

Sanitization and Deodorization of Waste Collection and
Storage Systems in high-rise buildings Using OZONE



OSG SERVICES LLC
GREEN SANITIZING SYSTEM





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INTRODUCTION

Residents all over the world experience various kinds of issues as they pertain to the upkeep of residential building common areas. One major concern is the proper maintenance of a building's waste disposal system. Though Service providers are mandated to deliver quality of service deemed acceptable by Regulators and residents alike, OSG Services LLC nevertheless believes that this tedious process can be further improved.

Foul smell at garbage disposal points or garbage chutes in a building is caused by micro-organisms breeding in an uncontrolled manner, ones which may cause the spread of disease onto humans. To effectively neutralize both the foul smell and its pathogenic capabilities, OSG Services LLC utilizes a technology which takes advantage of Ozone's (O₃) specific properties. The following Proposal shall discuss this technology in detail.

Ultimately, by removing foul smells and harmful, pathogenic micro-organisms, the Green Chute system aims to deliver a more effective alternative at a lower cost. Our Green Chute patented system is a proven concept, having demonstrated lasting results when introduced in Dubai, New-York, New Jersey, Connecticut and Miami.

EXISTING METHODS OF SANITIZATION AND DEODORIZATION

Urban residents all over the world experience issues with trash disposal, particularly with the foul odor emanating from trash disposal points in residential building common areas. Besides sowing discomfort, such odors harm residents' health because along with the odor come bacteria and spores, both of which tend to spread quickly.



Service companies must periodically clean, sanitize and deodorize all of the components of a garbage chute system to maintain its safe and sanitary function. Some newer buildings which boast efficient maintenance teams are able to effectively maintain the garbage chute, chambers and garbage system valves. However, this scenario is not common and in many buildings across

many communities such maintenance is either not performed at all, or is not performed effectively. Furthermore, residents of relatively old buildings experience conditions far worse. Garbage chute blockage commonly results in the appearance of persistent and unpleasant odors, which are an indication of the presence of bacteria, viruses and microbiologic pests. Blockage occurs over time and is inevitable, occurring more frequently in buildings where chutes are not regularly and properly maintained. Garbage systems have varying chute sizes, ranging between 15.75 and 31.5 inches in diameter. With time, the size of these disposal points decreases due to the buildup of dirt and debris along the walls of the chute.

Currently, there is only one mechanical way to clean and sanitize garbage chutes, used by most Service companies. The existing method is complex, tedious, and provides only temporary relief. Due to the lengthy process which uses water to clean the chutes, inevitably some water is left in the chute after the cleaning is completed. Unfortunately, water serves as a nurturing breeding ground for bacteria, which grows quickly, resulting in foul odors which spread and pose a threat to the health and safety of residents. To avoid this side effect, a simpler and more efficient process is required.

HAZARDS TO AVOID

Residents are exposed to health hazards as soon as they open the garbage chute lid. Airborne micro-organisms are easily inhalable. Hence the importance of proper waste management and odor treatment.



ECOLOGY & MEDICINE
Some of the most common health issues associated with garbage odor are:

- allergic reactions
- asthma
- fever
- itching
- pulmonary tuberculosis

Studies have shown that fungal spores from organic waste may lead to allergic reactions, asthma, fever and itching. Perhaps the most dangerous element in decomposing garbage is Aspergillus. It is a fungus that can live in the human lungs.

Besides Aspergillus, there is tubercle bacillus (Koch's bacillus, *Mycobacterium tuberculosis*), an extremely aggressive and resistant microbe which causes pulmonary tuberculosis. Koch's bacillus is capable of surviving for a long time in dried sputum, in soil, on contaminated objects, and is quite resistant to many substances.

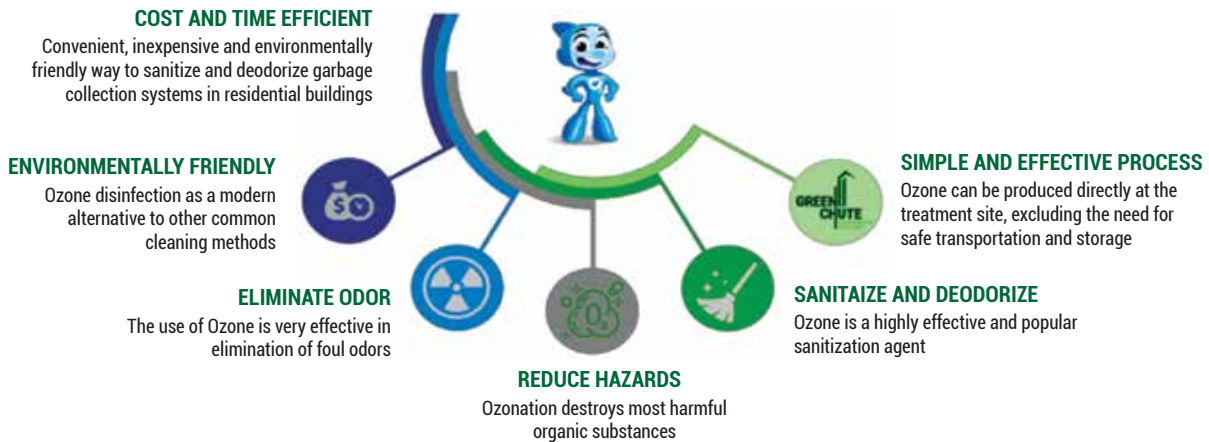
The international scientific community has tested the effectiveness of Ozone technologies in the destruction of tuberculosis infections for many years. As early as in 1911 Dr. Aberhart (Loyola University School of Medicine) used ozone to effectively treat tuberculosis and pneumonia. Thus, proper sanitization and deodorization of a building's garbage disposal system is essential to the mitigation of the risks mentioned here.

There are no effective treatments against fungi and mold except Ozone.

PROJECT INFORMATION

OBJECTIVES

OSG Services LLC aims to provide its own patented equipment which allows for effective and safe deodorization, as well as sanitization of waste. The company's goal is to become a "better alternative" to traditional methods currently being employed. OSG Services LLC aims to deliver the below objectives, alongside:



OSG Services LLC has more than five years of experience in sanitization and deodorization of waste collection and transportation systems in multi-story buildings across many countries around the world. We strive to deliver the same high level of service in every country and every building, using our one of a kind technology.

OZONE TREATMENT

Ozone is considered to be the most practical and effective way of fighting pathogenic micro-organisms. It is an inorganic molecule with powerful oxidant properties, and is utilized in many industrial and commercial processes. Ozone, when applied to microbes, ruptures microbe cell walls through oxidation. Ozone's negative charge weakens the cell wall and causes it to break down. This natural process has been proven to be effective across multiple types of bacteria, mold, virus strains and fungi.



Ozone breaks down foul smelling gases as well as airborne bacteria, which are ultimately converted into oxygen. This is an efficient way to eliminate odors and harmful airborne substances from the air which we breathe.

In the last twenty years it was proven that concentrations of ozone are capable of killing tuberculosis. Our system utilizes this knowledge, and based on the data received in the course of numerous experiments, we can guarantee that "Koch's bacillus" can be completely destroyed by ozone treatment.



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Our high-tech Green Chute system generates ozone from the ambient air found inside chute systems, and does so in a natural way. Nothing else is required, making our approach available for use at any time, in any quantity, and at practically no cost.

OZONE – HOW IT REALLY WORKS

Foul odors are a natural byproduct of decomposition of food waste. They are an inevitable part of all waste disposal systems and are evidence of micro-organism activity in the garbage chute system. However, after coming into contact with the Garbage Chute, ozone instantly reacts with aromatic hydrocarbons that are the source of foul odor and neutralizes them.

When maintained at a constant level of concentration, ozone produces permanent results that does not produce toxic halogenated compounds. The below diagram demonstrates how the process works and why it becomes even more effective over time.

Unlike traditional methods, OSG Services LLC offers a solution that is long lasting. The below timetable is based on actual experiments conducted, where positive results were observed within 6-10 days.



ODOR REDUCTION

The initial result - significant reduction of foul odor, occurs within 10 days after the sanitizing process



ODOR ELIMINATION

After 30-60 days, and depending on level of contamination, foul odor is reduced by up to 90%



PERMANENT RESULT

After 5-7 months, foul odor disappears entirely, and does not return

INDEPENDENT EXPERTISE RESULTS

Ozone (O_3) is a chemical compound which consists of three oxygen atoms and has a very pronounced odor. It is not a stable compound and therefore decomposes to its usual form of oxygen in 40 - 60 minutes, depending on temperature and humidity of the surrounding air. Ozone decomposes quite rapidly, leaving no trace of itself.

Ozone reacts more quickly and more fully than other common sanitizing agents, and when used in small concentrations, ozone is also not harmful to humans. Because our system makes use of O_3 , OSG Services LLC takes care to diligently monitor the concentration of O_3 while maintaining concentration levels which are optimal for the task at hand. To ensure that our system works effectively, OSG Services LLC sought third-party experts to assess results in buildings where our system has been successfully installed and utilized, in cities all over the world.

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OSG Services LLC believes that by monitoring of results of existing installations, we can maximize our system's capabilities through continuous improvements and technological innovations. The following tables demonstrate results of independent expertise in the UAE and around the world.



**WINSTON TOWER
MIAMI**

»»»»»»»»	TOTAL FUNGI CFU/CM ²		TOTAL BACTERIA CFU/CM ²	
	JANUARY 23	FEBRUARY 19	JANUARY 23	FEBRUARY 19
1ST FLOOR CHUTE	2 800	594	10 000 000	990 000
1ST FLOOR WALL	10 000	149	8 500 000	21
3RD FLOOR CHUTE	11 000	160	10 000 000	670
10TH FLOOR CHUTE	15 000	190	1 60 000	7 900
21ST FLOOR CHUTE	230 000	1.1	1 600 000	1.1



**TRUMP VILLAGE
NEW YORK**

»»»»»»»»	TOTAL FUNGI CFU/CM ²		TOTAL BACTERIA CFU/CM ²	
	JUNE 11	AUGUST 8	JUNE 11	AUGUST 8
BASEMENT COMPACTOR	670	33	270 000	4 000
4TH FLOOR CHUTE	330	33	6 700	33



**CHERTANOVO HOUSING
RUSSIA**

»»»»»»»»	TOTAL FUNGI CFU/CM ²		TOTAL BACTERIA CFU/CM ²	
	APRIL 24	MAY 16	APRIL 24	MAY 16
MAIN GARBAGE ROOM (WALL 1)	280	40	12 000	40
MAIN GARBAGE ROOM (WALL 2)	12	<10	28	<10



**MARINA TERRACE
DUBAI**

»»»»»»»»	TOTAL FUNGI CFU/CM ²		TOTAL BACTERIA CFU/CM ²	
	OCTOBER 10	NOVEMBER 7	OCTOBER 10	NOVEMBER 7
AVERAGE 22 FLOORS	2 000	0	950 000	75

The results clearly indicate a significantly decreased presence of harmful bacteria and fungi within the test period, proving the system's effectiveness and reliability across all test cases all over the world.

WHO WE ARE



OSG SERVICES LLC
 GREEN SANITIZING SYSTEM

OSG Services LLC offers a patented system that eliminates foul odors and eradicates harmful micro-organisms. Our system as a whole, and in parts, is protected by a number of patents and new applications for inventions in different countries. We are constantly improving our control system based on latest developments in technology, such as the generation of "pure" ozone based on the principle of low-temperature plasma. We firmly believe that our system will enhance people's quality of life.



HOW THE SYSTEM WORKS



THE SYSTEM CONSISTS OF SEVERAL COMPONENTS:

- **An ozone generator**
- **Central control device for programming and monitoring of the functioning of the ozone generator**
- **Ozone distributing agent which disperses the resulting ozone within the garbage collection system**
- **Ozone concentration-level control system.**

Sanitization and deodorization occur by means of continuously maintaining a level of concentration of ozone in the range of 0.3-0.6 ppm inside the garbage disposal system. This level of concentration allows ozone to destroy bacteria and microbes very effectively, while being completely harmless to humans. Moreover, the level of ozone concentration is maintained automatically by our patented "Green Chute" control system.



Consists of ozone generator and c control system

Maintains the concentration level of ozone at a rate of 0.3-0.6 ppm

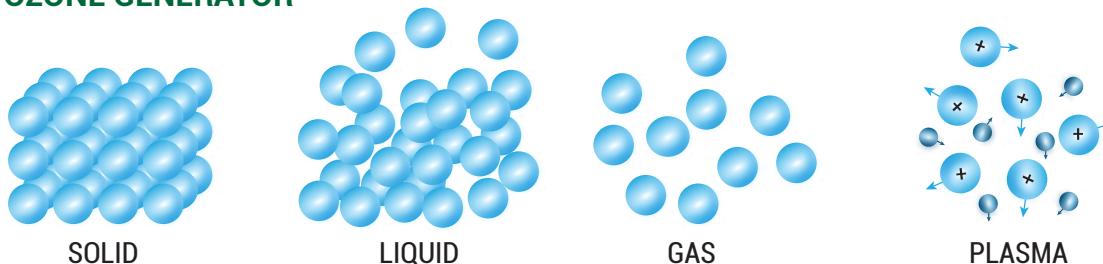


Equipped with sensors monitoring the concentration of ozone

Operates independently, without need of human intervention

The "Green Chute" system is equipped with sensors which monitor the concentration of ozone in common areas adjacent to the garbage disposal room. The sensors are connected to a central computer and turn off ozone generation once its concentration approaches the maximum allowed level. Thereafter, once concentration levels of ozone drop naturally to within an acceptable range, the system automatically restarts ozone generation. The entire process is fully automatic and does not require any human intervention. In essence, this self-balancing system maintains a healthy atmosphere in the entire building.

OZONE GENERATOR



The ozone generator is installed inside of the garbage chute system and produces the required doses of ozone, effectively destroying all kinds of bacteria, fungi, and microorganisms present in household waste and waste accumulation areas.

Our ozone generator uses the principle of cold plasma – it is one of the most advanced, powerful and user-friendly air cleaning systems, generating enough sanitizing power for premises of any size.

The generator is especially adapted for operation in waste chute systems. It is equipped with a central control processor, which programs the automatic ozone generating equipment depending on the time of year and ambient temperature. This makes it possible to virtually eliminate the need for human intervention in the operation of the equipment, limiting it only to the maintenance of equipment and its programming.

THE CONCENTRATION OF OZONE AND ITS EFFECTS

Results vary depending on the level of concentration of ozone in the air. The below table differentiates results based on different levels of concentration.

0.001 ppm	THE LOWEST VALUE OF OZONE CONCENTRATION DETECTED BY HYPERSENSITIVE PEOPLE. TOO LOW OF A CONCENTRATION TO BE ACCURATELY MEASURED BY THE BEST ELECTRONIC EQUIPMENT	THE LIMIT FOR THE VARIOUS HOME DEVICES IN THE USA. MEASURED AS SUSTAINED CONCENTRATION OF OZONE IN THE TEST ROOM	0.001 ppm
0.003-0.010 ppm	OZONE ODOR THRESHOLD PERCEPTION IN FRESH AIR BY AN AVERAGE PERSON	MAXIMUM ALLOWED CONCENTRATION OF OZONE PRODUCED BY ELECTRONIC AIR-PURIFIERS AND SIMILAR DEVICES FOR PREMISES IN ACCORDANCE WITH THE US FEDERAL LAW FOR FOOD, DRUG AND COSMETICS. (NOTE: KEEP THIS FIGURE IN MIND WHEN SELECTING OZONE AIR SYSTEM FOR YOUR HOME.)	0.050 ppm
0.001-0.125 ppm	TYPICAL CONCENTRATIONS OF OZONE IN THE NATURAL ATMOSPHERE. THESE LEVELS OF CONCENTRATION CHANGE WITH ALTITUDE, TIME OF THE DAY, ATMOSPHERIC CONDITIONS AND TERRAIN	THE MAXIMUM PERMISSIBLE CONCENTRATION (MPC) OF OZONE IN INDUSTRIAL WORKING AREAS: ALLOWED FOR HUMAN EXPOSURE - 8 HOURS PER DAY, 6 DAYS A WEEK. US STANDARDS IN RUSSIA - TWO TIMES LOWER. THE MAXIMUM ALLOWED LIMIT OF THE CONCENTRATION OF OZONE FOR INDUSTRIAL AND PUBLIC FACILITIES IN THE UK, JAPAN, FRANCE, THE NETHERLANDS AND GERMANY.	0.100 ppm
0.020-0.040 ppm	AVERAGE CONCENTRATION OF OXIDIZING AGENTS IN SOME MAJOR CITIES IN 1964. MORE THAN 95 PERCENT OF OXIDANTS ATTRIBUTED TO OZONE	TYPICAL PEAK OZONE CONCENTRATIONS IN LARGE CITIES	0.150-0.500 ppm

LONG-TERM OZONE EXPOSURE IN A PROFESSIONALLY CONDUCTED EXPERIMENT DOES NOT LEAD TO NOTICEABLE SIDE EFFECTS IN HUMANS. THE THRESHOLD OZONE LEVEL, WHEN THERE IS IRRITATION IN THE NOSE AND THROAT, IS APPROXIMATELY AT 0.3 PPM



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GREEN SANITIZING SYSTEM

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EMSL Order: 241902970

Customer ID: BL50

Customer PO: 190388

Project ID: Trump Village Towers

Attention: OSG Services LLC
1047 Elton Street
Brooklyn, NY 11208

Project: Trump Village Towers, Brooklyn, NY

Phone: (203) 856-1856

Fax: N/A

Collection Date: 6/11/19 3:37 PM

Receive Date: 6/12/19 10:10 AM

Processed Date: 6/12/19 3:45 PM

Analyzed: 6/19/2019 10:30: AM

Fungal Plate Count (EMSL Test Method M257)

Lab Sample Number	Customer Sample ID & Location	Raw Count	Dilution	CFU	Units
241902970-0001	1119-1 / Basement, garbage room compacter inter	2	1.000	670	in2
241902970-0002	Swab 2- 61119-2 / 4th floor inside garbage shoot	1	1.000	330	in2

N/A=Not applicable

Gloria Oriol-Aguilar
Microbiology Laboratory Manager
or Other Approved Signatory

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Revision: 0.00



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EMSL Order: 241902970
Customer ID: BL50
Customer PO: 190388
Project ID: Trump Village

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Project: Trump Village Towers, Brooklyn, NY

Phone: (203) 856-1856
Fax: N/A
Collection Date: 6/11/19 3:37 PM
Receive Date: 6/12/19 10:10 AM
Processed Date: 6/12/19 3:45 PM
Analyzed: 6/19/2019 10:30 AM

Bacterial Plate Count (EMSL Test Method M258)

Lab Sample Number	Customer Sample ID & Location	Raw Count	Dilution	CFU	Units
241902970-0001	1119-1 / Basement, garage room compactor inter	81	10,000	270,000	in2
241902970-0002	Swab 2- 61119-2 / 4th floor inside garbage shoot	2	10,000	6,700	in2

N/A=Not applicable

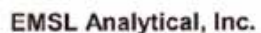
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Revision: 6.10



Sanitization and Deodorization of Waste Collection and Storage Systems in high-rise buildings Using OZONE



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<http://www.ers.si.com> wallnord@siemens.com

EMSL Order: 241903560

Customer ID: RL50

Customer PO: 190388 & 190445

Project ID: Trump Village Towers

Attention: OSG Services LLC
1047 Elton Street
Brooklyn, NY 11208

Project: Trump Village Towers, Brooklyn, NY

Phone: (203) 858-1858

Fax: N/A

Collected: 8/8/19 2:24 PM

Received: 8/9/19 10:30 AM

Processed: 8/3/19 2:45 PM

Analized: 8/16/19 9:30 AM

Revision: 1.00

Bacterial Plate Count (EML Test Method M258)

Not applicable

EMSL Analytical (Wallingford, CT) is accredited by the American Industrial Hygiene Association (AIHA) in the EMLAP accreditation ID# 165116.

W. L. R. O. P.

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Sanitization and Deodorization of Waste Collection and Storage Systems in high-rise buildings Using OZONE



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(203) 264-5940, (203) 264-5940
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EMSL Order: 241903560

Customer ID: BL50

Customer PO: 190388 & 190445

Project ID: Trump Village Towers

Attention: OSG Services LLC
1047 Elton Street
Brooklyn, NY 11208

Project: Trump Village Towers, Brooklyn, NY

Phone: (203) 856-1856

Fax: N/A

Collected: 8/8/19 2:24 PM

Received: 8/9/19 10:30 AM

Processed: 8/9/19 2:45 PM

Analyzed: 8/16/19 9:30 AM

New York: 1.00

Fungal Plate Count (EMISL Test Method M257)

N/A = Not applicable

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