



SEMOZON[®] AX8555

STAND-ALONE OZONE DELIVERY SYSTEM FOR ADVANCED PROCESSES

The SEMOZON[®] AX8555 Ozone Delivery Subsystem supports multiple chambers or tools to provide ultraclean, high concentration ozone gas using the SEMOZON AX8560 Ozone Delivery Subsystem. The SEMOZON AX8555 is also a fully integrated, high output ozone gas delivery system specifically designed for advanced semiconductor process applications such as Atomic Layer Deposition (ALD). ALD is a self-limiting “pulsed” process that sequentially introduces reactants into the process chamber in the gas phase to build successive monolayers of film on the wafer. By appropriately selecting the precursor materials, parameters such as growth rate, reaction temperature, impurity levels, and crystallinity of the deposited films can be influenced. Films grown using ozone as an oxidizer in ALD are very high quality, stoichiometric, uniform, dense and free from any significant contamination.

Features & Benefits

Superior Process Control for Higher Yields

- Specifically designed for lower flow, high ozone concentration
 - Required for advanced applications such as ALD
- Closed-loop concentration for tighter process control
- Ultraclean ozone at ultrahigh concentration

Flexibility

- Modular design
 - Each channel can be process matched to different concentration and flow
- Optional integrated ozone destructs with bypass valve
 - Multiple configurations available
- Flexible Tool Interface
 - Interlock interface assembly configures easily to OEM tools

Clean, Safe Alternative to Conventional Chemical Processing

- High redox potential
- Generated at point-of-use
- Green chemical, easily converted back to oxygen

Low Cost of Ownership

- Reduced chemical consumption and disposal costs
- Supports single or multiple process tools for maximum efficiency
- Compact footprint

Proven Reliability

- MKS patented, field-proven ozone generating technology



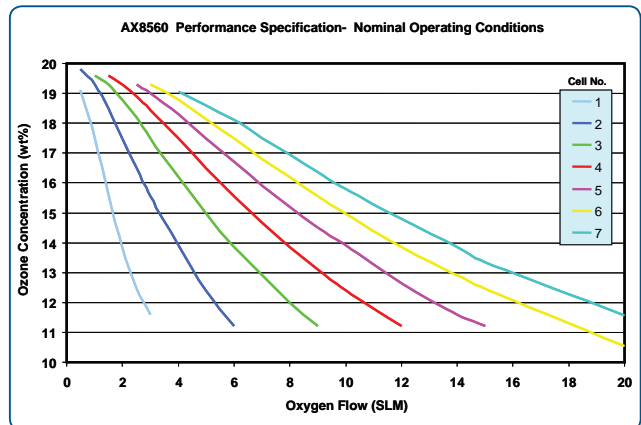
For gate oxides and high-k dielectric materials, one of the precursors needs to be an oxidizer. Ozone has many advantages over other oxidizers as a precursor for ALD and as a strong oxidizing agent. Ozone has a high redox potential, can be generated at the point-of-use, and it decays naturally into oxygen ($2\text{O}_3 \Rightarrow 3\text{O}_2$). Therefore, it is considered a “green” chemical. If required, ozone can also be destroyed at the output of the process chamber using a catalytic or thermal destruct unit. This significantly lowers chemical disposal cost, as the output is oxygen and contains no ozone. Ozone is very stable at room temperature, making it a good choice for most applications. In addition to ALD, typical ozone applications include chemical vapor deposition (CVD), photoresist strip, wafer cleaning, contaminant removal, surface conditioning, and oxide growth.

The SEMOZON AX8555 system is configurable with up to four (4) independent channels to support multiple ALD tools or chambers concurrently. Each channel can be matched to the specific concentration and flow required for your specific process. The ozone source for each channel is the production-proven SEMOZON AX8560 ozone delivery subsystem. It incorporates MKS patented, field-proven, high concentration, ultraclean ozone generation technology, as well as integrated ozone concentration monitor and flow control. The SEMOZON AX8555 includes all subassemblies required for stand-alone operation, including power distribution, an ambient ozone safety monitor, status indicator panel, and optional integrated ozone destructs for each channel.

Note: For ozone performance of each output channel, please refer to the SEMOZON AX8560 performance graph to the right.



SEMOZON® AX8560 Compact Integrated Ozone Delivery Subsystem



SEMOZON® AX8560 Performance Graph



Specifications

Feed Gases

| | |
|----------------------------|---|
| Type | Oxygen Nitrogen (20 - 100 ppm of total flow) Carbon Dioxide (1000 - 2000 ppm of total flow) |
| Purity | 99.9995% minimum |
| Supply Pressure | 60 psig (4.2 kg/cm ²) nominal, 75 psig (5.3 kg/cm ²) maximum N ₂ /CO ₂ pressure 10 psi higher than O ₂ pressure |
| Connections | Feed gases - ¼ inch face seal (VCR®) |
| Pressure Indication | Inlet pressure gauge for each gas |

Electrical Power

| | |
|------------------|---|
| Voltage | 208 volts AC (±10%), three phase |
| Current | 15 amps RMS, 30 amps service, 31 amps RMS, 50 amps service (<i>depending on configuration</i>) minimum of 10,000 A.I.C |
| Frequency | 50/60 Hz |

Cooling Water

| | |
|--------------------------------|---|
| Maximum Supply Pressure | 85 psig (6.0 kg/cm ²) |
| Flow Rate | 1.0 gpm (2.3 - 3.8 slm) minimum to 1.6 gpm max. per channel (<i>depending on configuration</i>) |
| Temperature | 63 - 73°F (17 - 23°C) |
| Quality | Demineralized, filtered to 20µm |
| Connections | ½ inch compression (Swagelok®) |
| Flow Control/Indication | Variable-area flow meter with valve |
| Pressure Indication | Inlet pressure gauge |

Exhaust

| | |
|------------------------|---|
| Type | SEMI Category 4 (accidental or emergency release of hazardous gas or vapor) |
| Flow Rate | 150 cfm (70.8 l/s) |
| Static Pressure | 0.10 in. (2.54 mm) H ₂ O minimum, measured at the bottom of the duct flange adapter on cabinet |
| Connection | 6-inch diameter duct opening |

Control Air (if required)

| | |
|-----------------|------------------------------------|
| Type | CDA or dry nitrogen, 40µm filtered |
| Pressure | 70 - 100 psig |
| Fitting | ¼ inch compression (Swagelok®) |

Environmental

| | |
|--------------------------------|--|
| Ambient Air Temperature | 41 - 104°F (5 - 40°C) |
| Relative Humidity | 30% - 90% (non-condensing) |
| Altitude | Up to 3280 ft. (1000 m) above mean sea level |

Mechanical

| | |
|-------------------------------|--|
| Dimensions (W x H x D) | 24 in. x 75 in. x 36 in. (610 mm x 1575 mm x 914 mm) |
| Weight | 600 lbs.(272 kg) for system with one generator 880 lbs.(400 kg) for system with four generators |
| Compliance | CE, SEMI S2-0302, SEMI F47 |



