ESCO International

Ozone & UV & AOP Solutions
ADVANCED TECHNOLOGIES

ADVANCED TREATMENT TECHNOLOGIES

OZONE GENERATING SKID PACKAGES

FOR

BOTTLING & RINSING & HIGH PURITY PLANTS

EC-OZ/SS & EC-ST/SS series

3 to 60 g/h

EC- ST/SS SERIES

EC-OZ/SS SERIES

The skid mounted ozone generator systems are specifically designed and manufactured to meet the disinfection and sanitizations requirements for controlled water quality standards for various industries, such as:

- Bottling and rinsing
- Food and beverage industries
- Pharmaceutical and chemical processes
- ultra pure water in electronic and pharmaceutical sectors
- hot water circuits and for swimming-pool
- Potable water circuits
- Process water loops

The advantages offered by the ozone process are numerous:

- fast disinfection rates of bacteria, viruses and spores (sometimes until 3.000 times faster than chlorine) and with short contact times
- colour , odour and taste are eliminated or significantly reduced
- active action within a wide range of temperature and pH
- no hazardous by-products formation
- odours are not increased or created through treatment
- strong oxidation reactions with organic impurities

The ozone production happens using an electronic system, the corona effect converts part of the oxygen contained in the feed gas into ozone. The produced ozone is mixed with water in a contact tank and then sent to the point of use or recycled.

1. PROJECT DATA OF UNITY OF STERILIZATION WITH OZONE

Ambient condition

- relative humidity 80 %
- dust < 5 mg/l
- pressure 1.013 mbar
- temperature < 35 °C
- gas impurities and vapours absent

2. DESCRIPTION OF ELECTROMECHANICAL PARTS

The following Design Description of the ozone generating systems is common to both EC-OZ and EC-ST series. The design differences are listed in the following tables.

2.1. AIR PREPARATION UNIT

2.1.1 Service

The supply of air to the ozone generator must contain no dust, oil, and has to be dry. A dew point of at least of - 60°C is required.

The air preparation unit includes :

- oil separator filters
- dryer
- Control and instrumental elements

2.1.2 Construction

The compressed air shall be supplied by the air distribution system at the required pressure of 6-7 bar(g), free of condensation.

Dust, water, oil vapour are separated and collected by the oil separator filters by coalescence. A membrane type dryer reduces the water vapour in air at the required dew point value of –60 °C.

2.1.3 Technical data

Dried air

- System pressure 1-3 bar
- Service temperature 25 °C
- dew point (a 1 bar) - 60 °C

Oil separator filters

- number 2
- type coalescence/active carbon

Dryer

- type membrane
- design pressure 7 bar

- design temperature 25 °C

2.2 OZONE GENERATOR

2.2.1 Service

Ozone is produced from oxygen / air by silent discharge method.

2.2.2 Construction

The ozone generator consists of a cylindrical vessel in which a specific number of stainless tubes in a compact arrangement are welded between two fixed plates.
A coolant fluid flows around the outside of these steel tubes to remove the heat produced during the generation of ozone.

This method of construction excludes any possible contact of the coolant with the high voltage electrodes. The steel tubes serve as receptacle for the calibrated electrodes, that is the high voltage electrodes.

Ozone is formed, by silent electrical discharge, in the small gap between the inside diameter of the steel tube and the outside diameter of the high voltage electrode.
By adjusting the feed gas flow rate and the power, ozone is produced in the ozone generator at the required capacity and concentration.

Each ozone generating element has its own fuse which ensures the selective disconnection of a defective element from the others without any interruption in the process.

2.2.3 Technical data

Number of ozone generators	1
• control range	10-100 %
Inlet Gas	
• pressure	1-3 bar
• operating temper.	<25 °C
Outlet Gas	
• operating temper.	< 45 ° C
Ozone generator	
• design pressure	4 bar (g)
• design temperature	50 °C
Coolant	water
• temperature IN/OUT	15/20 °C
• operating pressure	1 bar
• chlorine contents	< 50 mg/l
• volumetric flow	10-120 l/h

2.3. OZONE CONTACT SYSTEMS

2.3. Ozone contact system

2.3.1 Purpose

The ozonised gas is introduced into the process in a contacting system where it is mixed with the water being treated. The design includes an in-line injection device to ensure high ozone mass transfer.

2.3.2 Scope of supply

The ozone contact system consists essentially of the following parts:

EC-OZ/SS series (see details in annexe 1)

- main supply piping
- in-line ozone injector
- distribution manifold
- air dryer

EC-ST/SS series (see details in annexe 2)

- main supply piping
- in-line ozone injector
- distribution manifold
- ozone contact chamber
- ozone off-gas destructor
- circulation pump
- air dryer

2.3.3. Technical data

Water

• temperature	<25 °C
• max flow rate (bottling)	20 m3/h
• line pressure	3 bar
• gas concentration	26 g/Nm3
• pressure	3,2 bar relative
• liquid pressure, max	3 bar.relative
• Mixer injector	SS 316L
• construction material	SS 316 L

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OZONE GENERATOR STAINLESS STEEL SKID PACKAGES
MODEL EC-OZ/SS series

MODEL TYPE ►	Units	**EC-OZ/SS03**	**EC-OZ/SS06**	**EC-OZ/SS12**	**EC-OZ/SS30**	**EC-OZ/SS60**
Max. water flow rate to be treated,	m^3/h	2,5	5	10	20	40
Max. water pressure to be treated,	bar	3	3	3	3	3
Compressed air flow rate,	Nl/h	200	400	700	1600	3200
Power inst/absorbed	KVA/W	0,15/75	0,3/150	3/240	3/600	11/1200
Ozone production,	**g/h**	**3**	**6**	**12**	**30**	**60**
Dimensions, L x W x H,	mm	300 x 750 x 1000	300 x 750 x 1000	650 x 900 x 1100	730 x 900 x 1400	730 x 900 x 1400

PROCESS: This plant is designed for mixing ozone and water to be treated directly in line under a maximum pressure of 3 bar.rel. This ozone-water mixture is sent to the ozone contact vessel (NOT INCLUDED in EC-OZ/SS series) then to the point of use. The process produces a certain quantity of gas which contains ozone. Residual ozone in the vent gas from the contact chamber must be destroyed before exhausting to the atmosphere. Catalytic or thermal ozone destructors can be used to reduce ozone below a concentration of <0,1 ppm. The enclosures are made of AISI.

As an alternative solution to the EC-OZ/SS series is the EC-ST/SS series.

The EC-ST/SS design includes a contact tank, a circulation pump and an ozone off-gas destructors for a complete plug-n-play ozone skid package.

Please see details below.

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OZONE GENERATOR STAINLESS STEEL SKID PACKAGES
MODEL EC-ST/SS series

MODEL TYPE ►	Units	**EC-ST/SS 03**	**EC-ST/SS 06**	**EC-ST/SS 12**	**EC-ST/SS 30**	**EC-ST/SS 60**
Water flow rate to be treated, max	m^3/h	2,5	5	10	20	40
Max. water pressure	bar	3	3	3	3	3
Compressed air flow rate,	Nl/h	200	400	700	1600	3200
Power inst./ass, Installed pump,	KVA/W KW	0,15/0,075 0,75	0,3/0,15 1,1	3/0,24 2,2	3/0,6 4	11/1,2 7,5
Ozone production,	**g/h**	**3**	**6**	**12**	**30**	**60**
Dimensions, L x W x H,	mm	800 x 800 x 2100	800 x 800 x 2100	800 x 1600 x 2100	800 x 1600 x 2100	800 x 1600 x 2100

Optional:

- Residual ozone monitor in water
- Ambient ozone monitor
- Redox meter
- Integrated air conditioning system (suitable for tropical conditions)

3. BATTERY LIMITS

You should provide to the plant:

- cooling water
- drains
- electrical connections to the electrical board
- hydraulic connections in/out to the contact mixer/tank

4. EXCLUSIONS

- Everything not included and indicated in our offer
- Water recycling, drainages
- Compressed air 7 bar and T<25C (see above flow requirements for each model)

5. SALES CONDITIONS

5.1 Delivery: Ex works

5.2 Packing: Excluded

5.3 Delivery time: To be agreed, normally 3 months

5.4 Payments: Telegraphic bank transfer

5.5.Transport: Excluded

5.6 Assembly: The system is pre-assembled

5.7 Testing: Included

5.8 Validity of offer: 60 days from date of quotation

5.9 Service after-sale: To be agreed

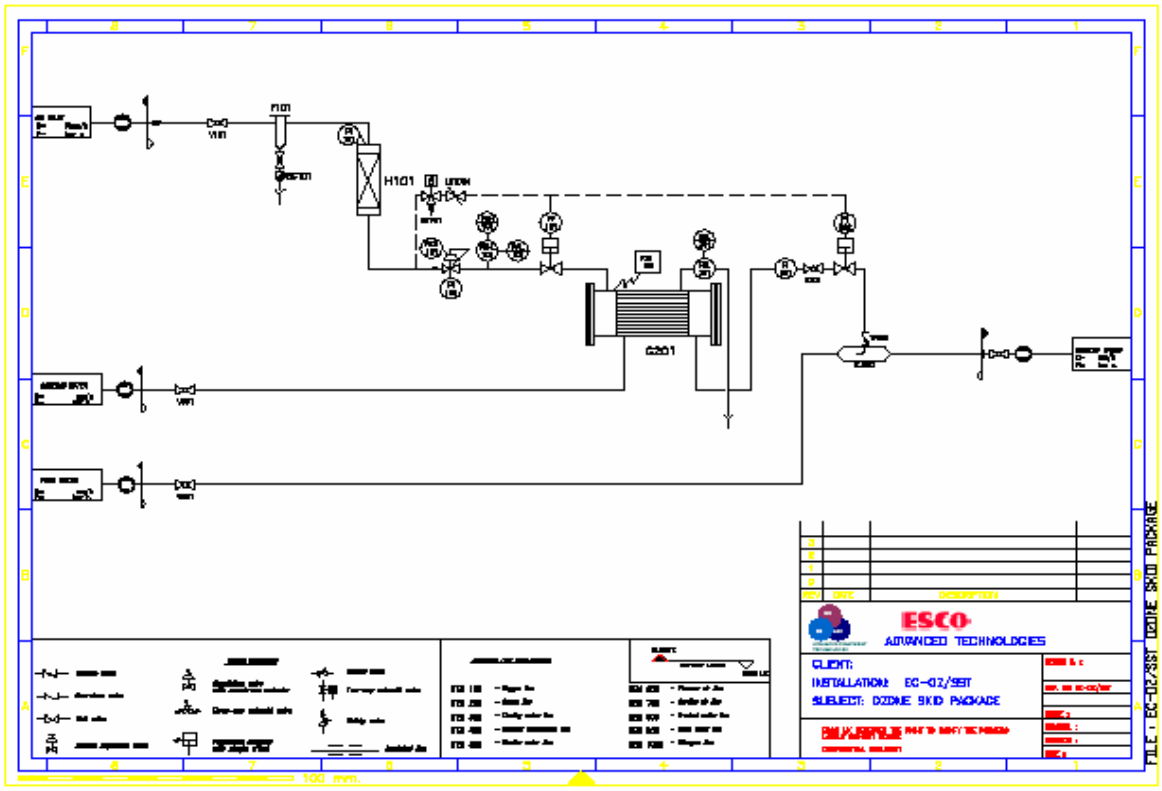
5.10 Changing rights:

ESCO International reserves the right to change at any time the design of the systems in order to improve their performance, characteristics without notification.

ANNEXE 1

LAYOUT OF THE OZONE GENERATOR SKID PACKAGE

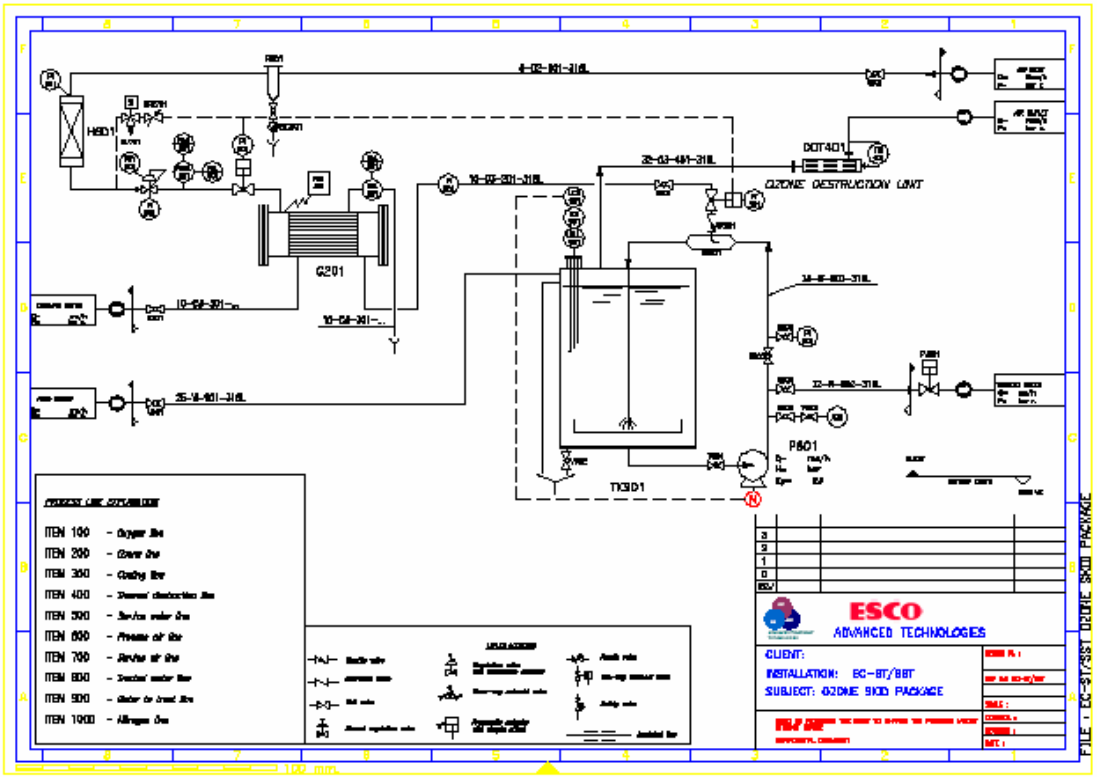
MODEL REF: EC-OZ SERIES



ANNEXE 2

LAYOUT OF THE OZONE GENERATOR SKID PACKAGE

MODEL REF: EC-ST SERIES



For additional information, please contact our technical & sales department:

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