

Minimize Risk and Maximize Efficiency with Nitrogen Blanketing and Purging

Avoiding a disaster is easier than responding to one—and that's not a lesson any chemical company should learn the hard way. Explosions can be catastrophic, and in some cases, the measures taken to respond to them can also lead to further catastrophes—such as damage to property, negative impacts on the environment and even risks to public health. And while storage facility managers are aware of these consequences and take precautions to keep them from happening, it's important to consider all preventive solutions available.

Among common preventive solutions to reduce the risks of fire and explosion, nitrogen blanketing and purging systems have proven incredibly effective for chemical, petrochemical, refining and pharmaceutical companies by reducing the amount of oxygen that is present in a system. These systems can be implemented efficiently by complying with industry standards like NFPA 69, reviewing and improving the existing system design to help reduce risks and choosing the correct materials with the specific stored materials in mind.

Oxygen: A threat to stored materials

How can storage facilities use nitrogen blanketing and purging to reduce the threat of fire and explosion when oxygen is present? The first step is to limit the amount of oxygen in the tank along with the stored material. Oxygen is one component of the fire triangle, which describes the three factors necessary to create a fire: oxygen, fuel and heat. In addition to increasing the risk of explosion, oxygen can also lead to spoilage of stored material, which could be a chemical, pharmaceutical ingredient, petroleum or oil. Storage facilities can use nitrogen to reduce the amount of oxygen present in a storage tank to safe levels, significantly reducing the likelihood of fire or explosion by eliminating one component of the fire triangle, minimizing environmental contamination and preventing product spoilage.

Maximizing efficiency and safety with nitrogen

Maximizing efficiency and safety requires careful consultation and engineering with current industry-standard codes and guidelines in mind. According to Brandon Sumners, Principal Applications Engineer for Chemical, Environmental & Technical Solutions at Airgas, an Air Liquide company, these codes and guidelines can help storage facility managers choose the best

solutions. For example, NFPA 69, also known as the Standard on Explosion Prevention Systems, defines how much oxygen is acceptable in the headspace of stored material. By tailoring a recommendation based on NFPA 69 and the specific material being stored, gas suppliers can help storage facilities protect themselves from damage while maximizing efficiency, minimizing waste and keeping costs reasonable.

“By referring to [industry standard] codes and guidelines, we can make recommendations for nitrogen blanketing and purging systems that are both efficient and safe,” said Sumners. For example, he added, “We could recommend that a storage facility use pure nitrogen to fully inert the headspace of stored material. This concentration of nitrogen would ensure safety, but it would be wasteful and prohibitively expensive.”

Designing an effective solution

Once storage facility managers determine how much nitrogen they need to effectively minimize risk, he or she must work closely with a gas consultant to determine the most efficient way to introduce nitrogen into their existing system. To do this, the industrial gas consultant assesses the size and shape of the tank to determine which point of introduction will optimize the sweeping action of the nitrogen. Often, a unique storage system setups pose an additional challenge. According to Sumners, “Due to the setup of certain storage tanks, they may not have an optimal point of introduction. If this is the case, an industrial gas consultant might suggest a modification to the tank or setup.” Ultimately, the goal of the consultation is to determine a solution that maximizes safety and efficiency.

The right tools for the job

A solution is only as effective as the equipment used to do the job, especially when a nitrogen blanketing or purging system is being added to an existing tank setup. To ensure the efficient operation of a nitrogen blanketing and purging system, storage facilities should consider new, more efficient regulators and tank blanketing valves, which can hold a precise, low pressure. These valves can help minimize wasted nitrogen. In addition, an industrial gas consultant can recommend equipment based on the chemical compatibility of the equipment material and the product being stored. Any reaction between the stored material and hardware in the tank can lead to inefficiencies and waste.

Nitrogen blanketing and purging systems are necessary to protect storage facilities from product spoilage and

explosion, but these systems don't need to be costly. When designed properly to conform to standard codes and guidelines, blanketing and purging systems can be efficient, cost-effective methods of protecting product and property.