Fixation of plant capacity & Project configuration

Kribhco will be providing 150 MTPD of anhydrous ammonia in liquid form for both weak nitric acid and ammonium nitrate. Therefore, based on ammonia availability, maximum of 100 KTPA plant of both weak nitric acid and ammonium nitrate can be setup. As per the information received by the KBR, for both 100 KTPA WNA and AN plant the following below mentioned raw materials and catalyst in the table are utilized with specific consumption norms. Platinum (94%)/Rhodium (6%) Gauze is used as catalyst in the manufacturing process of weak nitric acid. On the other hand, no catalyst is used to produce ammonium nitrate.

		Raw Materials				
Product	**Capacity (MTPA)**	**Raw Materials**	**Per MT consumption**	**Unit**	**Annual Quantity Required**	**Unit**
Weak Nitric Acid	100000	Anhydrous Ammonia (Liquid)	0.2875	MT	28750	MT
		Platinum (94%)/Rhodium (6%) Gauze (Catalyst)*	0.00028	Kg	28	Kg
Ammonium Nitrate	100000	Weak Nitric Acid (WNA)	0.747	MT	74700	MT
		Anhydrous Ammonia (Liquid)	0.213	MT	21300	MT

Manufacturing Process & Available Process Technology of WNA & AN

Plants and operating technology:

There are many technology providers in the race to weak nitric acid and ammonium nitrate plant. Thyssenkrupp is the major technology provider to the Indian WAN and AN manufacturing company. Casale SA and Stamicarbon are the other providers of technology of ammonium nitrate to Indian manufactures.

Thyssenkrupp is a global conglomerate of enterprises with about 100,000 workers that consists primarily of independent industrial and technological companies. Materials Services, Industrial Components, Automotive Technology, Steel Europe, Marine Systems, and Multi Tracks are the six business segments that make up the company. With a wealth of technological expertise, firms create solutions that are both affordable and resource-friendly for today's and tomorrow's concerns.

Casale is a privately owned Swiss Company, wholly owned by Casale Holding, with headquarters in Lugano (Switzerland). Casale SA acquires the melamine manufacturing, nitric acid, ammonium nitrate, urea ammonium, and other critical fertiliser production technology from Borealis in 2013-2014. Additionally, it purchases the reputable Czech EPC contractor Chemoproject Nitrogen, renaming it Casale Project. Thereafter, combining Ammonia Casale, Urea Casale, Methanol Casale, and Casale Chemicals into one business, Casale SA is formed to streamline the company's structure.

Stamicarbon has been in the forefront of creating and granting licences for technology for the urea industry since 1947. Nitric acid business entry by Kribhco in 2017 with a dual pressure plant idea at capacities >600 MTPD. 2017 saw the purchase of 20% of Pursell Agri-Tech to produce fertilizer with

controlled release. The business advanced in 2021 by introducing a small-scale green ammonia technology that paves the path for more environmentally friendly fertilizer production.

When M.W. Kellogg and Brown & Root Engineering and Construction joined in 1998, one of the top engineering, procurement, construction (EPC), and services businesses in the world was born: KBR. The business split from Halliburton in 2006, and it successfully completed an IPO on the New York Stock Exchange. We have expanded to offer comprehensive science, technology, and engineering solutions for a variety of areas, including aerospace and defense, industrial, intelligence, and more. These acquisitions include Ecoplanning, Energo, Granherne, GVA, HTSI, PLINKE, SGT, Weatherly, Wyle, and more.

S. No.	Plant	Technology provider	Process/technology	Client
1	Ammonium nitrate melt (AN melt)	Thyssenkrupp	uhde® Vacuum Neutralisation	Gujarat Narmada Valley Fertilizers & Chemicals Limited
2	Technical Ammonium Nitrate (TAN)	Casale SA	AN2000/Dual Pipe reactor	Smartchem Technologies Ltd. (a subsidiary of Deepak Fertilizer), (**Planned)**
3	Ammonium nitrate (AN)	Thyssenkrupp	uhde® Vacuum Neutralization	Deepak fertilizers, Taloja plant
4	Ammonium nitrate melt (AN melt)	Stamicarbon	ODDA process	Rashtriya Chemicals and Fertilizers Limited
5	Ammonium nitrate melt (AN melt)	**WIP**	**WIP**	National Fertilizers Limited
8	Weak Nitric Acid (WNA)	Thyssenkrupp	uhde® dual pressure nitric acid process	Gujarat Narmada Valley Fertilizers & Chemicals Limited
9	Weak Nitric Acid (WNA)	Weatherly Inc. (U.S.A.) (KBR's Subsidiary)	Weatherly Dual Pressure Nitric Acid Technology	Deepak Fertilizers
10	Weak Nitric Acid (WNA)	Thyssenkrupp	uhde® dual pressure nitric acid process	Rashtriya Chemicals and Fertilizers Limited
11	Weak Nitric Acid (WNA)	**WIP**	**WIP**	National Fertilizers Limited

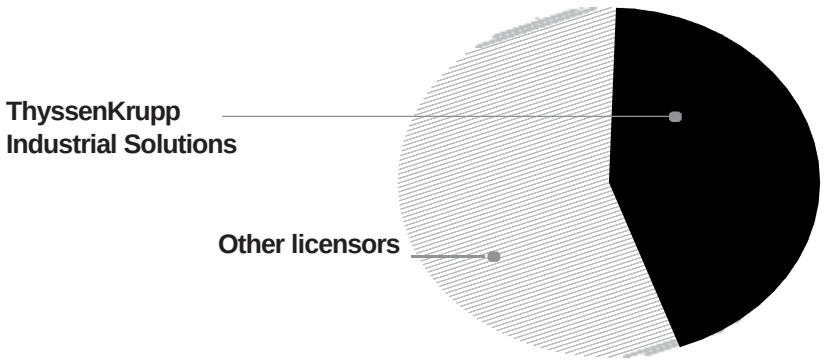
Thyssenkrupp: The Uhde dual-pressure process

Thyssenkrupp Industrial Solutions is best positioned to serve the industry with tried-and-true, cost-effective, and environmentally friendly processes thanks to its more than a century of involvement in nitric acid plant design and construction, more than 80 years of experience in the fertiliser sector, and more than 360 plants engineered and delivered.

Based on both their own patented and well-known licenced technology, the company can supply the entire range of plants to make single-component and mixed nitrogenous fertilisers. They can provide azeotropic nitric acid plants for the non-fertilizer industry. Their nitric acid plants are environmentally benign because they use the EnviNOx ® tail gas treatment technology, which is the industry benchmark for performance in terms of reducing N2O and NOx emissions.

The company is the world's largest licensor of nitric acid technology, has constructed more than 55 plants since 1980. In 1905, Dr. Friedrich Uhde, the company's founder, collaborated with Prof. Wilhelm Ostwald to design and build a pilot plant for the synthesis of nitric acid by burning ammonia with air in the presence of a catalyst. High reliability, profitability, and on-stream time are characteristics of the plants planned and built by ThyssenKrupp Industrial Solutions. Nowadays, shutdown times are mostly reserved for equipment checks and catalyst replacements.

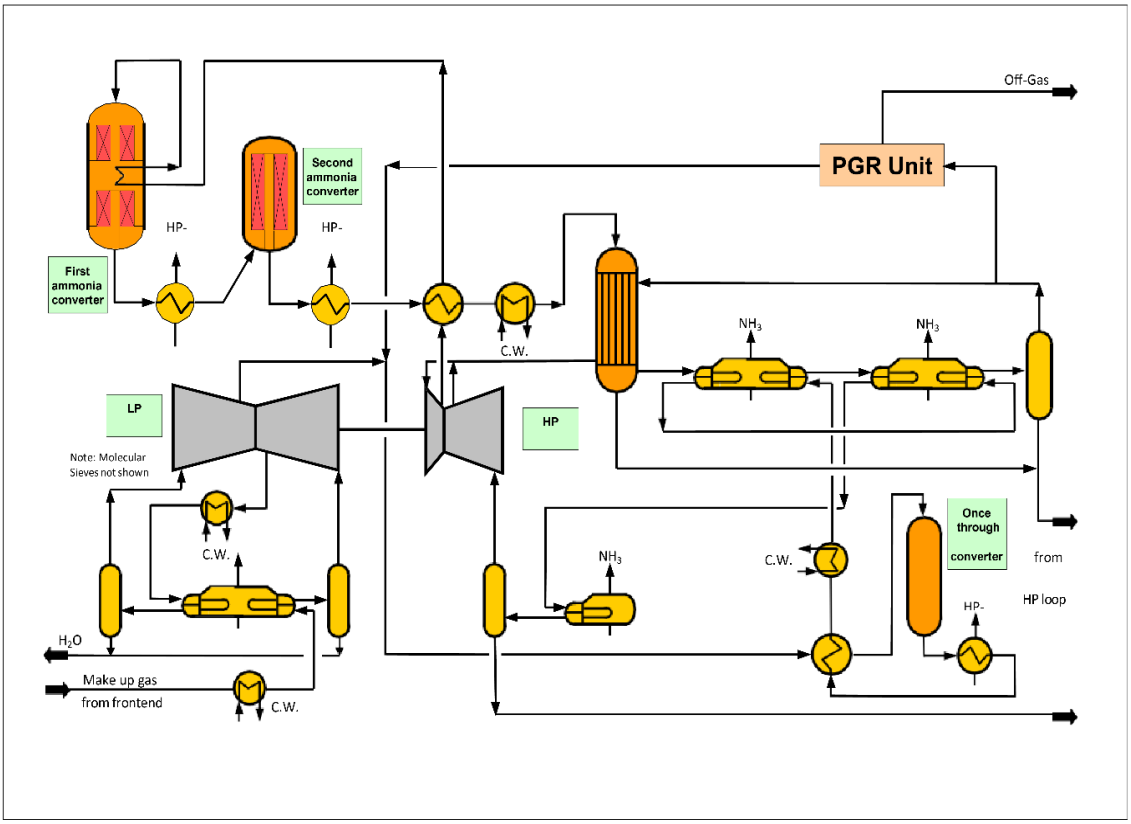
Nitric Acid Plants Installed capacity since 2000 **(World without China)**



Manufacturing Process-

- Ammonia is mixed with atmospheric air and converted to nitrogen oxides over a platinum/rhodium catalyst. The design of ammonia burner ensures the even distribution of reactants resulting in very high conversion efficiencies.
- Steam and hot tail gas is produced to recover the heat of reaction. Now, the hot tail gas and a part of steam is used in turbines that drive the plant compressors, and the rest of steam is exported.
- Now, the cooling of process gas below the condensation temperature leads to form the first nitric acid.

- The next step is absorption, took place in cooled absorption tower where nitrogen oxides are absorbed in water. The nitrogen oxides remaining in the tail gas are at a low concentration enhancing overall plant efficiency.
- After absorption, the remaining nitrogen oxides are treated in EnviNox tail gas treatment, to reduce the nitrogen oxides to very low level to meet the emission regulations.



Source: Thyssenkrupp

Technology	Features
Thyssenkrupp WNA	- high reliability and high on-stream time
	- easy maintenance
	- cost-effectiveness
	- energy efficiency
	- low emissions (BAT technology)

Weatherly Inc. (U.S) (KBR's Subsidiary)- Dual Pressure Nitric Acid Technology:

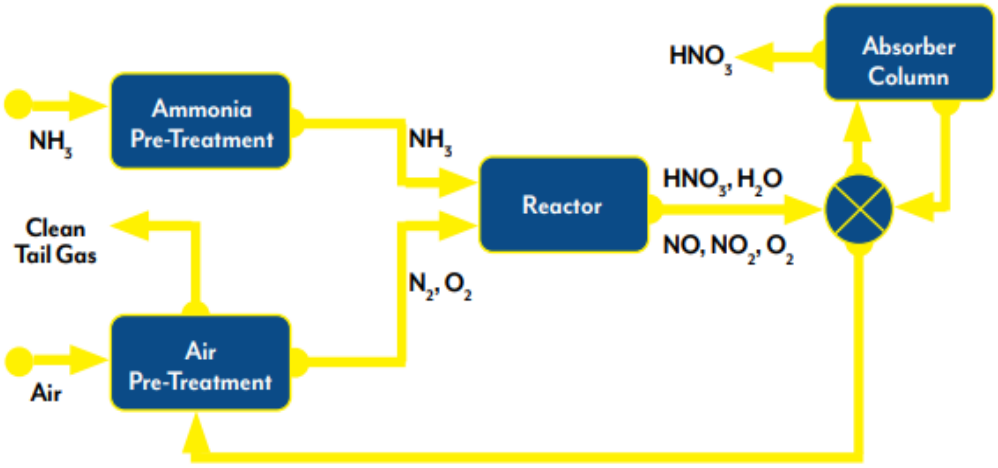
Raw material used for producing nitric acid is atmospheric acid and ammonia. Atmospheric air used in production of nitric acid must be filtered, compressed, heated, and filtered again. Approximately 90% of horsepower is extracted, needed for compression from heated tail gas which is a highly efficient design feature. Liquid ammonia is prepared separately by filtration, vaporization, superheating and

filtration again. After preparation of raw material, next stage is conversion and heat recovery. Next steps include the well mixing of air and ammonia and to evenly distribute over platinum catalyst. An exothermic reaction between ammonia and oxygen occurs which produce nitric oxide and water vapors. Now, the process gas is passed through the heat exchanger and major portion of reaction energy is recovered as heat and used to reheat the tail gas to provide power for the air compressor by driving a hot gas expander. The process gas is cooled and produced weak nitric acid. Before feeding into the absorption system nitric acid and remaining process gas are separated. Finally, nitric oxide, nitrogen dioxide, oxygen and water are combined in an absorber column, forming nitric acid of the desired strength.

Amount Per Metric Ton Acid (100% Basis) 250 MTPD	
Ammonia (100% basis) (m.ton)	0.2875
Gross Platinum Catalyst g	0.28
1900 kPag Steam Export (superheated to 360 °C) (m.ton)	<0.645>
Low Pressure Steam Import (m.ton)	0.0475
Boiler Feedwater (m.ton)	1.07
Steam Condensate Export (m.ton)	<0.0475>
Cooling Water (Cubic meters)	132.7
Turbine Condensate Export (m.ton)	<0.0278>
Electric Power 400 v (KWh)	8.34

Product Specifications

Particulars	
Concentration	Not less than 60 wt.% Nitric Acid
Dissolved oxides of nitrogen	Not more than 0.01 wt.% expressed as HNO2
Chlorides	Not more than 20 ppm w
Sulphates as H2SO4	Not more than 20 ppm w
Residue on ignition	Not more than 250 ppm w



Source: KBR

Technology	Features
Weatherly Inc.- WNA	Low capital cost – KBR's Weatherly technology operates at a higher
	pressure than competing processes, so equipment is smaller and less
	expensive, reducing the overall plant investment
	- High ammonia conversion – emphasizing clean raw materials, thorough mixing, even distribution and stable temperature, the design delivers extremely high ammonia conversion. Also, the catalyst basket design significantly enhances conversion. On average, the system maintains efficiencies of 95% or higher
	- Low catalyst cost – the process combines the latest development in platinum recovery systems with KBR Weatherly's high ammonia conversion resulting highly efficient platinum use
	- Low NOX emissions – KBR Weatherly's proven extended absorption design delivers superior NOX emissions performance; even lower emissions are possible by coupling with catalytic NOX reduction systems
	- Reduced maintenance cost – the vertical equipment arrangement minimizes piping runs and expansion problems, reducing maintenance expense
	- Minimal site area requirements – KBR Weatherly's plants are vertically oriented and utilize smaller equipment-site area demands are minimal
	- Energy recovery – KBR's plant design obtains energy recoveries as high as 5.23 GJ per metric ton (4,500,000 BTU per short ton). Each plant is customized to minimize costs

Weatherly Inc. (U.S) (KBR's Subsidiary)- Ammonium nitrate solution:

The interaction between ammonia and nitric acid results in ammonium nitrate.

The neutralizer's sparger is metered with ammonia vapour. Battery limits provide nitric acid to the neutraliser. Approximately 95–97% of the nitric acid is delivered to a sparger in the neutraliser under ratio control and pH trim. To neutralise unreacted ammonia that has left the neutraliser, the residual nitric acid is delivered to the scrubber. The neutralizer's output of ammonium nitrate overflows into the AN SURGE Tank.

A little amount of unreacted ammonia and steam that is released as a result of the heat of reaction created in the neutraliser are carried overhead into the scrubber. A packed bed in the scrubber comes into touch with these off-gases to apply diluted acidic ammonium nitrate. When the diluted AN solution is circulated back to the scrubber packing, the condensed water from the steam regulates the concentration of ammonium nitrate in the scrubber and, as a result, the neutraliser. The diluted AN solution is chilled externally in the circulating AN cooler. This diluted ammonium nitrate spills over into the primary neutraliser in part.

In the condensing section, which recovers process condensate for use as absorber feedwater in the nitric acid plant, the leftover off-gas and condensate from the vaporiser are subsequently transferred. The process condensate pumps, circulation condensate chiller, and vent scrubber make up the condensing section. The leftover process steam from the neutraliser and vaporiser comes into touch with the process condensate as it is cooled and circulated over a packed bed. Over the packed portion, the condensate is completely condensed, and the remaining inerts vent to the atmosphere as the condensate flows into the process condensate tank. The process condensate is then used as the feedwater for the absorber.

Amount Per Metric Ton AN- 300 MTPD	
Ammonia (100% basis) (m.ton)	0.2875
Nitric Acid (100% basis) (m.ton)	0.28
Electricity (kWh)	6.0
Cooling Water (Cubic meters)	15.0
345 kPag Steam Import (m.ton)	0.02
Steam Condensate Export (m.ton)	<0.02>
Process Condensate Export (m.ton)	0.284

Product Specifications

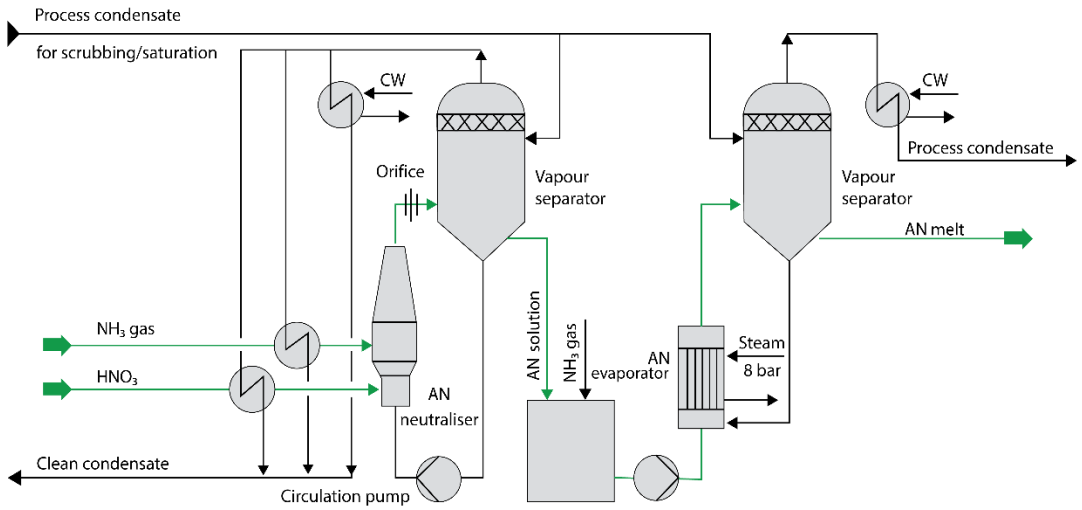
AN Solution: Concentration should be not less than 88 wt.% Nitric Acid.

Thyssenkrupp: Vacuum Neutralization and evaporation:

Ammonium nitrate is produced from gaseous ammonia and aqueous nitric acid in an exothermic reaction as follows:

$$NH3 + HNO3 \rightarrow NH4NO3 - 3HR$$

The reaction took place in a slightly pressurized and neutralizer to minimizing the ammonia loss by boiling in the mixing and reaction section. Now, the solution is flashed into a vacuum through a restriction orifice adjacent to the vapor separator and utilizing the reaction heat for water evaporation. To achieve 95 wt% solution concentration, feed of 60 wt% nitric acid is required but the ammonium nitrate concentration is limited to 92 wt% due to control and safety reasons.

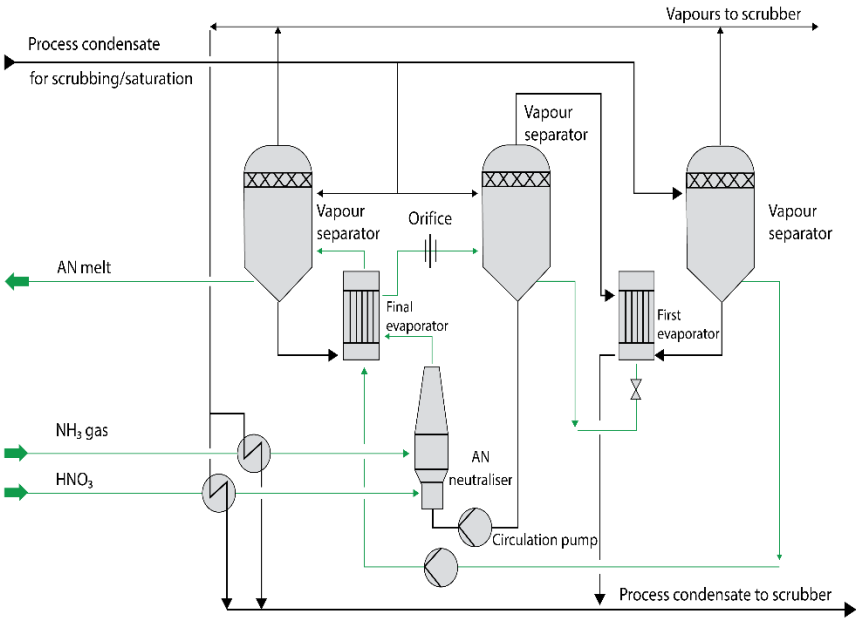


Source: Thyssenkrupp

Pressure neutralization:

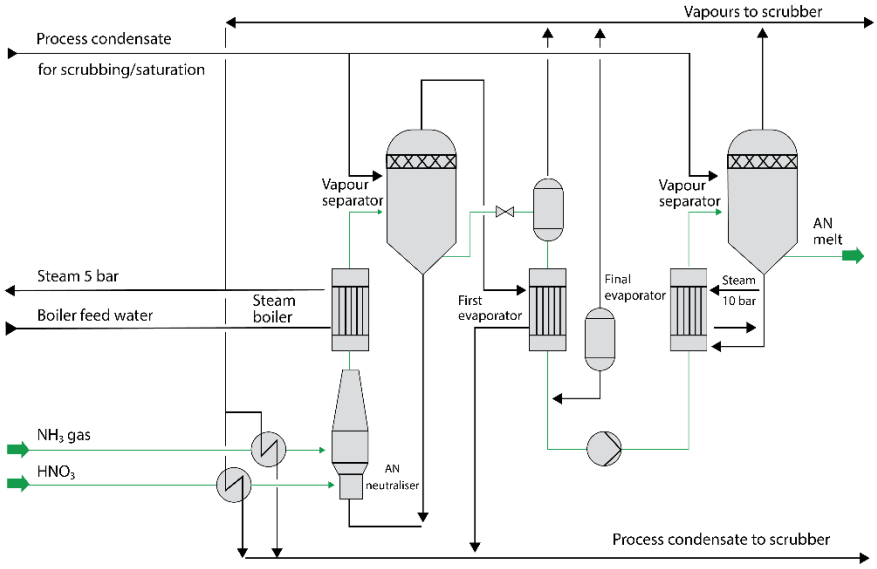
To utilize the heat of reaction more efficiently, the process vapor system operates above atmospheric pressure. Two major pressure neutralization alternatives for heat recovery are:

a) The heat stored in the ammonium nitrate solution, leaves the neutralizer used directly for the final concentration stage. There is no need to import additional steam even if 97 wt% concentration is required.



Source: Thyssenkrupp

b) For final concentration of ammonium nitrate solution, heating steam is imported while part of the heat of reaction is utilized to generate low pressure steam at approximately 5 bar abs.



Source: Thyssenkrupp

In both the above case, flash steam produced from the vapor separator at 2 – 4 bar abs are used for intermediate concentration of the weak ammonium nitrate solution and the remaining process vapors are used for feedstock preheating, surplus vapors are condensed. Depending on how the vapors condensate is to be used, some or all the vapors need to be scrubbed before condensation in a separate vapor scrubber.

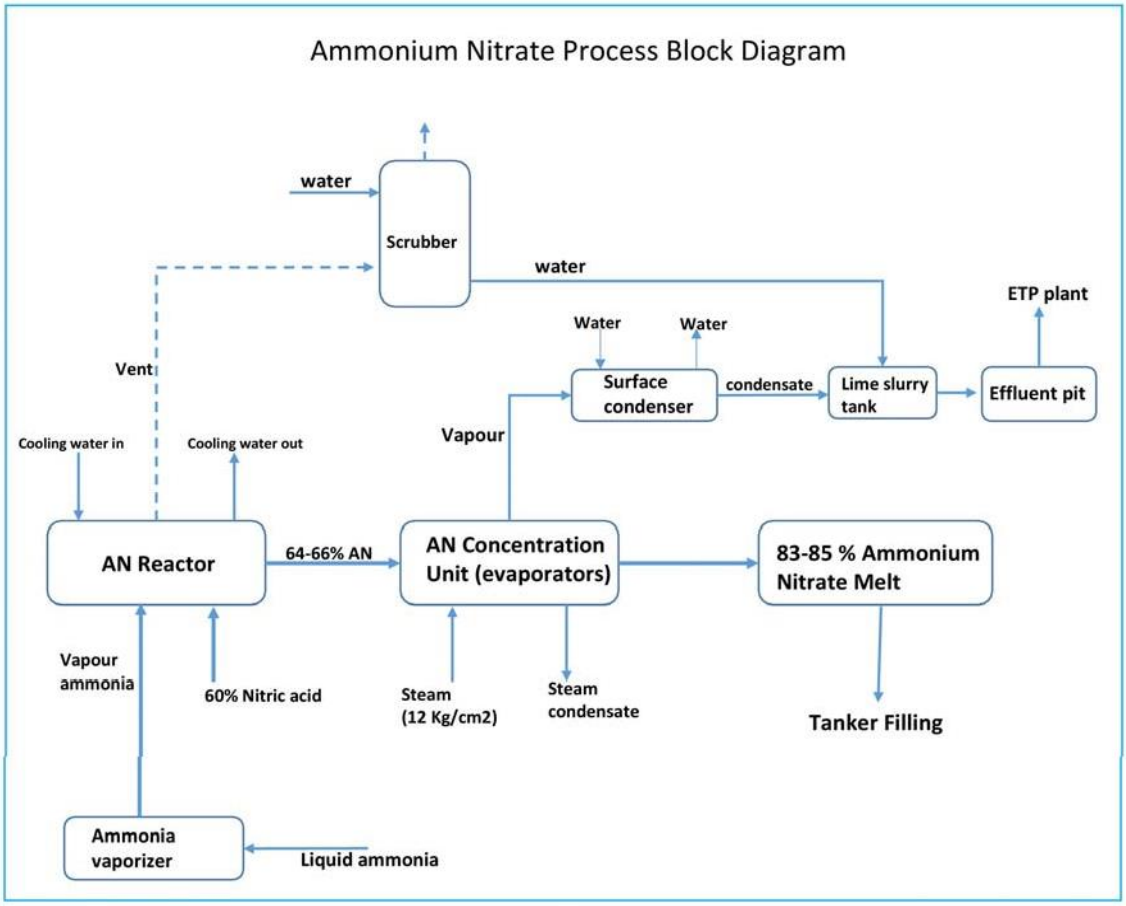
Technology	Features
Thyssenkrupp AN	- high reliability and high on-stream time
	- low maintenance by process design, low corrosion because of low temperatures
	- cost-effectiveness
	- excellent safety standards by process principle, design, and control
	- energy efficiency
	- very low liquid effluent contamination, virtually no gaseous effluents

Stamicarbon- ODDA Process:

Ammonia vaporizers and auxiliary vaporizers evaporate liquid ammonia that has been supplied from an ammonia plant. A shell and tube heat exchanger known as an ammonia vaporiser uses cooling water on the tube side to evaporate ammonia on the shell side. Ammonia super heaters use 2.5 kg/cm2 steam to heat the vaporised ammonia from ammonia vaporizers to 45 to 50C. The correct ratio of vaporised ammonia and nitric acid (60 percent concentration) is delivered to the reactor. A vertical back mixing reactor is the AN Reactor. The following reactions between ammonia and nitric acid result in 65 percent concentrated ammonia nitrate:

$$NH_3\ (g) + HNO_3\ (lq) = NH_4NO_3\ (lq) \text{ .....} \Delta H = -26.94 \text{ kcal/mole}$$

Exothermic is the nature of reaction. The cooling water removes heat produced during reaction. The reactor has three cooling zones, each of which is composed of a network of tubes filled with cooling water. Reactor temperature is kept between 60 and 65 degrees Celsius, and its pH is kept between 7.0 and 7.2. A holding tank that circulates with the reactor receives diluted ammonium nitrate (Dil. AN) (65%) from the reactor. Level control valves are used to keep the reactor's level constant. Dil. AN is pumped from the holding tank to the buffer tank (Dil. AN storage tank). Gases leaving the reactor are scrubbed using a connection between the reactor vent and scrubber.



Source: RCF EIA report

Casale SA: AN2000TM:

The AN2000™ is the process to produce ammonium nitrate solution (ANS), based on Casale's pipe reactor technology.

Preheated ammonia and nitric acid feeds are mixed in a specially designed tubular reactor at 7 - 8 bar pressure. Instant formation of ammonium nitrate occurs by releasing a significant amount of heat. Finally, the hot ammonium nitrate solution enters a vessel/separator where the steam is released vigorously from the solution and the liquid ammonium nitrate solution is collected from the bottom of vessel and sent to storage.

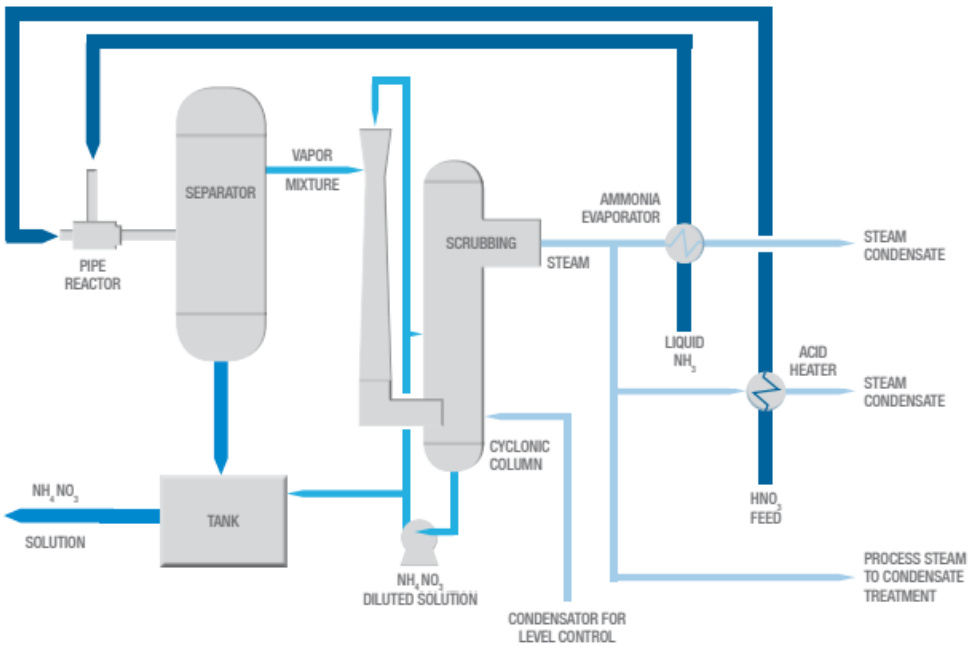
While collecting steam from the tubular reactor, it carries some mist of ammonium nitrate solution and traces of ammonia vapors which is eliminated by multiple process:

- Scrubbing: In the Venturi-type scrubber, the process steam is de-superheated, and an acidic scrubbing liquor is fed through a sprayer and a reaction occurs with the ammonia traces present in the process steam. A Cyclonic Column is present at the downstream of venturi-type scrubber, which is responsible for the recirculation of the liquor.

To recover the ammonium nitrate aerosol, the de-superheated process steam passes through a set of high efficiency demisters before the steam leaves cyclonic column. The excess of scrubbing

liquor generated from the cyclonic column is directly discharged to the ANS solution tank or the pipe reactor.

The steam leaving from the scrubbing system is used to preheat the nitric acid feed, to vaporize and superheat the ammonia feed and to clean the concentrated process condensates.



Source: Casale

Technology	Features
Casale SA- TAN	- Higher safety, due to the reaction zone's intrinsically low residence time
	- Low OPEX, since highly concentrated ANS is directly obtained without any concentrator
	- Low CAPEX, due to reduced equipment compared to traditional process
	- Easy and fast start-up and shutdown
	- Clean process condensate recovery with AN concentration less than 30 ppm

Effluent & Emissions and Technologies Available

Leakage of ammonia from storage tank / plant:

- In case of vapors leakage, water must be sprayed to mitigate the vapor loss which may leads to increase the quantity of effluent.

- Generally, effluents are not allowed to discharge into the storm water drain but if required in any case of emergency then the storm water drain must be equipped with bund/barrier so that it won't allow the effluent to pass further and can be treated lately.

- Ammonia should be neutralized immediately on transferring of contaminated effluent to ETP, and a person should be there to monitor the ammonia level near the gates.

- If in case, contamination is more than the Threshold Limit Value (TLV) i.e 25 PPM, the chief emergency controller must inform police to initiate the off-site emergency.

- All the associated valves must be isolated and tanker unloading must be stopped if there any.

- All the pumps also to be stopped.

Process of mitigating effluent:

-Ammoniacal Loop:

Source- NH3/AN/ANP/MeOH/IPA Plants

Pollutants – Ammoniacal and Nitrate Nitrogen

Ammoniacal nitrogen is removed by volatilization of the gaseous Ammonia into air with help of Stripper.

NH3 + H2O---->ammonium ion + hydroxyl ion.

After removing ammoniacal nitrogen, effluent contains mainly nitrates

-Nitrate Loop:

Source- ANP/AN/WNA/CNA/Tank Farm.

Pollutant- Nitrate Nitrogen

Nitrates in the wastewater are removed by biological treatment. Nitrate reduction can be achieved by Aerobic and Anaerobic process. In our ETP, we are using anaerobic process for nitrate reduction.

-De-nitrification:

The process by which microorganisms reduce nitrate ions to nitrogen gas.

The process of Nitrate dissimilation occurs through a complex series of reaction catalyzed by enzymes.

General Reaction- Nitrates Nitrites Free N2

- **List of hazardous waste:**

Sr. No.	Name of waste	Source of generation	Disposal Method
1	Discarded containers, drums	Receipt, storage, and handling of raw/packing materials	Collection in drums, storage and transportation to authorized recyclers /authorized TSDF
2	Used/Spent Oil	Process / rotary machines / transformers	Collection in drums, storage, transportation and sales to authorized recyclers.
3	Spent Catalyst	Process	Regeneration / Recycle through catalyst supplier
4	Nox abatement Spent Catalyst	Nitric Acid Plant	Collection in drums, storage and transportation to authorized recyclers /authorized TSDF.
5	Chemical sludge from wastewater treatment	Wastewater treatment schemes	Chemical Sludge from wastewater treatment scheme is being disposed to cement plants for co-processing / TSDF, Udaipur
6	Contaminated cotton waste or other cleaning materials	Maintenance and cleaning activities	Collection, storage and transportation to Common incinerator

Government standards for ammonium nitrate and weak nitric acid effluent:

S. No.	Parameter	Standards			
		Inland surface water	Public sewers	Land of irrigation	Marine coastal areas
1	Ammonical Nitrogen (as N), mg/l Max.	50	50	--	50
2	Free ammonia (as NH3) mg/l, Max	5	--	--	5

S. No.	Industry	Parameter	Standards
1	Nitric Acid	Oxides of Nitrogen	3 kg/tonne of weak acid (before concentration) produced

Government Policies and Regulatory Issues

Ammonium Nitrate Rules, 2012

The Ammonium Nitrate Rules, 2012 was established by Government of India in the Ministry of Commerce and Industry (Department of Industrial Policy and Promotion) under the Explosive Act, 1884.

The definition of Ammonium Nitrate as per the rule is mentioned below:

"Ammonium Nitrate" means the compound having the chemical formula NH4NO3 and includes any mixture or compound having more than 45 percent Ammonium Nitrate by weight including emulsions,

suspensions, melts or gels (with or without inorganic nitrates) but excluding emulsion or slurry explosives and non-explosives emulsion matrix and fertilizers from which the Ammonium Nitrate cannot be extracted by any physical or chemical process.

Scope of Applicability of Rules and Exemptions:

1. These rules are applicable all over India for regulating the manufacturing, conversion, import, export, stevedoring, bagging, transport, and possession for sale or use of the Ammonium Nitrate.
2. Nothing in these rules shall apply to the possession, use, transport or import or export of Ammonium Nitrate by –
    a) any of the, Armed Forces of the Union and Ordnance Factories or other establishments of such Forces for own use in accordance with the rules or regulations made by the Central Government.
    b) the Indian Railways and its authorized carriers while acting as carrier.
    c) the Port authority.
    d) any person employed under the Central Government or State Government in exercise of any power under the Act or these rules.
3. Nothing in these rules shall apply to the possession and use of ammonium nitrate of quantity not exceeding five kilograms by the established laboratories, educational institutions, medical institutions, hospitals and health clinics for scientific and educational purpose: Provided the local police is informed of the quantity under possession for the aforesaid purpose

General Provisions

Control over manufacture, conversion, stevedoring and bagging, import, export, transport, possession for sale or use of Ammonium Nitrate:

No person shall undertake manufacture, conversion, stevedoring, import, export, transport or possess for sale or use Ammonium Nitrate except as authorized or licensed under these rules.

Pre-requisite for grant of license: No license shall be granted unless all the relevant provisions laid down under these rules and all conditions contained in the license forms under Part-2 of Schedule II annexed to these rules are complied with:

Provided that all the existing manufacturers, converters, users, transporters, stevedores, sellers, possessors, importers and exporters shall apply for license within six months and shall comply with the provisions of these rules within a period of one year from the date of publication of these rules.

General Restrictions:

Restriction on manufacture - The Ammonium Nitrate shall not be manufactured at any place other than the place indicated in the licence.

Restriction on storage and conversion; -

a) The Ammonium Nitrate storehouse shall not be located in populated areas.

b) No Ammonium Nitrate shall be converted at any place except at converter's premises duly licensed.

c) No person shall extract Ammonium Nitrate from any fertilizer including by any chemical or physical process.

Restriction on bagging and possession for sale or use:

a) No person shall undertake bagging and possession for sale or use Ammonium Nitrate except under conditions of a licence granted under these rules at a licensed store house as specified therein.

b) No person shall store, process, deliver, receive, handle or transport any Ammonium Nitrate contaminated fully or partially with any organic material, metal powder or scraps, or sulphur, phosphorous etc.

Restriction on import or export:

a) No person shall import or export any Ammonium Nitrate except under and in accordance with the conditions of licence granted under these rules.

b) No Ammonium Nitrate shall be imported or exported except at its ports notified by the Central Government.

c) The Ammonium Nitrate shall not be imported into India by Sea except through the ports which are duly approved for this purpose by the Ministry of Shipping and Transport, Government of India, in consultation with the Chief Controller and declared as Customs Ports by the Commissioner of Customs.

d) The Ammonium Nitrate imported into India by sea shall not be stored in the port.

Restriction on transport:

a) The Ammonium Nitrate shall not be transported with any other explosives, inflammable substances, oil, gases, carbonaceous matter, etc.

b) No Ammonium Nitrate shall be transported in any carriage vessel plying for or carrying passengers on hire.

Restriction on delivery or dispatch:

a) No person shall deliver or dispatch any Ammonium Nitrate to anyone other than a person who-

   i. is the holder of a licence to possess the Ammonium Nitrate or the agent of a holder of such a licence duly authorised by him in writing on his behalf; or

   ii. is entitled under these rules to possess the Ammonium Nitrate without a licence.

b) The Ammonium Nitrate so delivered or dispatched shall in no case exceed the quantity at any point of time for which the person is holding a licence under these rules.

c) No person shall receive Ammonium Nitrate from any person other than the holder of a licence granted under these rules.

Restriction on use:

Ammonium Nitrate shall not be used for blasting either alone or in combination with other ingredients unless permitted under the Explosives Rules, 2008.

Packing of Ammonium Nitrate:

No person shall import, export, transport, possess or sell Ammonium Nitrate unless;

a) it is duly packed in a suitable waterproof bag or container or is suitably bagged by converter;
b) the container or package is marked in accordance with the provisions of rule 8;
c) the packages conform to the relevant standard of Bureau of Indian Standards or other standards accepted and approved by the Chief Controller; and
d) the packages of Ammonium Nitrate for export or import conform to the requirements of the tests as specified under International Maritime Dangerous Goods Code (hereinafter referred to as the IMDG Code in these rules) or United Nations recommendations on the transport of Dangerous Goods.

Marking on Ammonium Nitrate packages:

Each bag or container containing Ammonium Nitrate shall be marked in conspicuous indelible characters, by means of stamping or painting with-

a) the words "Ammonium Nitrate";
b) purity in percentage;
c) the name, address and licence number of manufacturer or converter or importer;
d) identification number of the package or bar coding;
e) the net weight of Ammonium Nitrate;
f) gross weight of the package;
g) date of bagging and batch number;
h) name, address, licence number and unique identification number of stevedoring agent, if any.

The bags shall be serially numbered with date of bagging by means of stencilling, bar-coding, by RFID tags or any other means by the manufacturer or importer as directed by the Chief Controller.

Restriction on unauthorized persons, provision of guards and safety distance for storehouse:

The premise used for manufacture of the Ammonium Nitrate or conversion of melt into solid form of Ammonium Nitrate or vice versa and the storehouse shall be surrounded by a wall of at least two meters height of such strength and construction as to effectively prevent entry of unauthorized persons.

The Ammonium Nitrate storehouse shall maintain;

i. for storage not exceeding 30 MT, safety distance of 4.5 meters from store house to the compound wall and 45 meters from any protected works;
ii. for storage exceeding 30 MT, safety distance of 9 meters from storehouse to the compound wall and 90 meters from any protected works;

the storehouse may be adjacent to the bagging unit of the manufacturing, conversion or explosives or nitrous oxide manufacturing plants, but shall observe the provisions of clauses (i) and (ii) of sub-rule (a) of rule 4.

The storehouse shall be;

i. constructed at ground level without any mezzanine floor, upper floor or any basement;

ii. with the floor (plinth) level not less than forty five centimeters from the ground level and well ventilated;
iii. with at least 23 centimeters thick walls built of brick or stone mortar, or concrete with roof of RCC or Asbestos or Fibre or GI sheet;
iv. with sufficient number of doors made of steel of minimum three millimeters thick and opening outwards;

Any store house used for possession for sale or possession for use of Ammonium Nitrate shall have a floor area not less than one square meter per 2.5 MT of Ammonium Nitrate and the store house holding capacity shall not exceed 5000 MT storage:

Provided that one stack of bagged Ammonium Nitrate shall not exceed 500 MT and a minimum clearance of 2 meters shall be maintained between the adjacent stacks and at least 0.6 meters wide gangway shall be maintained between the stacks and the walls of the store house:

Provided further that the maximum stack height shall not exceed 4.0 meters from the floor level and the same shall be prominently marked on the walls of the store house.

The storage tank meant for storage of Ammonium Nitrate melt shall be –

i. constructed of stainless steel or any other compatible material according to sound engineering practice conforming to a national or international code accepted by the Chief Controller and adequately insulated and supported so as to ensure safety and stability during loading and unloading of Ammonium Nitrate melt into or from such storage tank;
ii. with a secondary containment in the form of dyke enclosure made of cement concrete and its holding capacity shall not be less than the capacity of largest tank situated within such enclosure;
iii. observing safety distance of 4.5 meters within the compound wall and plant facilities and 45 meters from any protected works;
iv. with single storage tank capacity not exceeding 200 MT; and
v. provided with a suitable hard stand adjacent to it for loading and unloading and such a hard stand shall be located so that its centre maintains a minimum safety distance of 4.5 meters all around.

Provisions for manufacture, conversion, possession, sale, and use of Ammonium Nitrate

Safety and Security Management Plan:

A person intending to manufacture, convert, bag, possess for sale or use, transport, import or export Ammonium Nitrate shall submit Safety and Security Management Plan to licensing authority and to the District Authority with the security aspect duly vetted by the police authorities for approval.

Every person engaged in the manufacturing factory shall be imparted training in safety and security aspects by competent persons periodically during manufacture, handling, transportation, and storage of the Ammonium Nitrate and records of such trainings shall be maintained in the factory.

Provisions for import and export of Ammonium Nitrate

Import of Ammonium Nitrate:

1. Ammonium Nitrate shall be imported by the importer only in bagged form and for captive consumption only and the importer shall authorize licensee having valid licence in Form P2 for suitable packing if required.
2. The P2 Licensee shall maintain records of Ammonium Nitrate received and dispatched to each importer to ensure accountability, identification and traceability and file returns.
3. The imported Ammonium Nitrate shall be immediately removed from the port to the licensed storehouse in form P2 situated beyond 500 meters from the port notified area and the Ammonium Nitrate shall be dispatched from the licensed storehouse only in bagged form and each bag of Ammonium Nitrate shall be marked in accordance with rule.
4. Declaration by importer - A person holding an import licence granted under these rules shall furnish a declaration to the licensing Authority and the Chief Controller.
    a) in Form R-3 under Part of Schedule II as soon as ship carrying Ammonium Nitrate sails from the port of loading.
    b) in Form R-4 under Part 3 of Schedule II as soon as any shipment of Ammonium Nitrate is cleared at the port of import.
5. Declaration by master of ship or by the ship's agent-
    a) the master or every ship carrying Ammonium Nitrate or the agent for such ship shall give the Conservator of the port not less than forty-eight hours' notice of its intended arrival at the port.
    b) the master of every ship carrying Ammonium Nitrate shall deliver to the pilot before entering any port, a written declaration in Form CE-1, under Part 4 of Schedule II, provided that if in anticipation of a ship's arrival, the agent for such ship delivers to the Conservator of the port a written declaration, as aforesaid under his signature, no such declaration needs to be made by master of the ship.
    c) Every declaration delivered to a pilot under clause (b) of sub-rule (5) shall be made over by him without delay to the Conservator of the port and all declarations received by the Conservator of the port shall be forwarded by him, with all convenient despatch to the Commissioner of Customs.
6. Restrictions on import by air: The Ammonium Nitrate shall not be imported by air.

Export of Ammonium Nitrate:

1. **Restrictions on export by air** - The Ammonium Nitrate shall not be exported by air.
2. **Declaration by exporter or his agent** - The exporter or his authorised agent shall give notice to the conservator of the port before forty-eight hours that he intends to bring the Ammonium Nitrate to port for export and shall not bring the Ammonium Nitrate to any part of the port without prior permission in writing from the said officer.
3. Export of Ammonium Nitrate shall only be in the bagged form and marked in accordance with the provisions of rule 9.

Provision for transport of Ammonium Nitrate - General

Procedure to be followed during transportation:

Every consignment of Ammonium Nitrate or Ammonium Nitrate melt transported shall be accompanied by a pass issued by the consignor in Form R-11(b) of Part-3 of schedule II.

The pass shall be attached to the waybill, invoice or bill of entry or dispatch note as the case may be.

General requirements and documents to be available during transport

1. The Ammonium Nitrate or Ammonium Nitrate melt shall be transported only by consignors holding valid license in Form P-4.
2. The tanker for transportation of Ammonium Nitrate melt shall be:
   i. constructed of stainless steel or any other compatible material, properly and adequately insulted according to sound engineering practice conforming to national or international code accepted by the Chief Controller and secured or mounted over a vehicle chassis ensuring total safety and stability during transportation;
   ii. with gross carrying capacity of such Ammonium Nitrate melt tanker not exceeding the maximum load limit prescribed by the Road Transport Authority for such vehicle;
   iii. with inlet and outlet valves of such construction and design to permit its secured locking and sealing; and
   iv. with vent pipe(s) suitably covered to prevent pilferage of the product.
3. The Ammonium Nitrate shall not be transported along with any other material including hazardous material.

Provision for possession, sale or use of Ammonium Nitrate

Possession in licensed premises:

1. A person holding license for possession of Ammonium Nitrate granted under these rules shall store the Ammonium Nitrate only in the premises specified in the license.
2. The premises in which Ammonium Nitrate is kept shall be used only for possession and sale or use of such Ammonium Nitrate and for no other purposes.
3. No person shall sell Ammonium Nitrate from any premises other than those licensed under these rules.
4. The Licensed storehouse shall be kept securely closed or locked except when Ammonium Nitrate is taken in or taken out.
5. The keys of the Licensed storehouse shall be kept in the license holder's custody or with his authorized agent and shall be produced for opening the storehouse whenever so required by the inspecting officer.
6. The name, address and passport size photograph of the authorized agent with whom the keys will be kept shall be furnished to the licensing authority and the district authority having jurisdiction.

Quantity of Ammonium Nitrate to be purchased in a given period of time:

A license holder for possession, sale or use of Ammonium Nitrate in and from a storehouse shall purchase only such quantity of Ammonium Nitrate in a given period as may be specified in the license.

Grant or refusal of approval, license, amendment, transfer, and renewal

Grant of a License:

1. The license issuing authority, on being satisfied with the documents received for grant of license, in the Form specified in Schedule II and after making such inquiry, if any, as it may consider necessary, shall object to the other provisions of the Act and these rules, by order in writing either grant the license or refuse to grant the same.
2. License for transport of Ammonium Nitrate or Ammonium Nitrate melt in Form P-4 shall be granted only to the valid license holders in Form P1, P-2, P-3, or P-5.
3. The licensing authority may verify the facilities of the licensed premises and on satisfaction shall endorse the license.
4. The licensing authority, if necessary, may impose additional conditions to the license.
5. The District Authority may refer to the Chief Controller for seeking any expert opinion, if required.

Licenses And Licensing Authority

Form of license	Purpose for which granted	Licensing Authority
P-1	License to manufacture and possess for sale of Ammonium Nitrate or convert melt to solid and vice versa and possess for sale of Ammonium Nitrate	Chief Controller or Controller authorized by Chief Controller
P-2	License to bag and store Ammonium Nitrate	Chief Controller
P-3	a) License to possess for sale or use of Ammonium Nitrate from a store house not exceeding 30 MT; or	District Authority
	b) License to possess for sale or use of Ammonium Nitrate from a store house exceeding 30 MT; or	Chief Controller or Controller authorized by Chief Controller
	c) License to possess for use of Ammonium Nitrate from a store house attached to explosives manufacturing/Nitrous Oxide manufacturing unit; or	Chief Controller or Controller authorized by Chief Controller
	d) License to possess for use of Ammonium Nitrate for agriculture purpose from a storehouse	District Authority or Officer authorized by District Authority

P-4	a) License to transport Ammonium Nitrate for licenses granted by District Authority for possession for sale or possession for use; or	District Authority or Officer authorized by District Authority
	b) License to transport Ammonium Nitrate for licenses granted by the Chief Controller or Controller for possession for sale or possession for use.	Chief Controller or Controller
P-5	a) License to import Ammonium Nitrate; or b) License to export Ammonium Nitrate	Chief Controller

License Forms

Form No.	**Purpose**
P-1	License to manufacture and possess for sale of Ammonium Nitrate or convert melt to solid and vice versa and possess for sale of Ammonium Nitrate
P-2	License to bag and store Ammonium Nitrate
P-3	a) License to possess for sale or use of Ammonium Nitrate from a store house not exceeding 30 MT; or b) License to possess for sale or use of Ammonium Nitrate from a store house exceeding 30 MT; or c) License to possess for use of Ammonium Nitrate from a store house attached to explosives manufacturing/Nitrous Oxide manufacturing unit; or d) License to possess for use of Ammonium Nitrate for agriculture purpose from a storehouse
P-4	License to transport Ammonium Nitrate
P-5	a) License to import Ammonium Nitrate; or b) License to export Ammonium Nitrate

Application Forms

Form No.	**Purpose**
A-1	Application for license to manufacture and possess for sales of Ammonium Nitrate or convert melt to solid and vice versa and possess for sale of Ammonium Nitrate
A-2	Application for license to bag and store Ammonium Nitrate
A-3	Application for a) License to possess for sale or use of Ammonium Nitrate from a store house not exceeding 30 MT; or

	b) License to possess for sale or use of Ammonium Nitrate from a store house exceeding 30 MT; or c) License to possess for sale or use of Ammonium Nitrate from a store house attached to explosives manufacturing/Nitrous Oxide manufacturing unit; or d) License to possess for sale or use of Ammonium Nitrate for agricultural purposes from a storehouse.
A-4	Application for license to transport Ammonium Nitrate
A-5	Application for license to a) Import Ammonium Nitrate; or b) Export Ammonium Nitrate

References: https://www.dgms.net/Ammonium%20Nitrate%20Rules%202012.pdf
https://peso.gov.in/web/ammonium-nitrate-amendment-rules-2021

Note: *Major amendments (as of August 2021) has been mentioned above. For other details regarding the amendments refer to: https://peso.gov.in/web/ammonium-nitrate-amendment-rules-2021*

Rules for explosives supplier:

- Pricing and Marking:
    - The packing and marking of goods should be according to explosives rules, acts and PESO guidelines.
- Invoice should be quoted in reference to running contract number, date and subsequent amendments, if any, for any change in price, extension of delivery dates.
- No supply should include any order or orders against the running contract invoice.
- A self-attested copy of valid PESO license and valid DGMS certificate should attached with running contract of supply of explosives accessories.
- Following certificate should be attached, whichever is applicable:
    - In case of consignee vans:
        - Van number and date of dispatch must be mentioned to the consignee.
        - An acknowledgement memo and materials details acknowledged by consignee, or his representative of the same date as above must be attached.
        - Other claims must be as per purchase order and schedule to the same.
    - In case of suppliers' vans:
        - Van number and date of dispatch must be mentioned to the consignee.

        - An acknowledgement memo of the same date as above and materials acknowledged must be attached.
        - Other claims must be as per purchase order and schedule to the same.
- Along with acknowledgement memo, voucher mentioned in the certificate must be attached with each invoice.
- The explosives should be transferred through PESO approved vans.

- Supply of extra quantity:
    - If an RC holder, failed to supply the cartridge explosives or accessories, the balanced/unsupplied quantity may be cancelled/reduced from the RC holder after giving due notice to him. The cancelled quantity must be re-distributed among RRC holders and other suppliers, as the case may be, with in that subsidiary company.
    - The extra quantity must be supplied on ex-stock basis and the opportunity must be given to RC holder, if they failed to meet the said quantity then to RRC holders. The extra quantity, distributed among the RC/RRC holder may be done preferably in equitable manner but suppliers are must to ensure that the supplies must not be delayed on this ground. The subsidiaries have the liberty to procure extra supply from any/all the RC/RRC holder.
    - If the required amount exceeds 40% of the RC quantity and RC holder is not able/willing to supply, the subsidiary company may allocate the additional quantity to RRC holder.
    - From the date of issue of first allocation the RRC holder shall commence the supply within 15 days.

- Liquidated Damages
    - The buyer has the following rights if the supplier fails to comply with the terms and conditions or fails to deliver or despatch the goods or equipment by the specified length of time or date as stated in the supply order:
        - For each week or portion of a week during which the delivery of such stores may be delayed, up to a maximum of 10% of the total contract value, to recover from the successful bidder as agreed liquidated damages a sum not less than 0.5% of the cost of any equipment/stores that the successful tenderer has not been able to supply as stated, or
        - To make a different purchase after giving the winning bidder due notice and at their own risk, such as purchasing similar items elsewhere without cancelling the supply order for the consignment that isn't yet ready for delivery, or
        - to revoke the supply order, all or part of it, and, if desired, to acquire the stocks and/or equipment at the risk and expense of the defaulting provider and also,
        - To extend the delivery window with or without a fee if deemed appropriate and fit. If a penalty is assessed, it cannot exceed the previously mentioned agreed-upon liquidated damages.

    - To forfeit the security deposit fully or in part.
    - The buyer shall be entitled to recover any amount owing to and payable by the supplier under this contract by appropriating a portion of it or the entire amount and subtracting any amount that may later become due to the winning tenderer under this or any other contract. The winning tenderer must give the buyer the remaining balance immediately if the amount is insufficient to cover the entire amount that can be recovered. The provider won't be eligible for any profit from such a purchase.
  - The basic for destination price must be taken into account when determining the liquidated damages amount. Taxes and tariffs are not taken into account for determining LD.
- Risk Purchase:
  - The consignee or its subsidiaries have the right to purchase the stores from another supplier after giving the defaulting supplier due notice, at the risk and expense of the defaulting supplier, if the supplier fails to deliver or despatch the stores within the stipulated date/period of the supply order or in the event that any of the terms and conditions mentioned in the supply order/contract are broken. The supplier's earnest money deposit, security deposit, performance security, bills submitted against the same contract, any other contract pending in the same subsidiary Co., and/or in any other, may be used to cover the cost of the risk purchase exercise in the event of the supplier's failure as described above.

  - Risk purchase action may be initiated by subsidiary companies under any of the following conditions:

    - Even after extending the delivery period, the supplier still failed to provide the materials.
    - When the supplier ignores buyers' requests for the materials and refuses to offer any justification that is thought to be genuine for the supply delay.
    - When the provider fails to properly fulfil an order because they have violated one or more terms and conditions of the supply order or contract.

Rule for Vendor Registration

1.Tenderers shall offer duly insulated Stainless Steel (SS) Tankers with a Minimum carrying capacity of 24 MT and offer minimum 7 tankers.

The offered Tankers shall be owned by the respective Tenderers. The mode of ownership may be under Firm or Partner or Company or Proprietor. The tenderers may also offer tankers owned by others

provided they submit an Affidavit on Non-Judicial Stamp Paper from the owner of each of those tankers declaring the attachment of Tanker with the tenderer for the entire period of this contract with IOCL.

Note: If the same tanker is offered by more than one bidder, none of the bidders claim for the said tanker(s) will be considered.

2. All tankers offered by the tenderer should be in their name i.e., Firm or Partner or Company or Proprietor.

3. Age (As mentioned in RC book) of Tankers offered shall not exceed 15 years as on the closing date of bid submission. All offered Tankers should have valid RTO registration.

4. The tenderer shall submit a self-declaration on letter head that Tankers offered shall comply with all statutory provisions under Ammonium Nitrate Rules 2012 apart from relevant provisions under MV Act and shall also fulfil any other requirements specified by Ammonium Nitrate Suppliers viz. RCFL.

5. Earnest Money Deposit for tenders is waived against submission of Bid Security Declaration (in letter head) from bidders in lieu of EMD. Bidders must submit Bid Security Declaration as per attached format.

The tenderer is required to upload readable documents. Notwithstanding any other condition / provision in the tender documents, bidders are required to submit complete documents pertaining to PQC along with their offer. Failure to meet the PQC will render the bid to be summarily rejected. IOC reserves the right to complete the evaluation based on the details furnished by the bidder, with or without seeking any additional supporting documents / clarifications.

Time Schedule of Total Project including all milestones