

O₃ Ozone Systems for Drinking Water Treatment



WEDECO

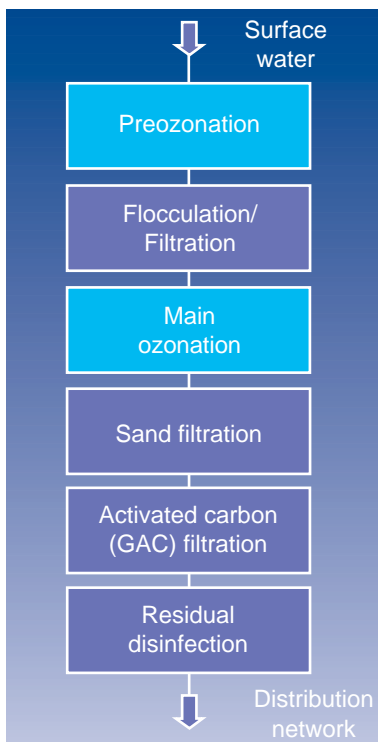
Umwelttechnologie

WEDECO – Your partner for drinking water treatment

As one of the leading ozone equipment manufacturers worldwide, WEDECO is able to supply ozone equipment for upgrading existing plants as well as to engineer and deliver complete ozone processes for a wide range of water treatment applications. A highly qualified international staff, with broad experience gained during the last 30 years and an emphasis on future oriented products and processes ensure that WEDECO is your perfect partner for drinking water treatment.

Water is the basis of our life

Water forms the basis of life on earth. Today, high population densities and overuse have put a tremendous strain on our water resources. This increases the risk of public illness and epidemics from unsafe drinking water supplies. Traditional physical/ chemical methods of treatment such as flocculation, filtration and chlorination are often insufficient to ensure the quality and safety of drinking water. A movement away from chemical water treatment to more harmless and friendly technologies such as ozone and UV can be detected worldwide.



Typical application of ozone for surface water treatment

Ozone in drinking water plants

Ozone is one of the most powerful oxidizing agents known and can be used to great advantage in the treatment of drinking water. First installations were done at the beginning of 1900. Ozone is used for oxidation as well as primary disinfection, replacing chlorinated compounds. Ozone provides the following advantages:

- Very effective oxidation of contaminants (organic and inorganic)
- No formation of harmful by-products such as Trihalomethanes (THM's)
- Effective virus and cyst reduction
- Perfect improvement of colour, taste and odor
- Control of algae

The use of ozone in water treatment plants

There are several methods of applying ozone for drinking water treatment. It is used in both single and multiple stages as in the flow diagram shown (below right). In many cases a single ozone stage is sufficient to meet primary oxidation and/or disinfection requirements.

Preozonation step

The principal purpose of preozonation is to improve the flocculation and filtration stage of the treatment. Advantages of preozonation are:

- Oxidation of high organic levels (DOC), Iron and manganese for better flocculation and filtration without producing THM's
- Control of algae
- Reduced use of flocculation agents (up to 50%)
- Improved sedimentation and flotation characteristics

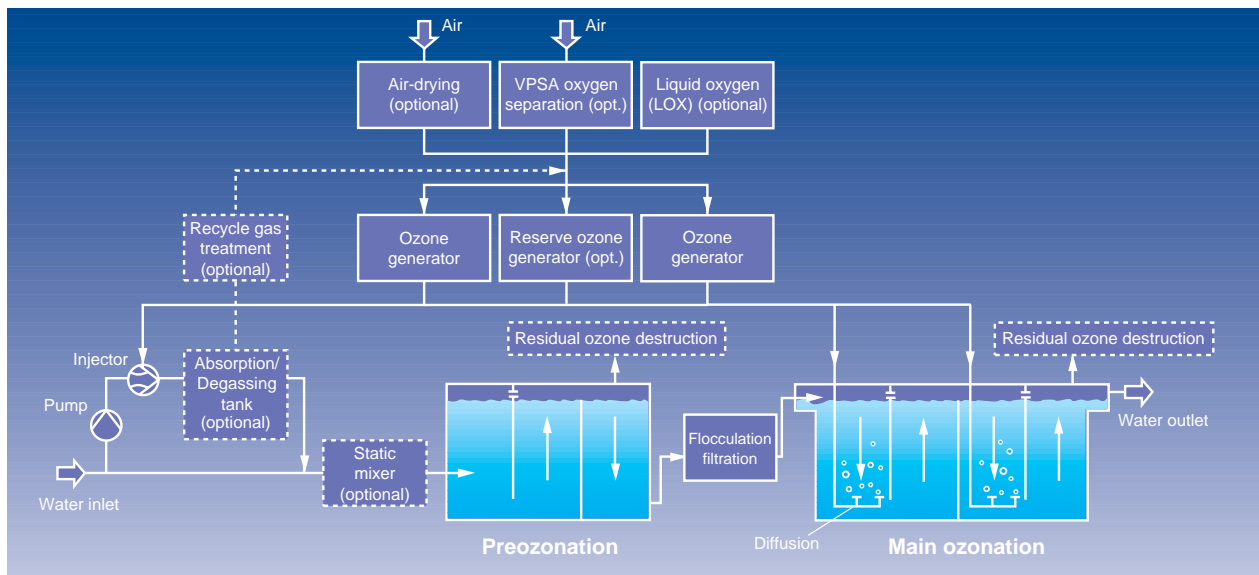
Main oxidation step

The primary oxidation and disinfection of the water takes place in this step, providing the following advantages:

- Improved odor, taste and colour characteristics
- Primary disinfection including destruction of viruses, giardia and cryptosporidium

Custom designed treatment solutions

WEDECO's extensive ozone systems experience, R&D efforts, and process engineering capabilities ensure that the ideal process technology will be provided for every application. Each ozone system consists of a coordinated group of individual process components.



Process diagram showing typical components of an ozonation system including pre- and main ozonation as well as some options

Feed gas supply and ozone concentration

Ozone is produced by a silent electrical discharge in oxygen-containing gases at various concentrations. Ranges are given below according to the feed gas source:

- Dry air (21 vol.% O₂): up to 60g O₃/m³
- PSA/VSA oxygen separation (90-94 vol.% O₂): 100 up to > 200g O₃/m³
- Liquid oxygen (LOX) (99 vol.% O₂): 100 up to > 200 g O₃/m³

Considerations that must be taken into account when choosing a feed gas source are the relative costs and availability of:

- Electricity
- Oxygen
- Investment

Effizon®HP ozone systems for drinking water

EFFIZON®HP systems offer users the highest level of ozone generation (1 kg/h - 700 kg/h ozone) with minimal levels of power consumption. Together with their excellent reliability and ease of operation, they provide users with optimal economic benefit. The systems, consisting of ozone generator, power supply unit and programmable logic controller (PLC), including fittings, pipes and wiring, are compactly constructed on a baseframe. A wide range of options enables the systems to be optimally adjusted to specific applications.

A comprehensive package

- water analysis and laboratory treatability testing
- on-site pilot trials
- design, engineering, production, delivery and commissioning of complete systems
- full-service packages with telediagnostic monitoring



Disc diffusion

Eccup



WEDECO Effizon®HP Ozone System Advantages

- Effizon HP dielectric technology for unmatched reliability!
- High ozone concentration (up to 16% by weight) capability reduces oxygen costs
- Very low specific energy consumption
- Safe, logical PSU design with segregated electrical compartments and specially designed inverter cooling unit
- Sophisticated PLC control
- High quality construction by experienced staff at our USA and Germany facilities
- Attractive, compact design reduces plant construction costs
- Factory pre-assembly and skid mounting significantly lowers field assembly, installation time and cost
- Production testing of every unit in our factory prior to shipment!
- Eliminates any uncertainty of ozone system performance during plant start-up!

Ozone contacting, offgas treatment and references

The design of an ozone application and contacting system is an important factor to ensure optimal reaction of ozone gas with water. WEDECO ozonation systems employ contacting systems selected and custom engineered specifically for each project, including:

- Sidestream injection and static mixing systems
- Fine bubble diffusion using porous ceramic disc or tube diffusers
- Others like stirring reactors, turbine aerators, etc.

Injection/static mixing systems provide excellent mass transfer characteristics while eliminating concerns over fouling. These systems are widely used for pre-ozone contacting and for high ozone dosages. Diffusion systems provide good ozone mass transfer and distribution at minimal cost. They are generally applied for main ozone contacting and relatively low ozone dosages in combination with air fed ozone systems.

Residual offgas ozone destruction units

Ozone which is not dissolved during contacting has to be converted back to oxygen before discharging to atmosphere. This may be accomplished using thermal or thermal-catalytic destruct systems. WEDECO is able to supply either type of destructor depending on customer preference and water quality.

References

WEDECO have supplied hundreds of large scale ozone systems for drinking water treatment and therefore is one of the most experienced companies worldwide. Systems in operation are in the range of 2 g/h to more than 700 kg/h (Dallas).



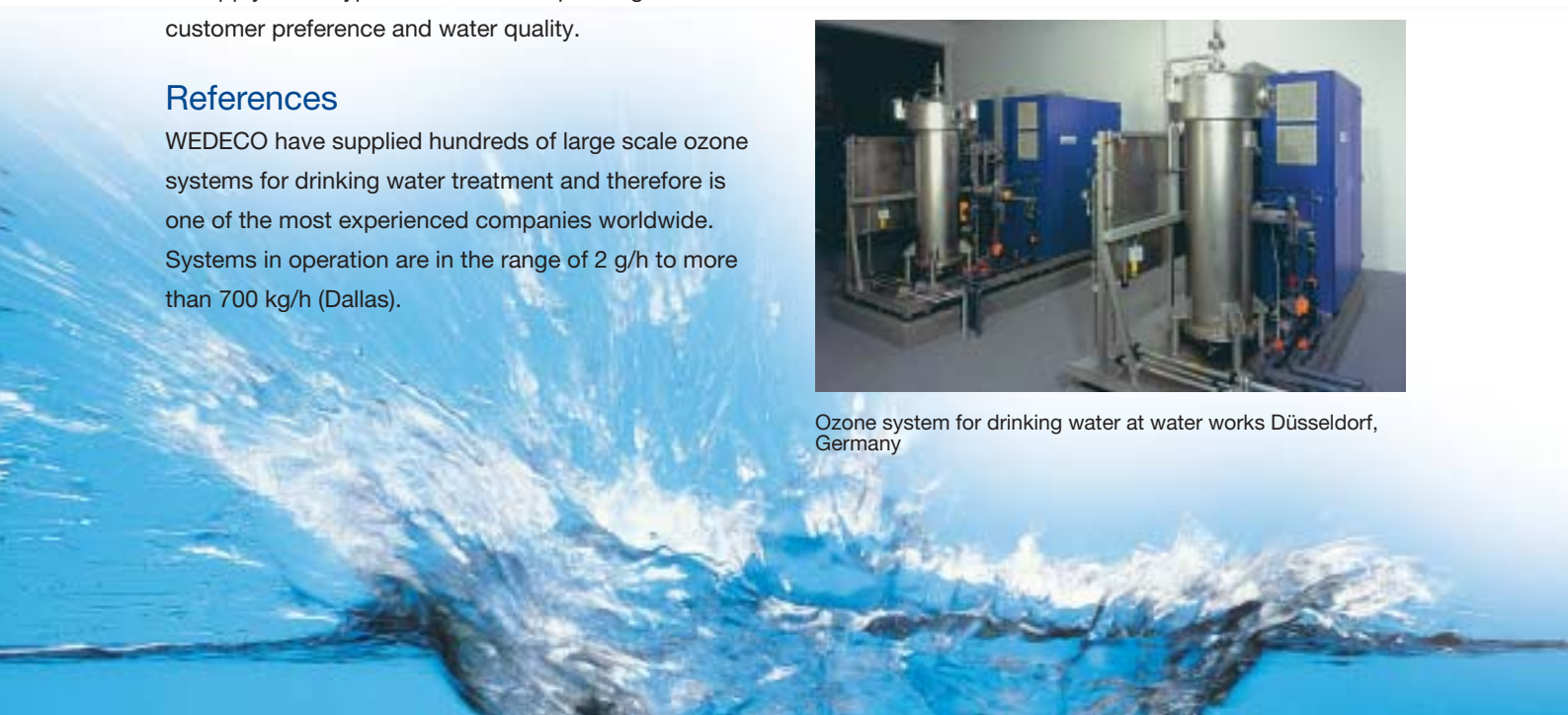
Water work Deoksan, Pusan City, South Korea
Capacity: 203 kg ozone per hour



Reservoir and drinking water treatment plant (upper left) for the city of Danzig (Gdansk), Poland



Ozone system for drinking water at water works Düsseldorf, Germany



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