



VIETCHEM

**AMMONIA LOADING – UNLOADING PROCEDURE**

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## **1 PURPOSE**

This procedure provides the method and detailed steps to carry out loading and unloading for Ammonia Anhydrous of Tan Thanh Produce CO., Lmd.

## **2 SCOPE OF WORK**

This procedure is applied for loading and unloading Ammonia Anhydrous at Tan thanh Produce Co., Lmd and company's client.

## **3 RESPONSIBILITIES**

The deliverer and supervisor (Supplier team) have responsibilities to perform loading – unloading Ammonia Anhydrous and ensure the job is carried out safely and efficiently.

The HSE department, Firefighting department and Medical clinics of Company's Client coordinate with supplier team to handle any Emergency cases during loading – unloading Ammonia Anhydrous process.

## **4 SAFETY AND ENVIRONMENT**

- Both Operator and Supervisor must be competent, qualified and trained about NH<sub>3</sub> physical and chemical properties;
- The operator and Supervisor must be able to aware of dangerous factors and conditions during the operation process. Preventing and remedial measures must be well prepared for any case;
- All personnel relating the job must be strictly followed up the working procedure;
- All personnel participated in particular job must attend pre-job safety meeting (Tool box talk);
- Special PPE must be equipped for Ammonia Anhydrous handling;
- Materials and equipment to prevent Ammonia Anhydrous spills and collect must be prepared before performing the job;
- All devices, NH<sub>3</sub> storage tanks:
  - o Storage equipment, Electrical systems and firefighting systems must meet the requirements of nation standards and norms;
  - o Safety equipment should be taken in terms of fire prevention, explosion protection, waterproof, anti-static, anti-heavy pressure, shock proof, anti-falling and dragging.
- Stop loading – unloading process if any case as below happens:
  - o Thunderstorm weather;

- Fire nearby;
  - Liquid Ammonia leakage;
  - Pressure inside tank is abnormal.
  - Unloading at night
- If any unsafe condition/ unsafe act takes place during these operations, personnel are allowed to stop the work, report to their supervisor immediately for prompt actions.

## 5 PROCEDURES

### 5.1 Ammonia Anhydrous General Introduction

Ammonia is widely used in the world in many fields such as fertilizer, water treatment, exhaust treatment from thermal power plants,...

Commercially, Ammonia is usually stored as a liquefied phase in pressure vessel. It is colorless in both gaseous and liquid form. Ammonia gas is easily detected by its characteristic sharp, pungent odor at high enough concentrations. In the absence of moisture, ammonia is a relatively non-corrosive substance. However, in the presence of moisture it becomes a highly corrosive compound.

Ammonia gas and liquid can be lethal to human life above certain concentrations by attacking the skin and lungs/respiratory system.

Ammonia is not considered a fire hazard at normal operating conditions. However, at temperatures above 1562 °F (850 °C) fires can occur in air at ammonia concentrations of 16-25 %. Ammonia can also form explosive compounds with bromine, chlorine, iodine, mercury, silver oxide, or hypochlorite so exposure and the potential of exposure of ammonia to chemicals should be avoided.

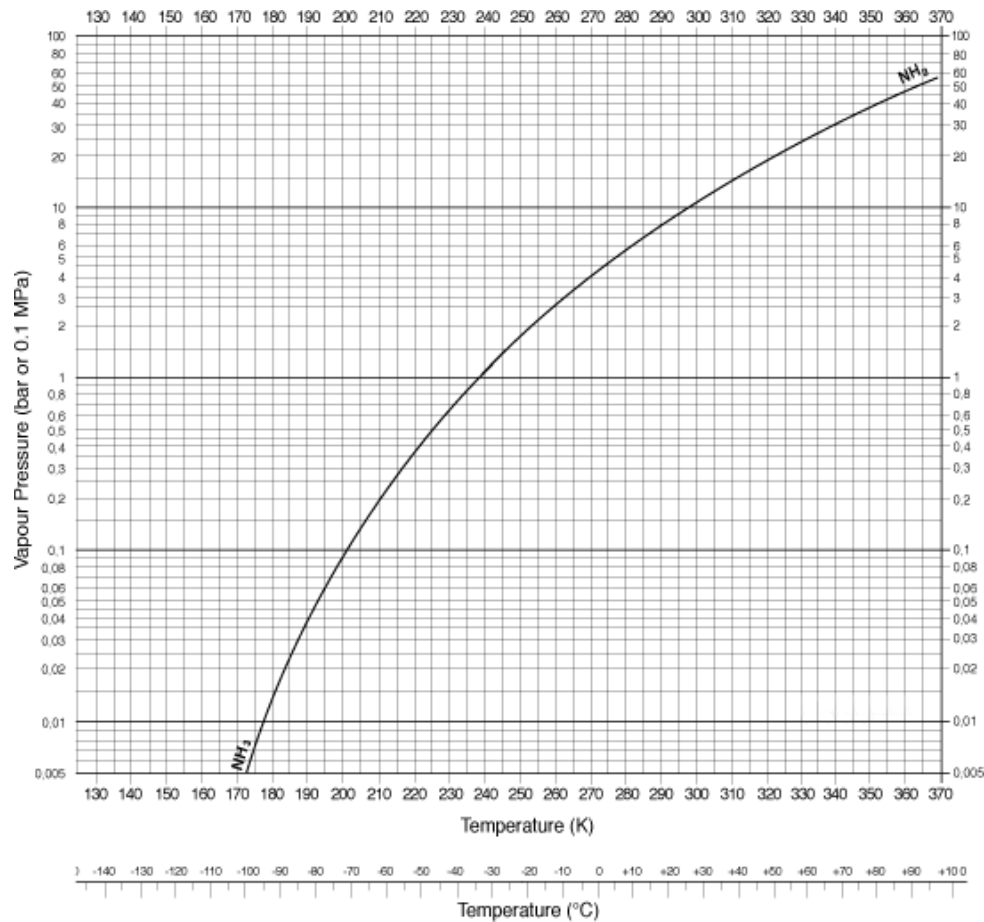
**Table 1. Chemical Properties of Gaseous and Liquid Ammonia**

Property	SI Units
<b>Ammonia, gas</b>	
Density	0.73 kg/m <sup>3</sup> (1.013 bar; 15 °C)
Compressibility factor	0.9929 (1.013 bar; 15 °C)
Heat capacity (C <sub>p</sub> )	0.037 kJ/(mol K) (1 bar; 15 °C)
Thermal conductivity	22.19 mW/(m K) (1 bar; 0 °C)
<b>Ammonia, liquid</b>	
Density	682 kg/m <sup>3</sup> (1.013 bar; -33.5 °C)
Liquid/gas equivalent	1.947 vol/vol (1.013 bar; 15 °C)

Latent Heat of  
Vaporization

1371.2 kJ/kg (1.013 bar; -33.5 °C)

**Figure 1. Vapor Pressure Curve of Ammonia Gas**



## 5.2 Preparation

1. Nitrogen replacement should be carried out before the First time use the tank. The tank inside oxygen content after the replacement treatment should not exceed 3%:
  - Nitrogen is injected into tank must balance pressure between gas and liquid phase;
  - Using pressure pump to inject and release Nitrogen when loading-unloading Ammonia anhydrous.
2. Before unloading liquid ammonia, Operators must check the configuration and status of Safety Facilities and Emergency Equipment of liquid ammonia tank, and record the process;

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3. The operators must carefully check all connection points, valves, leakage points on piping, nozzle, coupling, ...
  4. Before unloading liquid ammonia, carefully check whether the switching state of all valves in the pipeline meets the requirements, whether the grounding wire and jumper wire are intact and reliable, and connect the grounding wire, and stop for 0-20 minutes to fully conduct static electricity before unloading.
  5. Tank car should be parked in the designated position, brake and put out the engine with hand brake. If parking on ramp, wheels should be fixed by  $\geq 150$ mm plate or pad wood.
  6. Pay attention several matters as below during unloading Ammonia:
    - The vehicle must be turned off. It is strictly prohibited to adjust the oil, electricity, wiring and maintenance of the vehicle;
    - The driver of the vehicle and the unloading supervisor shall not leave the site;
    - Other vehicles shall not approach the working site.

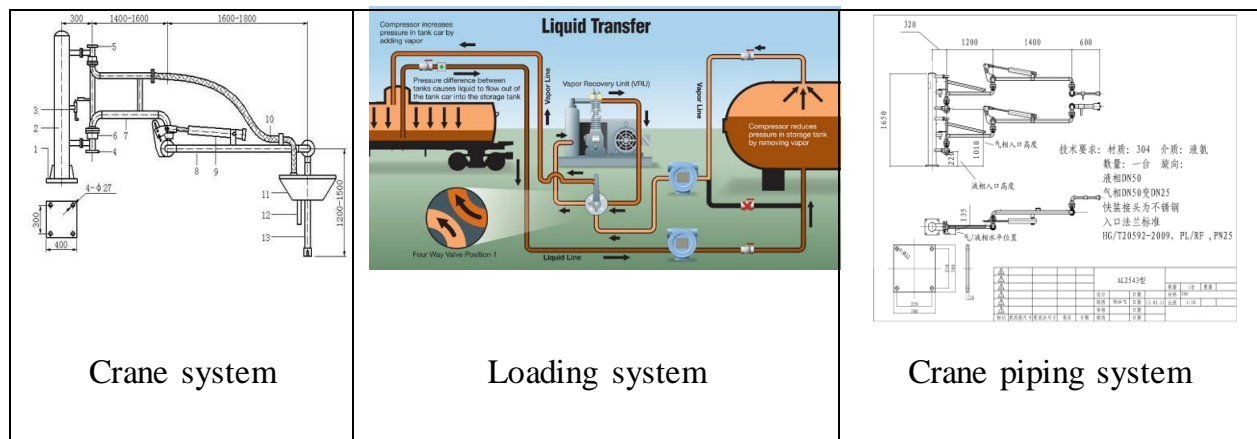
### **5.3 Ammonia Loading – Unloading process**

1. Confirm the capacity of ammonia storage tank through liquid level meter to prevent overloading;
2. Connect liquid phase and gas phase of tank truck with liquid phase pipe and gas phase pipe of loading crane arm pipe (Loading unloading equipment platform / Liquid ammonia loading crane pipe / bottom loading arm pipes) according to unloading requirements;
3. The supercargo opens bottom unloading valve manual (if have hydraulic opens handles) of the tank truck (tanker trailers) and check whether the connection with the liquid ammonia Loading (Loading unloading equipment platform / crane) pipes is tight without leakage;
4. After check the tank truck is in good condition, the emergency cut-off valve on the liquid phase pipeline of the tank truck / trailer, bottom valve on the ammonia storage tank, outlet valve of the liquid ammonia pump should be opened successively. under the pressure difference between the tank truck and the ammonia storage tank, the liquid ammonia will naturally flow into the ammonia storage tank (liquid ammonia flow from tank truck to storage tank).at this time, the ammonia unloading personnel should timely check the tank car, tank level and pressure, and timely deal with problems / risk;
5. After a period of time, after the pressure of the ammonia storage tank and tank truck gradually balances, the gas valve of tank truck, the loading crane arm pipe gas valve, the gas valve of the ammonia storage tank are opened successively, so that a closed loop is formed between tank truck and the ammonia storage tank through liquid to

- liquid, vapor line to vapor , then open the liquid ammonia unloading pump until the ammonia unloading is completed
6. During the operation of ammonia unloading pump, attention should be paid to the sealing condition of each connection point and whether there is abnormal noise and vibration. If there is any abnormality, stop the pump in time;
  7. After the unloading of liquid ammonia, stop the liquid ammonia pump, close the liquid-phase valve of tank truck, liquid-phase valve of (crane arm) pipes, liquid valve of ammonia storage tank, gas-phase valve of ammonia storage tank, gas-phase valve of (crane arm) pipes, gas-phase valve of tank truck successively, close the emergency cut-off valve. Tank truck supercargo closes the bottom unloading valve manual (If have hydraulic opens handles), manual ball valve, opens the pressure relief valve to relieve pressure, disconnect the arm pipes from the tank truck, close the electrostatic conductor, and guide the tank truck driving away.
  8. Vapor recovery.

#### 5.4 Post- Unloading work

1. Check all valves status and equipment, piping system,... and ensure that no abnormality;
2. After the liquid level of liquid ammonia storage tank is stationary and stable, the readout quantity shall be recorded;
3. Clean up the site and put firefighting equipment and supplies back in place.



## 6 EMERGENCY RESPONSE PLAN

### 6.1 Emergency cases

1. Ammonia leakage at the spherical tank when loading ammonia from tank trucks into the tank;
2. Tank explosion.

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## 6.2 Preventing measures

1. Prepare a dyke surrounding the Ammonia tank;
2. Always reserve a large amount of sand to prevent or dig holes to collect Ammonia to reduce the possibility of liquefied Ammonia spreading over areas, limiting evaporation of Ammonia;
3. In locations where there is a risk of Ammonia leakage, the warning system and emergency equipment/ material (Water, foam bottles, ...) must be available;
4. The storage tank must meet the general requirement on the manufacture, installation and repair of pressure vessels. Satisfying the requirements of the technical inspection regime, operating in accordance with safety principles, meeting general requirements for inspection instruments, measuring devices, safety devices and accompanying accessories (Manometers, safety devices, measuring instruments, etc.) and conducting regular inspection as this regulation;
5. Ventilation system and spray freshwater system should be used to dissolve and dilute Ammonia.

## 6.3 Recovery measures and Remedial action

1. Evacuate residents from the area affected by toxic gases to gather in safe place as Schools, offices where certainly not affected by toxic gases, while blocking small roads;
2. For small fires using dry chemicals or carbon dioxide;
3. For large fires using general sprinkler, fog or foam system. Move containers from the fire area if possible, in safe way. Avoid getting water into the container. Damaged containers should only be handled by expert;
4. For containers located around fire area, extinguish fire from the maximum distance possible or use an automatically controlled nozzle. Be aware that freezing can occur at sources of leakage, and wastewater from fire fighting can cause pollution. Therefore, it is advisable to control and treat waste water after incident.

## 6.4 Emergency contact point

### Supplier (Vietchem):

Operator (Escort) number:

Supervisor:

Driver number:

Management number: 0913.347.572 or 024.3984.2258



**Buyer:**      EHS number:  
                    Firefighting number:  
                    Factory doctor:

**Local force:**  
                    Firefighting: 114 or .....  
                    Doctor:      115 or .....  
                    Police:      113 or .....