

# **“Integrated Ozone Technology based solution”**

## **For**

## **Hospital**

Ozone is one of the most advance technologies and can be integrated with great advantage in treatment of Water, Waste Water and air treatment in hospital. Chemtronics has successfully designed and installed solution to integrate and retrofit with the present and conventional system with proven and time tested ozone based technology. Its technology integration gives buy back of CapEx in reasonably short period depending upon the application and customised solution.

### **Our Solutions for Hospitals**

- Laundry Water Ozonation.
- Drinking Water Treatment.
- Ozone in Hospital HVAC System to improve Indoor Air Quality & Energy Efficiency.
- Operation Theatre Disinfection Solutions.
- Hospital Kitchen Odor.
- Cooling Tower Water Treatment Ozonation.
- Hospital Sewage Treatment Plant for Recycle & Reuse.
- Type II RO for Lab

## Application Areas:-



### IN HOSPITAL LAUNDRY WATER TREATMENT: -

- Hospital laundries face great pressures to meet high standards of hygiene, quality, logistics, cost optimization and transparency.
- Textiles must be handled correctly to limit the transfer of dangerous bacteria amongst patients and healthcare staff and the right wash processes are vital for the desired result.
- As pressure grows on hospitals to cut costs, healthcare administrators are weighing the cost of outsourcing their linen services to textile rental companies against the cost-effectiveness of operating an on-premise laundry (OPL).
- A bad linen service is one of the most frequently heard complaints in a hospital. Attention to patients' personal needs and comforts are as important as the physician's medication and therefore adequate supply of clean linen becomes imperative. Besides helping in maintaining a clean environment, clean linen is a vital element in providing high-quality medical care. Also, pleasant employees in a fresh and neat uniform go a long way in creating a positive image of the hospital.
- The prevention of microbiological contamination is the most significant requirement for the hygienic processing of textiles.
- Hospital bed sheets, gowns, uniforms, towels and cleaning mops are potential tools for spreading infections.
- Properly controlled laundry processes can limit the spread of bacteria. Good practices start with appropriate washing techniques that will ensure decontamination of linen.
- The use of ozone in the laundry water reduces the requirement of detergents and also the wash can be achieved with lower temperatures.
- Ozone acts as a chemical enhancer. When applied properly ozone; Reduces water use, reduces fuel use in making hot water. Reduces chemical use, reduces waste water contamination. Ozone is also effective in Reducing fabric degradation .Extending linen life reducing formula run time (productive hours).extending equipment life
- Reduces energy cost of heating.
- Ozone destroys the residual alkali, eliminating the salt crystals left by the residual alkali and so eliminating the need for fabric softener. Once the fabric softener is removed, the drying time is substantially reduced which in turn results in additional energy savings.



#### **IN HOSPITAL DRINKING WATER TREATMENT: -**

- *The Hospital Water Supply as a Source of Nosocomial Infections.*
- *Some of the most frequently isolated gram-negative bacteria, including Pseudomonas and Enterobacter, have been found to persist in hospital water for extended periods and have been responsible for nosocomial outbreaks.*
- *Contamination of the hospital water supply with potentially pathogenic organisms is very common,*
- *Impurities in potable water causes health disorders. In the hospitals patients generally take the drinking water directly from the supplies provided by the public health engineering. If this water becomes contaminated, the patient may suffer from some water borne disease.*
- *The drinking water distribution system of a hospital mainly obtained Legionella and Pseudomonas aeruginosa. Moreover, several other opportunistic pathogenic bacteria, such as Escherichia albertii, Acinetobacter lwoffii and Corynebacterium tuberculostrerarium emphasizing that drinking water systems, especially those with stagnant water sections, could be the source of nosocomial infections.*
- *Ozone is both a strong oxidizing agent as well as a strong disinfectant*
- *Ozone interferes with the metabolism of bacterium cells most likely through inhibiting and blocking the operation of the enzymatic control system.*
- *A sufficient amount of ozone breaks through the cell membrane, and this leads to the destruction of the bacteria.*
- *Ozone destroys viruses by diffusing through the protein coat into nucleic acid core, resulting in damage of the viral RNA.*



### **IN HOSPITAL HVAC SYSTEM OZONATION: -**

- Ozone is increasingly being used in HVAC systems to improve the indoor air quality & also to achieve the energy efficiency of the HVAC systems. Chemtronics has successfully designed and installed oxygen fed air ozone generator to integrate with the present HVAC system. It achieves acceptable Indoor Air Quality (IAQ) while minimizing energy consumption, and fully complying with ASHRAE standards. It also helps in getting LEED rating points on Indoor Air Quality. This unique technology integration gives buy back of CapEx in less than 1 year.

#### **Indoor Air Quality**

- *It often said that Hospitals are not the best place to be if you are ill. As predominant aerobic bacteria, fungi and potential pathogenic organisms prevalent in the hospital environment. Often these germs and bacteria are brought into hospitals by the patients. So, no matter how careful a facility is about disinfecting surfaces, new germs and bacteria are introduced on a daily basis, often evolving beyond the effectiveness of current antibiotics. It is necessary for hospitals to take special care on improving Indoor Air Quality.*
- *Ozone has been successfully reduced smell, bacteria, mould, mildew and other micro organisms from the HVAC system.*
- *Controlled quantity of ozone introduces in the AHU Ducts Eliminates Toxic gasses, odors smoke by oxidation and microbes & virus.*

#### **Ozone helps in achieving Energy Efficiency**

##### **i) Reduction in Capital Cost:**

Use of Ozone Generator in AHU will reduce in fresh air intake results in reduction of overall HVAC plant capacity sizes:

- » Chiller, Cooling Tower.
- » Condenser water and chilled water pumps.
- » Pipe sizes and Insulation.
- » Electric / Steam Duct heaters.
- » Electrical Panel & Cables.
- » Stand by diesel generator.
- » Plant room space.

##### **ii) Reduction in Operating Cost due to use of Ozone Generator in AHU:**

- » Reduction in Energy consumption to run HVAC System
  - » Reduction in Water consumption to run HVAC System
  - » Cost of Maintenance (Labor and Material)
- C) LEED / USGBC rating points on Indoor Air Quality



#### **IN OPERATION THEATRE FUMIGATION/ STERLIZATION/ DISINFECTION:-**

- *It is very important to maintain good indoor air quality (IAQ) in Operation Theatre to ensure health and safety for the patient and surgical team. A significant consideration in ORs is the control of aerosols, anesthesia gases and smoke. Aerosols are solid and liquid particles,*
- *A significant consideration in Operation Theatre is the control of aerosols, anesthesia gases and smoke. In Operation Room, however the main sources have an indoor origin are the patient, the surgical team and equipment. The anesthesia gases dispersed in Operation Theatre are also considered as pollutants. The anesthesia gases are dispersed in the environment through problems in the equipment and from the exhalations of the patient. Some gases used in the surgery, for example, NO<sub>2</sub> will continue to be exhaled by the patient for up to one hour after the surgery is finished. During surgery the highest concentration of gases is on the floor. However, with the movements of people these gases can be mixed with room air and inhaled by the surgical team.*
- *The concentration of gases in the Operation Theatre is critical and needs to be controlled; otherwise the productivity and quality of the work of the surgical team can decrease, and in the medium and long term health problems may occur.*
- *Halothane gas, for example, has a high toxicity and can affect the central nervous system. The gas concentration is controlled by the air change rate in the Operation Theatre by dilution to acceptable levels.*
- *The smoke can be generated by laser or electro surgery unit. "Research studies have confirmed that this smoke plume can contain toxic gases and vapours such as benzene, hydrogen cyanide, and Formaldehyde, bioaerosols, dead and live cellular material (including blood fragments), and viruses. At high concentrations the smoke causes ocular and upper respiratory tract irritation in health care personnel, and creates visual problems for the surgeon.*
- *In some critical situations the indoor air in Operation Theatre will be ultra-cleaned, for example, for orthopedic surgery, traumas, implants, burn patients, and other situations where the patient is immunocompromised. Otherwise, when the surgery is septic, there should be also a higher control in the indoor environment, to protect the adjacent areas.*
- *In Operation Theatre Air Conditioner duct system installed.*
- *Duct mounted Ozone generators the released ozone combines with the mainstream air in the supply air duct and reaches the space. It is present in the indoor space at the times at low concentration. When it encounters chemical pollutants, it almost instantly oxidize them and keeps the indoor air free of chemical pollutants VOC as interferes with metabolism of cell multiplication of fungi resulting in the reduction of fungi along which is responsible for wide range of indoor related allergies.*



#### **IN HOSPITAL KITCHEN ODOR REMOVAL: -**

- *In many hospitals meals are prepared and cooked in the hospital kitchen and distributed directly to the wards. Food from these outlets must also be safe for patients and staff.*
- *In hospital catering, food handlers are very frequently nurses or domestic staffs, who are involved in food operations and supervision functions.*
- *Food hygiene in hospital poses peculiar problems, particularly given the presence of patients who could be more vulnerable than healthy subjects to microbiological and nutritional risks.*
- *Ozone oxidizes any bacteria, viruses, fungus, moulds and fungi thus; using it in the kitchen creates a totally sanitary environment in which to prepare food, free of germs and diseases.*
- *By neutralizing bacteria, ozone also kills odors, leaving the kitchen totally free of any unpleasant odors from stale cooking smells, dustbins or drains, or clears the air of chemical pollution like glue or paint.*
- *Insides of a fridges and freezers absorb unpleasant smells of fish or garlic etc, which cannot be cleaned away with detergents. Ozone permeates all of the surfaces inside the area being treated, destroying the smells inside the fridge or freezer, even in the cracks and corners which conventional cleaning methods cannot reach.*
- *Ozone makes your perishables last longer, in the pantry or in the refrigerator. Ozone will keep the air free from bacteria, which slows down the ripening of fruits and vegetables and extends the life of food material substantially.*
- *By making your kitchen cleaner and significantly reduces bacterial load which also deters insects like cockroaches and flies.*
- *In the staff washrooms and changing rooms, disinfecting clothing and shoes and preventing spread of bacteria into the kitchen from contaminated clothing.*



#### **IN HOSPITAL AIR CONDITINING SYSTEM: -**

- *By treating the air conditioning system with ozone, you can prevent the buildup of bacteria and fungi this will eliminate bad smell and the spread of health problems such as, allergies, rashes, colds, viruses & legionnaires.*

Keywords: Hospital Airborne Infection Disease Control Ozone Generator Air Purifier Health Care Infectious Airborne Particulate