



lotus[®] PRO

*Liquefied Ozone For
100% Chemical-Free
Commercial Cleaning*

**Information Memorandum
June 2009**

COMPANY BACKGROUND

Since 2002 Lotus PRO manufacturer Tersano Inc. has been a world leader in counter-top residential chemical-free cleaning systems. In 2008, the Company launched its commercial product line - the Lotus® PRO Cleaning System. Commercial and residential product lines share the same liquefied ozone technology that saw the consumer model named as a Time Magazine Best Invention 2006 for its ability to kill e.coli, salmonella and other pathogens quickly and effectively without chemicals.

Lotus® PRO AT A GLANCE

The Lotus PRO Cleaning System is a chemical-free commercial cleaning system. The Lotus® PRO produces liquefied ozone using tap water and 120v electrical power, on-the-spot and on demand. The Lotus® PRO Trigger Spray Unit (*See Appendix A*) requires 2 minutes to produce 600 ml of liquefied ozone. The Lotus PRO High Capacity Unit produces 4 liters of liquefied ozone in one minute.

Also known as aqueous ozone, ozonated water or super-oxygenated water, this liquefied ozone works two ways before reverting back to oxygen and water:¹

- a) as a surface sanitizer and cleaner for the first 15 to 45 minutes.
- b) as a chemical-free cleaner for the following 45 to 120 minutes.

In general terms, a cleaner is considered effective if it removes 85%² or more of soil on hard surfaces like ceramic, steel, glass, chrome and plastics. The standard for approval as an EPA compliant sanitizer is more rigorous.

According to regulatory protocol, a sanitizer must kill 99.9%³ of test bacteria on a hard surface within 5 minutes.

On a food contact surface like a cutting board, it has to kill 99.999%⁴ of the test bacteria within 30 seconds. Sanitizers are considered to be wide spectrum eliminators of bacteria, viruses, mold, mildew and fungi.

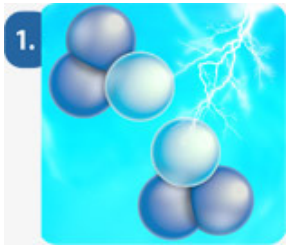
HOW Lotus® PRO WORKS

Inside each Lotus PRO device electrical energy is used to create ozone gas from the air we breathe. This ozone is water soluble and is infused into tap water, creating liquefied ozone. A powerful natural cleaner and sanitizer, liquefied ozone quickly eliminates soil and pathogens safely, without chemicals, vapors or residues. Liquefied ozone is much safer than gaseous ozone. The latter is considered to be harmful in sufficient amounts, whereas liquefied ozone is the safest cleaner ever tested by TURI (*See Appendix B*) scoring a perfect 50 out of 50 in comprehensive safety screening.

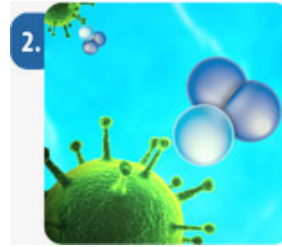
CURRENT OZONE USERS & COMMON APPLICATIONS

The purity and sanitizing power of ozone along with approval by regulatory bodies like the EPA, FDA and USDA have made for widespread large-scale use; in food processing, water and beverage bottling, drinking water purification, produce and pharmaceutical sanitizing. Leading consumer products companies including Del Monte, Safeway, Crystal Springs Coca-Cola, Kimberly-Clark, P & G and Sunny Delight and many others⁵ have been using ozone to clean, sanitize and disinfect without residues - for decades.

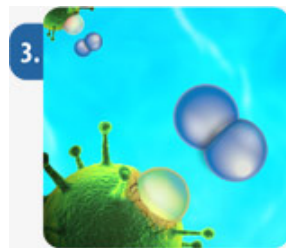
HOW LIQUEFIED OZONE CLEANS & SANITIZES NATURALLY



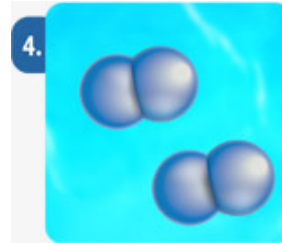
1. Inside lotus® PRO unit, oxygen from the air is safely turned into ozone then infused into tap water, creating Liquefied Ozone.



2. Liquefied Ozone's extra oxygen atom is fatally attracted to pathogens & contaminants.



3. Harmless to people but deadly to bacteria, viruses and contaminants, the extra oxygen atom actively detaches and attacks them.



4. The ozone turns back into oxygen. Only pure oxygen and water remain after heavy duty cleaning and sanitizing has taken place.

Over 2000 North American municipalities use ozone for their drinking water purification needs. The US Army uses it for portable water sanitization and the Olympics use ozone in their competition pools.

Commercial cleaning and janitorial applications are newer territory. Locations like schools, hotels, quick service restaurants, hospitals; public washrooms, waiting areas and kitchens are still being cleaned using chemicals. Unfortunately, many of the chemical cleaners used may be hazardous and potentially dangerous to users and occupants. Green cleaners are more expensive, don't work well as sanitizers and have a large carbon footprint because like chemical cleaners, they consume resources for packaging, transportation, storage, handling and recycling or disposal.⁶

REGULATORY APPROVAL FRAMEWORK

lotus PRO and the liquefied ozone it makes are subject to close regulation by a number of government agencies including the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the US Department of Agriculture (USDA) and Department of Labor Occupational Health and Safety Administration (OHSA) as follows:

EPA: The lotus PRO device itself, the liquefied ozone it manufactures and the performance claims are subject to separate and distinct treatment by the EPA:

lotus PRO Unit: The device itself does not require registration but it must be manufactured in an EPA registered establishment. Production in an unregistered establishment is a violation of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA – 1947). Lotus PRO's EPA registered establishment number is 82126-CHN-001. The lotus PRO device also adheres to strict EPA regulations with regard to labeling, production, record keeping, packaging and import/export requirements.

lotus PRO Liquefied Ozone: With the exception of ozone, FIFRA mandates that any substance intended to prevent, destroy, repel, or mitigate any pest, must be registered before sale or distribution. To obtain an EPA product registration number, a manufacturer must submit specific data regarding its safety and the effectiveness. Because it is chemical-free, liquefied ozone is unique in the opinion of the EPA. Unlike chemical, biochemical and microbial pesticide substances, the EPA does not require a product registration number for liquefied ozone.

Liquefied Ozone Performance Classification: The liquefied ozone made on demand by lotus PRO is classified by the EPA with

regards to how it may be effectively used, e.g. as a general cleaner versus a hard surface sanitizer. lotus PRO's liquefied ozone is classified a food surface sanitizer because an EPA approved lab followed strict protocol and showed a 99.999% reduction of test bacteria in 60 seconds or less.

FDA: In 1997 the FDA approved the use of ozone as an indirect food additive through use as antimicrobial agent with indirect contact with foods.⁷ In 2002 the FDA approved ozone for use on food contact areas and directly on food with its Generally Regarded As Safe (GRAS) designation. GRAS substances are those that are intentionally added to food which are reviewed and recognized by qualified experts, as having been adequately shown to be safe under the conditions of its intended use.

USDA: The Organic Foods Production Act (OFPA) authorizes the establishment of the National List of allowed and prohibited substances. The National List identifies liquefied ozone as a substance that is allowed for use in organic crop and livestock production.⁸

OHSA: Regulations address the toxicity of gaseous ozone and acknowledge the safety of liquefied ozone. Strict limits are set for exposure to gaseous ozone while no limits are set for exposure to liquefied ozone even with high concentrations. Liquefied ozone is considered to pose no health or safety threats;⁹ requires no safety training, certification or reporting; and requires no protective gear or compliance for safe use. Additionally, the liquefied ozone produced by lotus PRO carries a zero health hazard, reactivity and fire hazard NFPA ratings.

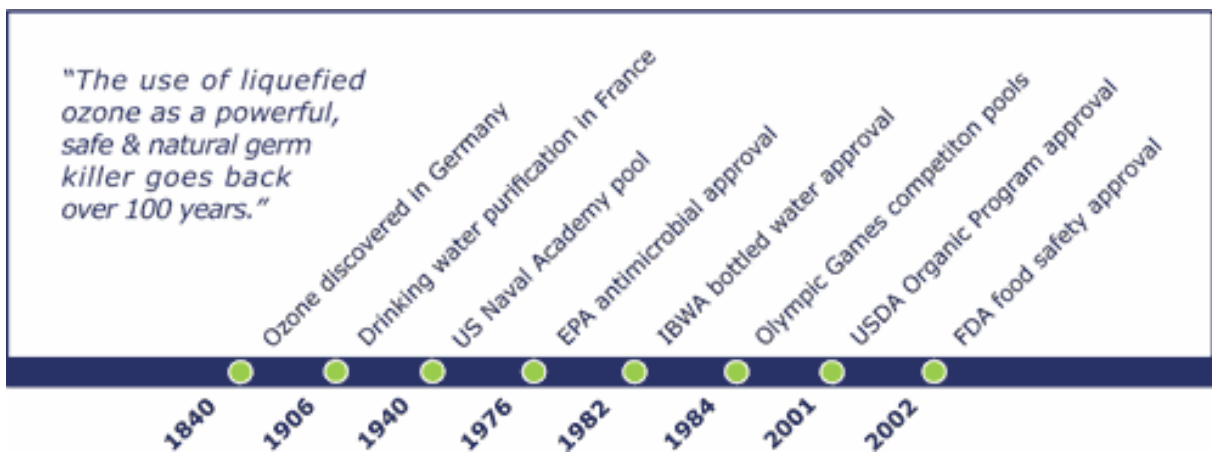
CLEANING, SANITIZING & SAFETY

As a chemical-free cleaner the lotus PRO system has been tested and recognized as effective by third parties, exceeding the Green Seal Environmental Standard (GS-37) for performance as an Industrial Cleaner. In tightly controlled testing by the Toxics Use Reduction Institute (TURI), the liquefied ozone produced by lotus PRO was more effective than a leading quat chemical cleaner, as well as a green cleaner at removing soil from bathroom surfaces such as glass and chrome. It was also proven as an effective cleaner on ceramic, steel, plastic and fiberglass surfaces.

The liquefied ozone produced by lotus PRO is a broad range anti-microbial agent (See Appendix C) that works faster and more effectively against pathogens than chlorine bleach, without fumes and toxic residues like dioxins and tri-chloramines. Because of its toxin-free sanitizing action, liquefied ozone is considered safe as a

direct and indirect food additive by the US Food and Drug Administration (FDA) and United States Department of Agriculture (USDA) under its Organic Program. This naturally occurring substance is one of the strongest oxidizing agents known, second only to fluorine in its speed and effectiveness.¹⁰

Because it is chemical, vapor and residue-free, liquefied ozone is considered as extremely safe for people and planet. In the same study that established its effectiveness as a cleaner, liquefied ozone scored a perfect 50 out of 50 TURI safety score, with zero levels for VOC emissions, zero global warming potential, zero ozone depletion potential and zero scores in all National Fire Prevention Association (NFPA) and Hazardous Material Identification System (HMIS) categories. In over 100 years of commercial use, there has not been a single reported death resulting from ozone exposure.



lotus® PRO in Food Service Areas

The lotus® PRO is particularly effective in cleaning and sanitizing food contact surfaces. Unlike chemical sanitizers (which must be used off hours and with protective gear) liquefied ozone can be used to clean and sanitize in the close presence of food without concerns of chemical contamination. Since liquefied ozone reverts to oxygen and water, food preparation surfaces do not require post-application rinsing to eliminate potentially harmful residues, nor do they require careful handling and preparation of chemical cleaning concentrates.

Lotus PRO ANTI-MICROBIAL EFFICACY

A recent article published in the Association for Professionals in Infection Control and Epidemiology found that ozone gas was able to inactivate more than 99.9% of most bacteria including *Acinetobacter baumannii*, *Clostridium difficile* ("C.difficile") and methicillin-resistant *Staphylococcus aureus* ("MRSA") in both laboratory and field conditions. ¹¹

The study concluded that ozone gas is a valuable decontamination tool for the removal of bacteria in many institutions and communal settings including hospitals and other health care institutions. Ozone in the liquid phase is a significantly faster contact sanitizer than ozone gas, requiring much lower concentrations and shorter dwell times. For example 20.00ppm of ozone in air takes 20 minutes to sanitize a common pathogen. By contrast, 0.25ppm concentration of liquefied ozone requires only 96 seconds to achieve the same kill rate.

**FOR MORE INFORMATION
PLEASE CONTACT:**

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Appendix A: Trigger Spray Technical Description



Trigger Spray Unit: Specifications

PRODUCT DESCRIPTION:

The lotus® PRO Trigger Spray chemical-free cleaning system turns ordinary tap water into liquefied ozone - an EPA, FDA and USDA approved cleaner and sanitizer. The liquefied zone is made on-the-spot inside the base unit and transferred to a removable trigger spray bottle. It can eliminate up to 99.999% of common pathogens.



TECHNICAL SPECIFICATIONS:

Dimensions: 11" x 9" x 13"

Weight: 7 lbs.

Capacity: 600 ml cold tap water

Cycle charge time: 2 minutes

Sanitizing Duration: 15 mins. (40 mins. with Booster Pack)

Cleaning Duration: 45 mins. (120 mins. with Booster Pack)

Cleaning/Sanitizing surface area: 300 sq. ft. (hard surface)

Power: Standard 120v

Power consumption: 50 watts/ \$0.002 per cycle

Cartridge lifespan: 650 cycles/6 weeks \$0.03 per cycle

Product lifespan: 12,000 - 15,000 cycles

REGULATORY INFORMATION:

EPA Site Registration No.: 82126-CHN-001

TURI Ratings: Safety screening score: 50 out of 50. Zero global warming; Zero ozone depletion; Zero VOCs

CSA & UL: USA and Canada compliant

Green Standard: Exceeds Green Seal GS-37

FDA Safe Designation: 21CFR184.1563

USDA: Organic Program designation

EPA: DIS/TSS-4 sanitizer (food contact surface)

OSHA Safety Compliance:

Off-gas O₃ < .01 ppm PEL

www.tersanoprofessional.com

1-800-808-1723

Tested to meet or exceed UL and CSA standards. EPA, FDA, TURI, USDA and OSHA compliant. Exceeds GS - 37 standard. lotus is a registered trade mark of Tersano Inc. All other marks are property of their respective owners. Products may vary from image shown above. Filter cartridges extra - 4 pack available.

Appendix B: Lotus PRO Performance Review



Toxics Use Reduction Institute
Surface Solutions Laboratory
 University of Massachusetts Lowell
 One University Avenue, Lowell, MA 01854-2866
 (978)934-3133 or 3249 fax: (978)934-3050 or 4962
 www.cleanersolutions.org

SSL CLEANING PRODUCT PERFORMANCE REVIEW

Performed for Triple S, 2 Executive Park Drive, Billerica, MA 01862

Vendor Name: Date of Testing:
 Product Name:
 Major Fields of Cleaning: Parts Precision Janitorial/Facility

Primary Cleaner Classification

Acidic Aqueous Semi-Aqueous Powder detergent Extracting
 Neutral Aqueous Terpene Enzymatic/ Microbial HCFC
 Alkaline Aqueous Petroleum distillate Blasting Alcohol
 Caustic Organic Biobased Other:

Methods Used for Cleaning

Cold Solvent Media Blasting Vapor Degreasing
 Immersion/Soak Spray Washer Other1:
 Manual Wipe Other2:
 Mechanical Agitation Ultrasonic Other3:

Concentration used %
 Temperature used F
 Analysis used

Contaminant Removal Performed at SSL¹

<input type="checkbox"/> Adhesives	<input type="text"/> %	<input type="checkbox"/> Paints	<input type="text"/> %
<input type="checkbox"/> Buffing/polishing	<input type="text"/> %	<input type="checkbox"/> Resins/Silicones	<input type="text"/> %
<input type="checkbox"/> Carbon deposits	<input type="text"/> %	<input type="checkbox"/> Rosins	<input type="text"/> %
<input type="checkbox"/> Coatings	<input type="text"/> %	<input type="checkbox"/> Rust/Scale	<input type="text"/> %
<input type="checkbox"/> Fluxes	<input type="text"/> %	<input type="checkbox"/> Oil-cutting/tapping or lubricants	<input type="text"/> %
<input type="checkbox"/> Greases	<input type="text"/> %	<input checked="" type="checkbox"/> Other1: <input type="text" value="All purpose soil mix"/>	<input type="text" value="88.01"/> %
<input type="checkbox"/> Inks	<input type="text"/> %	<input checked="" type="checkbox"/> Other2: <input type="text" value="Bathroom Soap Scum"/>	<input type="text" value="92.31"/> %
<input type="checkbox"/> Mold releases	<input type="text"/> %	<input checked="" type="checkbox"/> Other3: <input type="text" value="Glass Soap Scum"/>	<input type="text" value="90.46"/> %

Laboratory Safety Screening Score for Important Physical/Chemical Properties²

VOC (g/l): NFPA rating: H F R
 Global Warming Potential: HMIS rating: H F R
 Ozone Depletion Potential: pH:

Safety Screening Score: The higher the score, up to 50, implies a potentially safer product

¹SSL uses a modified version of the ASTM standard G122 to determine product performance. Effectiveness is determined using the gravimetric analysis of portion of the standard. The lab considers the removal of 85% or more on average of the soil from three coupons to be effective. However, in some cases lower or higher values may be acceptable depending upon the end goal of the cleaning process.

²SSL has developed a screening methodology to help in the selection of safer cleaning products. It is important to conduct a full EH&S assessment of any product prior to adoption. Contact SSL to find out how to have an EH&S evaluation completed.

Appendix C: Pathogens killed by liquefied ozone

With regulatory approvals and widespread use of ozone as a sanitizer and disinfectant, thousands of studies and research papers have been completed regarding pathogen kill rates. These rates vary depending of the type of organism, dissolved ozone concentration, dwell time, and temperature. Below is a partial list of common pathogens killed by liquefied ozone compiled from publicly available academic, medical, scientific and ozone industry sources, as well as third party tests:

Bacteria:

Achromobacter butyric
Aeromonas spp.
Aeromonas salmonicida
Aeromonas hydrophila
Bacillus spp.:
B. anthracis
B. cereus
B. coagulans
B. globigi
B. licheniformis
B. megatherium
B. paratyphosus
B. prodigiosus
B. subtilis
B. stearothermophilus
Clostridium spp.
C. botulinum
C. difficile
C. sporogenes
C. tetani (Tetanus)
Cryptosporidium spp.
Corynebacterium diphtheriae
Eberthella typhosa
Endamoeba histolytica
E. coli
Flavobacterium spp.
Leptospira canicola
Listeria spp.
Micrococcus spp.
M. candidus
M. spharaeroides
Macrococcus caseolyticus
Mycobacterium spp.
M. leprae
M. tuberculosis
Neisseria catarrhalis
Phytomonas tumefaciens
Proteus vulgaris
Pseudomonas spp.
P. aeruginosa
P. putida

Salmonella spp.
S. choleraesuis
S. enteritidis
S. typhimurium
S. typhosa
S. paratyphi
Sarcina lutea
Serratia marcescens
Shigella spp.
S. dysenteriae
S. flexnaria
S. paradysenteriae
Spirillum rubrum
Staphylococcus spp.
S. albus
S. aureus (incl.MRSA)
Streptococcus spp.
S. faecalis
S. hemolyticus
S. lactis
S. salivarius
S. viridans
Torula rubra
Vibrio spp.
V. alginolyticus
V. anguillarum
V. cholerae
V. comma
V. parahaemolyticus

Fungus & Molds:

Aspergillus spp.
A. candidus
A. flavus (produces aflatoxin)
A. glaucus
A. niger
A. terreus
A. saitoi
A. oryzae
Botrytis allii
Colletotrichum lagenarium
Fusarium oxysporum
Geotrichum spp.
Mucor piriformis
Oospora lactis
Penicillium spp.
P. cyclopium
P. chrysogenum
P. citrinum
P. digitatum
P. glaucum
P. expansum
P. egyptiacum
P. roqueforti
Rhizopus spp.
R. nigricans
R. stolonifer
Rhizoctonia solani
Rhizopus stolonifera

Protozoa:

Paramecium
Nematode eggs
Chlorella vulgaris
Alternaria solani
Botrytis cinerea
Fusarium oxysporum
Monilinia spp.
M. fructicola
M. laxa
Pythium ultimum
Phytophthora spp.
P. erythrosetica
P. parasitica

Sclerotium rolfsii
Sclerotinia sclerotiorum
Candida albicans
Saccharomyces spp.
S. cerevisiae
S. ellipsoideus
Cryptosporidium parvum
Giardia spp.
G. lamblia
G. muris
Chlorella vulgaris
Thamnidium elegans.
Trichoderma viride
Verticillium spp.
V. albo atrum
V. dahliae

Viruses:

Adenovirus
Coxsackieviruses (A9, B3, & B5)
Echoviruses (1, 5, 12, & 29)
Encephalomyocarditis virus (EMCV)
Hepatitis A virus
HIV
GD V11 Virus (encephalomyelitis virus)
Influenza viruses
Legionella pneumophila
Norovirus
Polio virus (Poliomyelitus) 1, 2 & 3
Rotavirus
Tobacco mosaic virus
Vesicular Stomatitis virus

For more detailed information regarding specific pathogens, kill rates and dwell times, please contact us.

References

1. Ozone chemistry in aqueous solution - Ozone decomposition and stabilization; Margareta Eriksson Department of Chemistry; Royal Institute of Technology Stockholm, Sweden, 2005. Also lab testing with tap water only: ≥ 0.5 ppm O₃ in solution at 15 minutes after full charge completion; with Booster Pack and tap water ≥ 0.3 ppm 45 minutes after charge.
2. Toxics Use Reduction Institute (TURI). University of Massachusetts Lowell, Surface Solutions Laboratory (SSL) ATSM standard G122 modified gravimetric analysis.
3. EPA DIS/TSS - 10 Sanitizer Test for inanimate non-food contact surfaces - Efficacy Data Requirements. Supplemental Efficacy. Prepared by Registration Division of Pesticide Programs - 1976.
4. EPA DIS/TSS - 4 Sanitizer Test for previously cleaned food contact surfaces - Efficacy Data Requirements. Supplemental Efficacy. Prepared by Registration Division of Pesticide Programs - 1979.
5. See http://www.purfresh.com/cust_list.htm. Liquefied ozone crop applications, food wash systems and cold chain technologies.
6. University of Tennessee/EcoForm Sustainability Study; Center for Clean Products Knoxville - 2009.
7. Electric Power Research Institute (EPRI) Generally Recognized as Safe (GRAS) declaration for ozone use in food processing in the U.S. expert panel May 1997. Food and Drug Administration Code of Federal Regulations, Title 21, Volume 3, Revised as of April 1, 2008 [CITE: 21CFR184.1563]
8. "National Organic Program (NOP), Sunset Review (2008)" Organization: National Organic Program of the USDA Agricultural Marketing Service 2008 USDA AMS Final Rule. The Organic Foods Production Act (OFPA), 7 U.S.C. 6501 et seq.
9. Occupational Health and Safety Act; (OHSA) Permissible Exposure Limits (PEL) '8' hour - 8 hour per day/5 days per week (occupational exposure limit) - 0.1 ppm '15 minute (Short Term exposure Limit) - 0.3 ppm. gaseous. Canadian Standards Association (CSA) US Certificate: 1595550 2006/03/07. Toxics Use Reduction Institute (TURI). University of Massachusetts Lowell NFPA RATING: Zero Health Risk rating.
10. Electric Power Research Institute EPRI Study # CR-106435 ref. Studies on the Use of Ozone in Food & Agriculture; Proceedings of the International Ozone Association 2002 Pan American Group Production Agriculture and Food Processing.
11. Ozone gas is an effective and practical antibacterial agent. M Sharma and JB Hudson ; October 2008. AJIC - APPLIED EPIDEMIOLOGY IN HEALTH CARE SETTINGS AND THE COMMUNITY: Volume 36 No.8.