



Being odd is normal! New HVAC is real," Yasushi (Kelly) Sasaki of Mayekawa declared during the HVAC parallel session at ATMO America 2017, in a sign that natural refrigerants – and ammonia in particular

*11 reasons to think about SIRE
new chillers come to you
new ideas for solving your problem*



Models

**Ammonia Gas or Refrigerant
R717**

Ammonia Gas or Refrigerant R717

Ammonia is amongst the oldest of all the refrigerants and still used widely in the refrigeration applications. It is also the only refrigerant outside the halocarbons group, still being used to a great extent. Ammonia refrigerant is commonly known as R717 and its chemical formula is NH_3 . Its molecular weight is 17 and boiling point is -28-degree F (-2.22-degree C).

Ammonia has highest refrigerating capacity per pound of any refrigerant and a number of other excellent thermal properties that make it popular for a number of refrigeration applications in spite of its being toxic, explosive and flammable within certain conditions. Ammonia is used as refrigerant prominently in the refrigeration systems of food industry like dairies, ice creams plants, frozen food production plants, cold storage warehouses, processors of fish, poultry and meat and number of other applications.

Properties and Advantages of Ammonia Refrigerant

1) Small piston or screw displacement: Ammonia has the highest refrigerating effect per pound compared to all the refrigerants being used including the halocarbons. Even though the specific volume of ammonia is high, the compressor displacement required per ton of refrigeration is quite small, due to this small compressor is required per ton of the refrigeration capacity. This saves lots of power in the long run.

2) Compressor used with ammonia refrigerant: Since the specific volume of ammonia is high it is used mostly with rotary and the centrifugal compressors though it can be used with open type of reciprocating compressor as well.

3) Condensers used with ammonia refrigerant: The condensers used in the refrigeration systems using ammonia gas as the refrigerant are of water cooled type or evaporative type. This again is mainly because of the high volume of the gas handled by the refrigeration system. Air cooled condensers are used in the systems that have rotary screw compressors.

4) Chillers used with ammonia refrigerant: Ammonia can be used with direct expansion types of chillers as well as flooded chillers. In flooded chillers there is higher heat transfer that results in higher refrigerating effect for ammonia refrigerant.

5) Environment friendly: One of the biggest advantages of ammonia gas as the refrigerant is that it is safe to the environment and does not cause any depletion of the ozone layer. Due to this it won't not have to be replaced with any alternative refrigerants as is the case with number of chlorofluorocarbons (CFCs). Ammonia is the oldest of all the refrigerants being used and it will compete with the new refrigerants for a number of years to come.

Ammonia gas (NH_3) or R717 refrigerant is available almost everywhere and is the cheapest of all the commonly used refrigerants. These coupled with the chemical stability of ammonia, its high refrigerant effect, and non-miscibility make it ideal refrigerant for the applications and places where toxicity is not a major factor. Ammonia refrigerant is non-miscible with oil so it does not mix with the oil in the crankcase of the compressor.

6) Materials used in the refrigeration system: For the standard conditions of say, -15-degree C in the evaporator, the condenser and the evaporator pressures are 2.37 bar and 11.67 bar respectively, which are quite moderate. Since the pressures are not very high, lightweight materials can be used for the construction of the equipment. The pressure in the evaporator is quite high so it is not necessary to expand the gas to very low pressure. This also enables high suction pressure for the compressor and lower compression ratio.

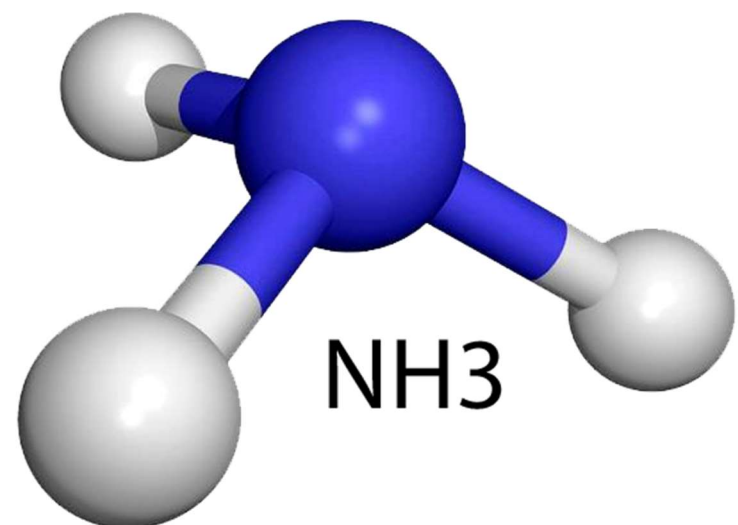
7) High discharge temperature of ammonia gas: The discharge temperature of the ammonia refrigerant from the compressor is high, hence water cooling of the cylinder heads and the cylinders of the compressor is very important. If high discharge pressure is required, it is advisable to use the multi-cylinder compressors instead of the single cylinder compressor to avoid overheating of the compressor.

8) Corrosive nature of ammonia: Anhydrous ammonia is non-corrosive in nature, however, in presence of moisture it tends to become corrosive to copper, brass and other non-ferrous materials. Thus, while in halocarbon systems, copper is used predominantly in the refrigeration equipment, its use should be avoided in the ammonia refrigeration systems.

9) Miscibility with oil: Ammonia refrigerant is non-miscible with oil so it does not mix with the oil in the crankcase of the compressor. The ammonia refrigerant leaving the compressor picks up oil particles and carries them to the condenser and then the evaporator. Here these oil particles tend to reduce the heat transfer efficiency from the refrigerant. The oil separator should be installed in the evaporator to remove the oil and return it back to the crankcase.

10) Leak testing of ammonia: The leak testing of ammonia from the refrigeration system can be done either by using sulfur sticks or soap solution. When ammonia reacts with sulfur, a dense smoke is formed. To detect the leakage of ammonia from the refrigeration system, the stick is dipped into sulfur and moved around in the whole plant. The location where the dense smoke is formed can be further traced to find exact point of leakage of the refrigerant. The leak testing can also be done by applying the soap solution at the various joints of the pipeline. At the point of leakage bubbles are formed in the solution.

11) Ammonia is cheap and available readily: Ammonia is available almost everywhere and is the cheapest of all the commonly used refrigerants. These coupled with the chemical stability of ammonia, its high refrigerant effect, and non-miscibility make it ideal refrigerant for the applications and places where toxicity is not a major factor.



Compressors used by SIRE in this new chiller

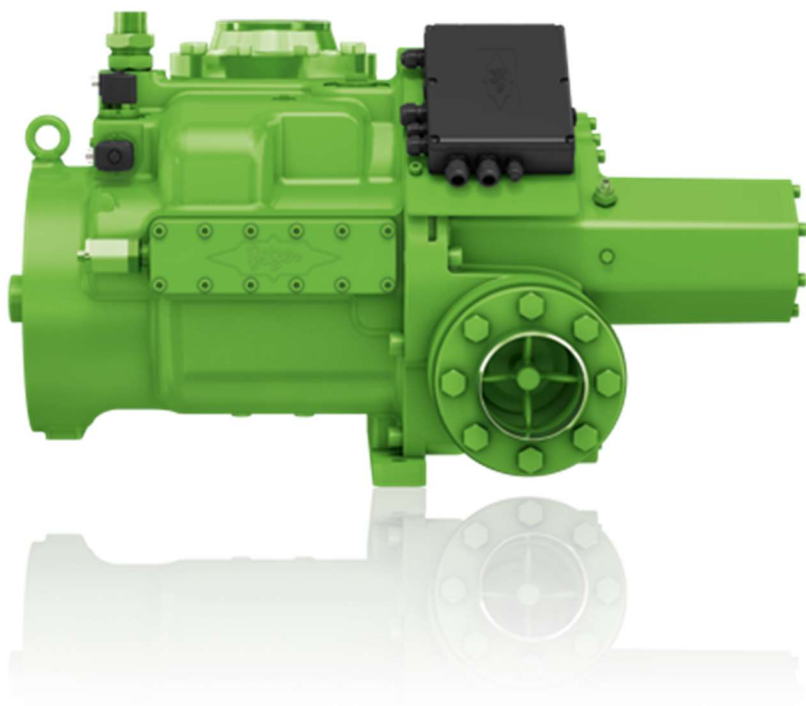
Piston compressors
Used in SIRE CHILLERS

Screw compressors
Used in SIRE chillers

BITZER until 900kW

IQ

INTELLIGENT
COMPRESSORS



Mycom until 1.7MW

