

Measuring Pressure on Ammonia Applications

Overview

Anhydrous ammonia (NH_3) that is over 99% free of water;) is a simple compound, used commonly as a refrigerant or fertilizer in commercial applications. While it is inexpensive and works very effectively in both uses, it can be poisonous and corrosive in high concentrations. Other than its use in low concentration cleaning agents, ammonia is seldom used in consumer products.

Ammonia is largely incompatible with the wetted materials most frequently used in fluid vessels and tubing, especially copper or copper alloys like brass and bronze. Therefore, systems designed to circulate or distribute ammonia will require every wetted component to be constructed with suitable materials. Failure to do so will likely result in component failure, and a containment breach, allowing poisonous ammonia to escape into the surrounding environment. This will cause a significant safety hazard and potential equipment damage.

**“anhydrous” comes from
the Greek word
“anydros” meaning
“waterless”**

the refrigerator or freezer. Like any refrigerant, the liquid absorbs heat and changes phase (from a liquid to a gas). The gas then passes through a condenser, which uses fans to remove the energy and cool the gas back into a liquid. Anhydrous ammonia is one of the most efficient fluids for this purpose, because it has a boiling point of -28.01°F (-33.34°C). Since the refrigerant temperature

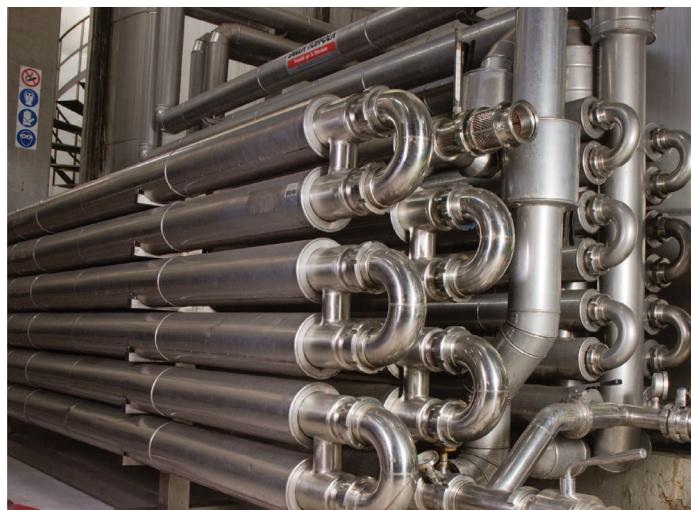
is also an important factor in establishing the specified charge (amount of refrigerant in the system), measurement of the refrigerant temperature is necessary. While this requirement may appear to necessitate the need for a separate temperature instrument, the thermodynamic properties of ammonia and the “Ideal Gas Law” may be applied to establish a fixed relationship between its pressure and temperature.

Process Requirements:

- Compatible wetted parts
- Identified Ammonia dial
- Temperature and Pressure relationship on dial
- Vacuum and positive pressure scales

Making an anhydrous ammonia refrigerant pressure gauge

1. Specify 316 stainless steel: Anhydrous ammonia use will require this wetted material to prevent failure due to corrosion. In no case can copper or copper alloys like brass or bronze be employed.
2. Specify the XR5 dial option when required: This dial will include both a pressure scale and the associated temperature scale to facilitate the reading of both measurements at a glance. It will also display the imprint “Ammonia.”

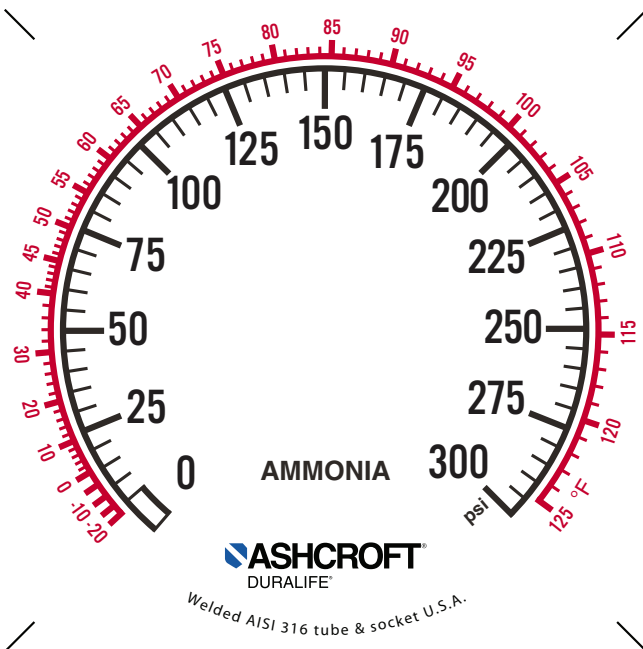


Refrigeration

Anhydrous ammonia is used as the refrigerant in commercial refrigeration. It circulates through heat-exchanging coils to transfer energy out of the inside of

Technical Information Page

3. Common ranges: Compound gauges (vacuum and pressure scales) are usually required, because systems are thoroughly evacuated to remove moisture prior to the introduction of the refrigerant. The majority of the gauges produced for anhydrous ammonia refrigerants are ranged as either: 30 inches of mercury vacuum to 150 psi or 30 inches of mercury vacuum to 300 psi
4. Gauge model: Ashcroft offers a variety of models with 316 stainless steel wetted parts and the XR5 ammonia dial option. Consult our on-line gauge selector or contact us for help choosing.



Fertilizer

Ammonia is an ideal fertilizer because it delivers a high concentration of nitrogen to promote plant growth. Traditionally, nitrogen was delivered to the soil in the form of solid particulate ammonium nitrate. While this chemical served its purpose, it also created potential environmental hazards due to nitrogen and phosphorus runoff that could contaminate rivers and lakes and cause toxic algae blooms.

To prevent these ill effects, a new delivery system using hollow blades or spikes has been developed to inject pressurized liquid anhydrous ammonia 10 to 20 centimeters beneath the surface of the soil. Upon release, the liquid immediately vaporizes, permeating the surrounding soil and reacting with ground moisture keeping it from evaporating back into the atmosphere.

Process Requirements:

- Compatible wetted parts
- Identified ammonia dial

Making an anhydrous ammonia fertilizer pressure gauge

1. Specify 316 stainless steel: Anhydrous ammonia use will require this wetted material to prevent failure due to corrosion.
2. While no specific dial is associated with this application, purchasers often desire an imprint of their company logo and/or the addition of an "Ammonia" designation. If required, specify the XDA custom dial option and provide specifications and logo artwork.
3. Common ranges: The majority of the gauges produced for anhydrous ammonia fertilization systems are ranged as:
 - 0-60 psi
 - 0-100 psi
 - 0-150 psi
 - 0-160 psi
 - 0-400 psi
4. Gauge model: Ashcroft offers a variety of models with 316 stainless steel wetted parts and the XDA custom dial option. Consult our on-line gauge selector or contact us for help choosing