

RAILYARD



Air Eliminator Tanks: General Info

Description

Air Eliminators are designed to provide separation, elimination, and prevention of air in piping systems for a variety of installations and conditions. Positive displacement and turbine meters, being volumetric measuring devices, cannot differentiate between liquid, air, and vapor. Although the air content, in most instances, is small when compared with the product, it will contribute to measurable error. Large amounts of free air or vapor entrapped in a piping system, not only compromises meter accuracy but can lead to overspeeding of the measuring unit, creating excessive wear, or possible unit failure. To insure accurate liquid measurement, it is necessary to remove all vapor and free all entrained air from the system prior to entry into the measuring unit.

Features

- High capacity air elimination provides maximum meter protection and superior measurement accuracy
- Vertical tank facilitates more effective air elimination
- Carbon steel or stainless steel construction

Principle of Operation

Air Eliminators decrease the velocity of the flowing stream and bring the liquid to a state of relative calm so that air bubbles or vapor will rise. As air and vapor collect in the top of the vessel, liquid volume is displaced. Once displaced to a predetermined point, a float-operated valve opens, and the accumulated air and vapor is discharged from the tank. Liquid level then rises, causing the float-operated valve to close. Discharge rate is regulated by back pressure on the outlet side of the eliminator. If sufficient pressure differential is not available to maintain a proper rate, a back-pressure valve should be installed.

Applications

In most applications, free air is eliminated without difficulty. Air which has become entrained in the product and carried along with the stream, however, must be separated from the liquid product and collected as free air before it can be discharged effectively. Entrained air in gasoline and low viscosity products separates and rises to the surface quite rapidly when the liquid velocity is decreased sufficiently. As viscosity increases, the rate of separation and rise of entrained air decreases and more retention time is required to effect surface operation. Because tank size is a consideration in the storage and dispersal of collected air and vapor, it is not always economical to remove entrained air from the system. When considering installations handling such products as heavy oils, it is usually far more economical to prevent the entrance of entrained air rather than eliminate it. Products such as fuel oil, diesel oil and kerosene tend to foam, causing air to be discharged in the form of vapor. Petroleum products in this form are hazardous when discharged to the atmosphere and, for this reason, require large air eliminators to accommodate increases in surface tension.

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Sources of Air or Vapor in Piping Systems

Conditions leading to severe air problems can often be eliminated or improved at the design stage, or through a comprehensive preventive maintenance program. Factors frequently contributing to air and vapor problems include:

- Pumping into or out of storage through the same line
- Allowing the formation of vortex conditions in low levels of product
- High suction vacuums can pull in finely divided air through packing glands
- Above-ground or heat-absorbing lines exposed to the sun can cause vaporization
- High pressure drop across valves can cause release of dissolved gases
- Lack of or improperly placed check valves can allow lines to partially drain during idle periods
- A suction vacuum that is too high for a volatile product
- Allowing a storage tank to become completely empty

Air Eliminator Selection

Air Eliminators for a given job should be selected based on flow rate, viscosity and the magnitude of the air problem incurred. Normally, the problems incurred that require the elimination of free air can be classified in one of three conditions.

Condition One: Venting Free Air from a Piping System - Starting a New Installation or Filling a System After Drainage In most cases, a simple air elimination device combined with a strainer will perform satisfactorily and is the most economical method. This combination offers protection of the meter against intrusion of foreign material and eliminates free air that could cause meter inaccuracy.

CAUTION: During start-up or after maintenance, slowly purge the line until it is filled with liquid and all air and vapor have been removed.

Condition Two: Moderate Amounts of Air Requiring a Separate Air Eliminating Vessel and Venting Device In applications involving moderate amounts of free or entrained air or when highly viscous products are being measured, an elimination tank is recommended for proper retention time. In Condition One the strainer body allows very little time for air to be released to the surface. Condition Two, for moderate to heavy concentrations of air, requires a reduction in product velocity as well as more retention time before release of air or vapor, thus the need for a larger receiving/holding tank. Applications common to this condition include those which have allowed the product tank to completely empty, failed to properly close a valve, very low storage tank levels or have been loaded and unloaded through a common line. Condition Two is limited to those applications in which no high, continuous volumes of entrained gas or air may result from either system failure or human error.

Condition Three: Critical Conditions Involving Large Amounts of Air or Gas Entrainment Typical applications may involve:

- Unloading transport trucks, tank cars or pumping from barges or tankers
- Pumping from underground storage
- Piping systems used for several different operations and products (air is introduced when changing products)
- Lines with occasional drainage between products
- Above-ground and heat-absorbing lines exposed to the sun can result in the release of solution gases and boiling of light ends where high vapor pressure products are utilized
- Pumping in and out of the same line
- High turbulence created by high liquid velocity, valves, fittings, etc.
- Viscous products greater than Number 2 Fuel Oil

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- Lines blown down with compressed air or those allowed to run dry

Vessel Loading and Off-Loading

Free air introduced into the piping system caused by vortexing, stripping bottom product, or simply unloading mobile tankers or seagoing vessels is a problem which requires special attention. The unloading of rail cars or road tankers often requires the air eliminator vessel to have a liquid level float as an interface to close the discharge valve downstream of the meter. This stops all flow when liquid level drops to a predetermined point in the vessel. The valve must have adequate closing time to minimize the introduction of surges yet fast enough to eliminate the air being displaced into the metering system. For off-loading seagoing vessels, secondary or multiple air release devices may be required to assist with air elimination before entering the metering system. Contact the factory for recommended procedure when flow rate exceeds standard vessel size or when such conditions exist.

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