

Total Tank Solution for Emission Control

Introduction

Tank owners have a variety of concerns while managing a tank farm; chief of them include process safety, cost, product quality, environmental compliance and product loss. However, with the undeniably growing emphasis on net-zero in the green world, **emission control and compliance to EPA guidelines** is one of the biggest concerns for aged as well as new assets and therefore it is a challenge.

As per EPA estimates, storage tanks are one of the largest contributors of volatile organic compound (VOC) and green-house gas (GHG) emissions in oil and gas production. With storage tanks under the radar, regulatory enforcement has also become high-tech and unforgiving, with inspectors now using an optical gas imaging infrared camera (IR camera) (Refer to Figure 1) to detect leaks from storage tanks.

Common non-compliance issues include leaking hatches and other pressure relief devices, with violations resulting in significant fines (combined EPA penalty in 2019 was around \$163M globally) and even facility shutdown. Not adapting to this technological shift timely, will certainly lead to an uncertain future ahead.

To avoid such future uncertainties, it is recommended for tank owners to follow this three-pronged approach:

- Selection of a trusted partner in safety, offering correct sizing, selection and integration of competitive product portfolio
- Remote monitoring of tank top products
- Regular maintenance at recommended frequency



Figure 1. FTIR camera being deployed for leakage detection in storage tanks

Highly competitive total tank solution

Due to change in liquid level and ambient conditions, the pressure inside the tank fluctuates by varying degrees. Therefore, it's important to take a layered approach (Refer to Figure 2) to tank protection to prevent rupture or implosions. Emerson's customizable total tank solution comprising of pad/depad regulators, PVRVs and EPRVs ensure the same. The first layer of tank blanketing regulator relieves over pressure (depad) and vacuum condition (pad) by introducing blanketing media into tank. They also preserve product integrity and ensure safety and sustainability by creating non-flammable condition in the tank. Other layers include PVRVs, thief/gauge hatches and EPRVs. A PVRV handles normal venting requirements for tanks and are designed to prevent over-pressure and under-pressure situations. Thief and gauge hatches perform similar functions to PVRVs. EPRVs handle emergency venting requirements and prevent catastrophic over-pressure or under-pressure situations.

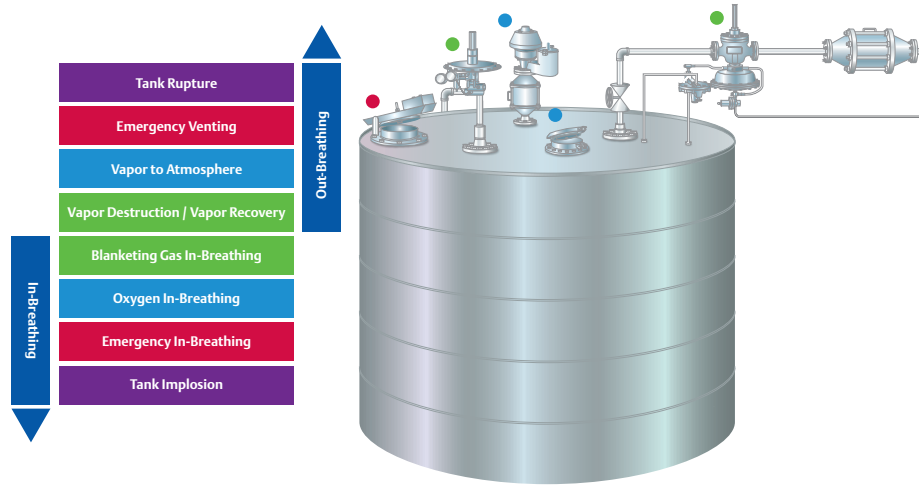


Figure 2. Three layers of tank protection for varying pressure and vacuum conditions

The key competitive features of our portfolio that ensure tight emission control, are as follows:

- 10% overpressure technology:** As per API 2521, Breathing losses from independent tanks can be minimized with the use of vent settings that are as high as possible. To meet this goal of emission reduction, Emerson’s Anderson Greenwood™ series full lift vents utilize 10% overpressure technology, which provides short opening and closing pressure ranges, allowing tank pressure to be set higher (closer to MAWP and MAWV) to achieve the same flow. (Refer to Figure 3). Additionally, since the valve is set higher, there is less leakage when the valve is closed during normal working pressures in the tank.

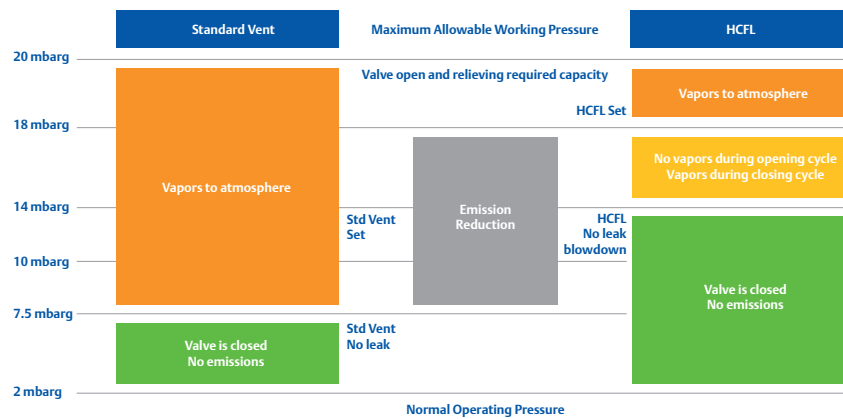


Figure 3. Diagram depicting how HCFL can be set higher and open later to minimize emissions and product loss

- High precision of tank blanketing/vapor recovery regulator:** Efficient sizing and selection of Emerson tank blanketing regulators ensures precise control of as low set points as 1/4 in. W.C. or even vacuum. Since lower tank set pressure equates with lower vapor leakage rate, such high precision results in reduction of emissions and product loss. Additionally, Emerson’s vapor recovery regulator throttles the flow within 95% ~ 102.5% of set pressure (as opposed to industry average of 75% - 130% which leads to pressure fluctuation and unnecessary venting due to valve flutter) Thus, it helps to maintain a constant tank pressure and reduce >25% of unnecessary emission.

- **Low leakage rate:** Emerson’s low leakage rate valves can help customers meet their EPA emission compliance challenges and their bottom line. To achieve a tighter seal and reduce fugitive emissions, each critical component has been engineered with tighter tolerances for increased sealing performance. As a result, the sealing performance of our PVRV and EPRV is 0.5 SCFH at 90% of setpoint at ambient conditions (For Enardo™ ES-850 and ES-950, best-in-class leakage rate is 0.1 SCFH at 90% of setpoint), as against the allowable leakage rate of 0.5 SCFH at 75% of setpoint. The leakage rate summary for our products against API 2000 has been depicted in Table 1.

API 2000 allowable			Leakage performance of Emerson products		
Size	Flow (CFH)	% set point	Size	Flow (CFH)	% set point
<=6 in.	0.5	75%	<=6 in.	0.1 to 1	90%
8 to 16 in.	5	75%	8 to 16 in.	0.1 to 1	90%
>16 in.	20	75%	>16 in.	1	90%

Table 1. Best-in-class leakage rate of our product portfolio against API 2000 standard

- **Better venting seal tightness:** Emerson PVRVs use US patented Saber Guide System as shown in Table 1. It is the only dual guided pallet system, which minimizes vent flutter and makes sure the plug sits back to the seat properly to provide tight seal, ensuring high leakage resistance.

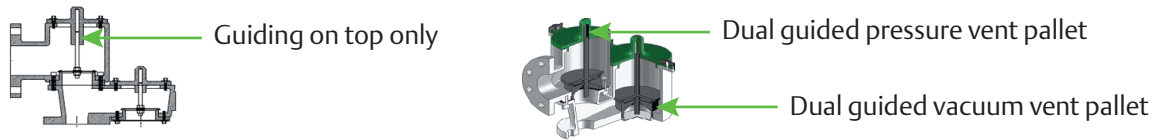


Figure 4. Pictorial representation of Saber Guide System

Wireless capability for remote monitoring

Wireless monitoring of these devices minimizes operating costs and improves safety performance by knowing the operational status of the devices in real time to know if it is open when it should be closed or vice versa. These sensors combined with built-for-purpose analytics helps you identify problems before having to send a maintenance crew out.

Regular maintenance and site audit

Emerson, as a trusted partner in safety, conducts tank walkdown, which is a physical infield review of a customer’s tank(s) existing pressure control solution. The walkdown includes review of the devices physical condition, installation and attributes (i.e., sizing and materials). The objective is to solve a customer’s problem and to identify areas of opportunity to improve safety, reliability and reduce cost associated with tank(s) pressure control system(s).

Using this three-pronged approach, the tank farm owners can improve system reliability, ensure complete compliance to EPA guidelines and minimize operational uncertainty. Emerson, with its long trusted technical expertise and strong market leadership, would be happy to partner in your safety journey. After all, Safety isn’t expensive, its priceless!

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