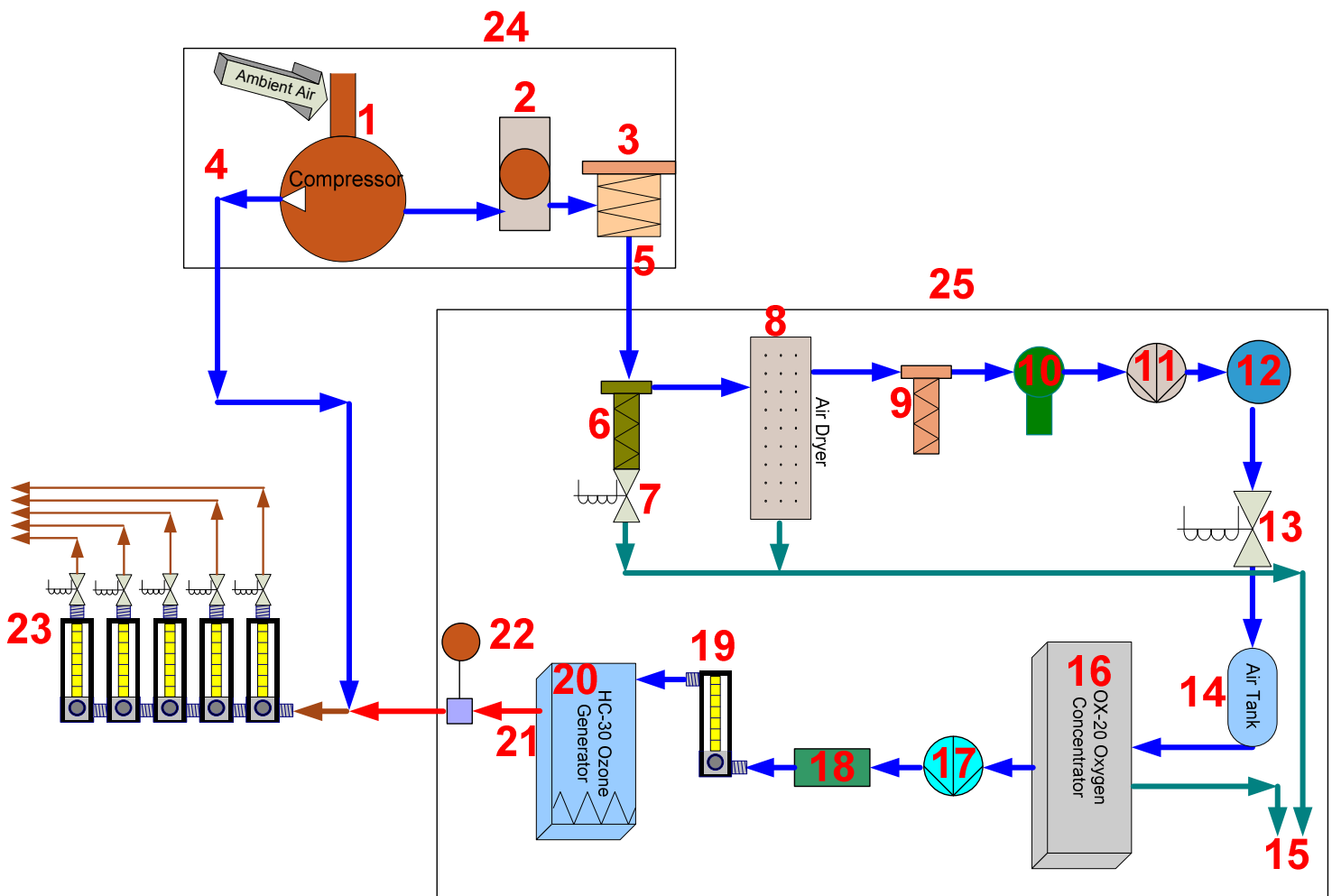


## Ozone System Diagram



### Sparging system diagram explanation:

This entire system will be trailer mounted and ready to use upon delivery. The Air Compressor, and Ozone Generating Enclosure will be enclosed units that are mounted in this trailer. The manifold will be mounted to the wall. All other ancillary equipment will also be mounted inside the trailer.

1. **Type 30 – 5 HP Ingersoll Rand Air compressor.** This compressor is mounted on a 80 gallon tank. Compressor requires 230V Single Phase power. Compressor produces 16 CFM @ 100 PSI.
2. **Aftercooler** is built onto the compressor; this will cool the air to remove moisture form the supply air.
3. **Air Filter** built onto the compressor. this will remove some moisture but all oils and dust from the air

4. This air will be used to supplement the ozone. There will be about 3 SCFM @ 90 PSI of clean dry air to mix with the ozone gas stream. This pressure will have to be regulated to a maximum of 30 PSI.
5. Up to 6 CFM of clean dry air will pass into the Ozone System enclosure. This air will be at 90 PSI of pressure at this point
6. **Coalescing filter** will filter any remaining dust, and possible moisture in the event any moisture is able to condensate from the aluminum cooling lines.
7. **Solenoid valve** will be mounted to the bottom of the Coalescing filter. This will remove any moisture that is caught in the bowl. This will be set on a timer operated by the PLC. This should open for no more than 2 seconds every 1-2 hours. The air bled off this line will be plumbed outside the enclosure.
8. **PSA Air Dryer** will be installed to dry air to -40-deg F Dew point. 20% of the incoming air will be wasted to dry the desiccant tubes. This air will be plumbed to outside the enclosure.
9. **Coalescing filter** will filter any dust that may escape from the air dryer. This will be attached directly to the air dryer.
10. **Pressure Regulator** will be panel mounted to the control face of the system enclosure. This will make operation simple and useful without having to enter the enclosure. This regulator will safely regulate the air pressure used to no more than 50 PSI.
11. **Pressure Transducer** will be installed to ensure the process air pressure is never less than 30 PSI. This will send a 4-20 mA signal to the system controller. If the process air pressure drops below the set point the PLC should set an alarm condition, turn on a light, and shut down the oxygen concentrator and Ozone Generator.
12. **Pressure Gauge** will be panel mounted for easy display. This gauge will display the air pressure of the regulated process air. This will be a liquid filled gauge made of brass or any good material. The tubing to this gauge will be aluminum with brass compression fittings.
13. **Solenoid valve** will shut down flow to the system on shutdown and in the events there are problems with the system.
14. **Air Tank** this is a buffer tank for air entering the oxygen concentrator. This will allow air pressures to remain stable when the oxygen concentrator demands air.
15. **Waste air fittings** will be panel mounted on the enclosure. There will be 2 separate waste air fittings. These will be at least ½" Female NPT to be easily plumbed. The waste air will be moisture laden air with a very high nitrogen concentration. This can be plumbed outside the trailer to remove all air safely. The tubing to this fitting from the O2 concentrator, air dryer and coalescing filter may be Teflon or another tubing.

16. **Oxygen Concentrator** will produce 10 LPM Oxygen at 93% concentration at up to 30 PSI. This oxygen stream will be dried to -60-deg F Dew Point. The concentrator requires 4 SCFM of clean dry air at 50 PSI Max. Up to 3.7 CFM of this air will be exhausted. Tubing after the oxygen concentrator will be 3/8" Stainless tube with Ty-Loc compression fittings.
17. **Pressure Transducer** will measure pressure and give a 4-20 mA signal to the PLC. In the even this pressure drops below the set point the Ozone Generator will be shut down and an alarm condition with a light will be set.
18. **Dew Point Meter** will ensure the air entering the ozone generator is dry. This air must be dried to at least 32-deg F. If the air is not this dry the PLC will shut down the Ozone Generator and set an alarm condition with a light. This Meter should provide a 0-5V signal.
19. **Flow Meter** will display the oxygen flow rate into the ozone generator. This will be a manual float type to visually inspect and determine the operation of the system. The air flow should be close to 10 LPM entering the ozone generator. A built in needle valve will allow for manual adjustment of the oxygen flow.
20. **Ozone Generator** will be rack mountable in a 19" rack. This will be the HC-30 components mounted into the rack. This generator produces 30 g/hr of ozone from 8 LPM of oxygen. This generator will not be field serviceable. In the event of a failure the generator must be pulled out and shipped back to Ozone Solutions. Stainless compression fittings in and out must be used and a simple cord to easily remove ozone generator.
21. Ozone leaving the system will flow at 8-10 LPM at 10-30 PSI. This will be very concentrated ozone at up to 6% by weight.
22. **Pressure gauge** will be panel mounted and display the ozone pressure. This gauge must be plumbed with stainless line and be a stainless liquid filled gauge.
23. **Manifold** will be mounted either to the wall of the trailer. This will have 16 flow meters to display the flow to the 16 wells. Solenoid valves and check valves will be included onto each of the manifold outputs. Control will be done with an easy to use PLC interface to choose wells, group them, and set timing.
24. The air compressor will be tank mounted. This will be mounted inside the trailer bolted to the floor.
25. The Ozone System will be mounted into an enclosure. All these things will be in this enclosure.