer combined with high gas to liquid (G/L) ratios. In addition, GasTran ozone injectors simultaneously degas unreacted or undissolved ozone, minimizing additional equipment, space requirements, and preventing downstream off-gas problems.

## **GasTran System Features**

- Capable of ozone doses above 100 ppm
- Integrated off-gassing
- Corrosion-resistant materials of construction
- Reaches steady state saturation concentrations in seconds
- Low operating pressure requirements
- Highly scalable with a turn-down ratio of 95%
- Non-fouling, low maintenance design easily handles suspended solids
- Standard system designs to handle up to 150 gpm streams which can be combined with additional units or operated in a side stream configuration for higher liquid flow rates.

The table on the next page shows the HP series ozone injectors available.

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## GasTran HP Series Ozone Injectors

<i>Liquid</i>	<b>Model HP-A</b>	<b>Model HP-B</b>	<b>Model HP-C</b>
Rated Flow Rate (gpm)	20	60	120
Minimum Flow Rate (gpm)	1	5	10
Pressure at Rated Flow (psi)	11	13	13
Max Temp (°F)	400	400	400
<i>Gas</i>			
Max G/L Ratios	45:1	45:1	45:1
Max ACFM	120	360	720
Max Vessel Pressure (psi)	35	35	35
<i>Port Connections</i>			
Gas Inlet	2 in flanged	2 in flanged	3 in flanged
Gas Outlet	2 in flanged	2 in flanged	2 in flanged
Liquid Inlet	1.5 in flanged	2 in flanged	2 in flanged
Liquid Outlet	3 in flanged	(2) 3 in flanged	(2) 4 in flanged
<i>Unit</i>			
Rotor Housing Material*	314/316 SS	314/316 SS	314/316 SS
Body Material	Steel frame	Steel frame	Steel frame
Footprint (LxWxH inches)	29" x 29" x 44"	54" x 40" x 45"	54" x 40" x 57"
Unit Weight (lbs)	250	1150	1350
<i>Motor</i>			
Horsepower - max	5	15	25
Drive	Direct	Belt	Belt
Electrical	3phase 230/460V	3phase 230/460V	3phase 230/460V
<i>Mechanical Seal</i>			
Manufacturer	John Crane	John Crane	John Crane
Seal Type <sup>+</sup>	4610	4610	4610
Flushable	Yes	Yes	Yes

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## **COD/BOD Removal with GasTran Ozone Injection System**

The table below shows selected results of tests using the GasTran ozone injection system to treat wastewater for the reduction of COD/BOD. It should be noted that not all BOD/COD is amenable to treatment with ozone. Some specifics are completely unaffected by ozone and others are converted to more biodegradable compounds which can actually increase BOD. As shown below in cases where ozone is effective, the GasTran system has shown very high COD removed/Ozone transferred ratios.

<b>Low COD</b>	<b>Medium COD</b>	<b>High COD</b>
Starting COD = 623 mg/L	Starting COD = 6485 mg/L	Starting COD = 15964 mg/L
Starting BOD = 334 mg/L	Starting BOD = N/A	Starting BOD = N/A
Ozone Dose = 26.4 ppm	Ozone Dose = 14.7 ppm	Ozone Dose = 50.6 ppm
Transfer Efficiency = 86 %	Transfer Efficiency = 100 %	Transfer Efficiency = 100 %
System Pressure = 0 psig	System Pressure = 0 psig	System Pressure = 0 psig
Ozone Gas Concentration = 4.5 wt %	Ozone Gas Concentration = 3.0 wt %	Ozone Gas Concentration = 3.0 wt %
G/L Ratio = 0.44	G/L Ratio = 0.45	G/L Ratio = 1.31
Outlet COD = 497 mg/L	Outlet COD = 5901 mg/L	Outlet COD = 12610 mg/L
Outlet BOD = 232 mg/L	Outlet BOD = N/A	Outlet BOD = N/A
4.5 mg/L BOD destroyed per mg/l ozone transferred	BOD NA	BOD NA
4.7 mg/L COD destroyed per mg/l ozone transferred	39.7 mg/L COD destroyed per mg/l ozone transferred	66.3 mg/L COD destroyed per mg/l ozone transferred