

Staying NEUTRAL

By Bill Fehrman

Chlorination has played a significant role in the disinfection of water and wastewater treatment for the past 100 years. This effective treatment method is proven, reliable and economically priced to meet varying application needs. Safety concerns associated with the use of gaseous chlorine require attentive handling procedures, including the use of chlorine gas scrubbers and gas supply shut-off systems.

Gas chlorinator vent exhaust neutralizes chlorine release

Gaseous chlorine is typically furnished in 150-lb, one-ton and railcar configurations, and accompanying gas-feed systems can be cylinder-, ton-, wall- or floor-mounted depending on the application.

The use of chlorine gas is regulated by local, state and federal code restrictions against exhausting chlorine fumes outside a building. Vacuum regulators in both cylinder- and ton-mounted arrangements have occasional chlorine gas vent releases that may accompany fouled vacuum

regulator inlet valves and chlorine container changeovers. If the vacuum regulator vent must be contained within the chlorine room, it can cause nuisance tripping of chlorine room air-sensor alarms and can lead to chlorine-related acid corrosion in the building.

Recent product developments have resulted in the commercial availability of systems designed to neutralize the small chlorine releases from a vacuum regulator vent with the use of scrubber media. One such product is the Capital Controls vent exhaust gas arrestor (VEGA) designed by Severn Trent Services for use on the vacuum regulator vent line.

Vent Exhaust Gas Arrestor

The VEGA is a 5-gal high-density polyethylene disposable container of chemically impregnated alumina oxide 4-mm spherical beads designed to react on contact to convert the chlorine gas vent releases to clean air and into a harmless landfill-disposable salt. The solid reaction products are locked in the ceramic bead, and the alumina oxide media is also used in commercially available large-scale chlorine dry scrubbers.

Unlike carbon-based media used for the same purpose, which can have high heats of reaction, the ceramic-coated media carries no fear of com-

bustion and does not require neutralization prior to disposal.

As designed, the vent exhaust gas arrestor has less pressure loss than an equal length of vent tubing. Two vent exhaust gas arrestor arrangements are typically recommended: single and stacked. At least one vent exhaust gas arrestor system is recommended per vacuum regulator vent. The manifolding of two or more vacuum regulator vents to a single vent exhaust gas arrestor is discouraged due to back pressure concerns.

The vent exhaust gas arrestor is equipped with inlet and outlet chlorine colorimetric indicator strips, which change from white to yellow when exposed to chlorine gas. The inlet (bottom) will turn yellow during normal operation and does not indicate unit exhaustion. The outlet (top) will turn yellow when the unit is exhausted, indicating that replacement is needed.

Tests have shown that under sporadic venting conditions, a VEGA system should last at least one year before replacement is required. While it is recommended to consult federal, state and local landfill disposal laws and regulations to determine proper disposal procedures, in most cases the media is considered nonhazardous and landfill-disposable without further neutralization.

Principles of operating a VEGA system include:

- Place the vent exhaust gas arrestor unit on the floor next to operating vacuum regulator;
- Run vacuum regulator vent line directly to vent exhaust gas arrestor bottom side inlet connection;
- Run vent exhaust gas arrestor vent discharge line (top) to suitable outdoor area for venting;
- Vent exhaust gas arrestor is set to operate;

The VEGA converts chlorine gas vent release into clean air.



- Chlorine gas will flow from the vacuum regulator vent to the floor-mounted VEGA bottom inlet;
- Exothermic reaction between the chlorine and the scrubbing media will cause a draft as the clean hot air rises and exits the VEGA top outlet—vent release is also under slight pressure; and
- When the unit is exhausted, or after one year, the entire bucket assembly, including media, is thrown away and replaced with a new unit.

Testing & Validation

The object of the testing was to generate data under a variety of operating scenarios to support VEGA performance assertions and suitability for purpose.

Full-scale tests that were performed included:

1. Third-party full-scale tests performed by Adsorption Research, Inc. for pressure drop, chlorine exhaustion challenge and temperature effects.
2. Beta-site trials performed on actual vent releases from vacuum regulators mounted on 150-lb chlorine cylinders.

Third-party full-scale tests performed by Adsorption Research, Inc. showed very low pressure losses that were lower than equivalent lengths of normal vent tubing when passing air. The chlorine removal efficiency was excellent with discharge concentrations below 100 ppb. The allowable OSHA workplace limit is 500 ppb.

The structural integrity of the VEGA test unit was unaffected by the temperatures experienced during the tests. These temperatures ranged from 70°F to 239°F with the majority of the tests at or under 131°F.

Beta site trials were performed at the Hall Road Station, Aqua, Pa., and proved the VEGA capable of removing normal VR vent releases in excess of one year with no complications or maintenance required. The VEGA exceeded the requirements of the NFPA 1/Uniform Fire Code latest edition, including the requirement of Article 80 section 8003.3 relating to treatment systems for toxic and highly toxic compressed gases.

The VEGA unit answers the need in those areas that do not permit

any gas emission, no matter how small. This will also greatly reduce the corrosion in feeder rooms that have the VRs venting directly into the room. *wqp*

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