

## Challenging the NH3 Refrigeration & Electrical Classification (UPDATED 3/3/12)

Safety Info Posts - Chemical Process Safety (PSM/RMP) Written by Bryan Haywood Monday, 20 February 2012 20:51

Most ammonia refrigeration personnel know their refrigerant is flammable, but most would also tell us that they do not have any "Hazardous Locations" (e.g. Class 1, Div 1 or 2 locations) associated with their refrigeration process. Most of these workers will explain their engine room/compressor room ventilation system is designed, installed, and maintained to ensure that NH<sub>3</sub> never achieves 25% of its LEL (e.g. 40,000 ppm), thus allowing the facility to escape the requirement of making their engine room an electrically classified area (e.g. hazardous location). This is allowed in the National Electric Code and both IIAR and ASHRAE codes. But in these technological days, this may no longer be the case...

A new trend is making its way into the refrigeration industry and this new trend may not be so popular if the users knew the full and potential impact it may have on their process safety and OSHA/EPA compliance. This new trend involves installing an ammonia detector in a vent line or vent header so that personnel will be alerted to the presence of NH<sub>3</sub> vapor in the vent line/header. This is a GREAT practice to have in place, but unfortunately for an industry that does not embrace the concept of "Hazardous Locations" for their electrical equipment used in process areas, the industry may be digging a large hole that is a bottomless pit!

As I said earlier, I know of no ammonia refrigeration process that meets the National Electric Code for Hazardous Locations or any other RAGAGEP for establishing hazardous locations. To my knowledge, all refrigeration facilities use the "ventilation exception" in the NEC, IIAR and ASHRAE codes so they do not have to comply with these electrical requirements. There is absolutely nothing wrong with using this exception when it is applied properly; however, this exemption ONLY applies where the facility's ventilation can control a release of NH<sub>3</sub>! Left to question are the areas where liquid ammonia is piped to evaporators, areas around condensers, the rooftop area around where the engine room ventilation discharges to the atmosphere, etc. But I digress... back to the vent header sensors...

There are several brands being used in these vent lines/headers monitoring systems and ALL of the ones that I have reviewed require their sensor(s) be placed no more than 1-2 feet from the end of the vent line. Based on the fact that all the RAGAGEPs for establishing hazardous locations establish a 5 feet bubble around the end of a vent line, means that the vent line sensor and transmitter will have to be rated for at least a CLASS I, Div 2 Group D location. The problem arises with the manufacturer's design in that the design uses a NEMA 4 enclosure, which is NOT an enclosure rated for a hazardous location. In fact two of the brands even tell the user to "keep (the NEMA 4 enclosure) away from discharge".

Installing one of these sensors per the manufacturer's installation instructions (e.g. 1-2' from vent line discharge) means the facility will now need to define their electrical classifications, as they will have now established a Class I Div 2 hazardous location within their process. And this one can not be eliminated with the "ventilation system".

PLEASE NOTE: NH<sub>3</sub> refrigeration processes have ALWAYS had "hazardous locations" around their vent line and ventilation system discharges, but somehow/somewhere the industry convinced itself HAZLOC's does not apply to their industry in any capacity, even though Ammonia is listed as a Group D flammable.

The reason I raise this flag once again, is that years back the industry was not installing ignition sources within the 5' HAZLOC vent bubble and now it is. In fact the ammonia refrigeration RAGAGEP's required the vent discharge to be 15' away from working surfaces, roof lines, etc. to ensure the ammonia would discharge into a space where no ignition sources would be present. Now it appears this trend is spreading through the industry and I am just trying to educate users of these devices of their need to establish a hazardous location program for their facility. It is my belief that most facilities are viewing these devices as the latest and greatest process safety improvement and since it is a "safety improvement" many may not have done a MOC review before installing these sensors and leaving themselves vulnerable to an incident and OSHA/EPA compliance issues.

As I said earlier, having this vent line sensor is a GREAT process improvement! We just need to ensure it is **designed, installed, and maintained** properly so it acts as a BENEFIT to process safety and not a PROBLEM. We should not be afraid of establishing HAZLOC's within our process areas where we expect ammonia to be discharged per the process design (e.g. vent and ventiation discharge points).

