



Anyhdrous Ammonia Contamination in Propane – Operator training

Background

Anhydrous ammonia (NH₃) is used as a fertilizer, a refrigerant, and as a chemical feedstock. Because it is transported in cargo tanks also used to transport LPG, contamination of LPG is possible if transporters fail to use proper procedures for cleaning cargo tanks.

Effects of Anhydrous Ammonia

Anhydrous Ammonia in LPG can potentially result in two major problems:

- Corrosion stress cracking of brass fittings in the presence of water.
- Production of oxides of nitrogen (NO_x) in combustion products, possibly causing eye and respiratory irritation in customers using unvented equipment.

Corrosion Stress Cracking

Corrosion stress cracking of forged brass fittings is dependent on several factors:

- Concentration of NH₃
- Presence of water
- Length of exposure
- Pressure and temperature

Corrosion stress cracking is most likely (and severe) in brass exposed to NH₃ in the liquid state, such as a brass valve or fitting installed in the liquid space of a tank or plant piping, less likely (and severe) in the vapor space of the tank or plant vapor piping, and far less likely in low pressure vapor lines at customer locations

Trailer cleaning procedures

Only properly trained individuals should attempt to clean a cargo tank.

After properly venting the ammonia vapors, the cargo tank should be steam cleaned, flooded with water or a combination of both, and then aired to dry. For more details refer to NPGA Safety Bulletin 122-70.

Testing for Anhydrous Ammonia

The simplest test for the presence of anhydrous ammonia is the test required in NFPA 58. Pink or red litmus paper moistened with distilled water is held in the LPG vapor stream for 30 seconds. Any change in the color of the litmus paper from red or pink to blue indicates the presence of anhydrous ammonia. The time and the amount of color change roughly indicate the ammonia concentration. A rapid change to a deep blue indicated higher concentrations of ammonia than a slow change to a light shade of blue.

Other tests such as using stain tubes or laboratory tests may give much more precise results, however the NFPA standard is simple, reliable, and easy to perform in the field.

Summary

Anhydrous ammonia is caustic and hazardous. It is corrosive to brass fittings and can be an inhalation hazard.

If you are not sure of the last product in the cargo tank or you smell or suspect the presence of ammonia in the tank ask your supervisor to verify the tank has been properly cleaned. For more information or if you have any questions please contact the Missouri Propane Gas Commission at 573-893-1073.

Helpful References

NFPA 58 (2008 edition) 4.5.1

NFPA Bulletin 122-70

NFPA Bulletin 123-92

Missouri Propane Safety Commission

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