



TECNICAS REUNIDAS



espindesa

## AMMONIUM NITRATE SOLUTION

Ammonium Nitrate (AN) Solution is widely used as feedstock for the production of fertilizers or civilian explosives, being able to be used directly in liquid form, or processing it further to obtain a solid product.

When selecting an ammonium nitrate solution plant there are a number of choices to be made:

The first one would be the type of reactor, whether pipe reactor or recirculation reactor.

The neutralization reaction pressure selection is of paramount importance firstly to ensure a safe operation, as well as to maximize the reuse of the process steam produced in the neutralization stage, in order to improve the energy balance of the plant.

The well proven technology, as well as the Flexibility to adapt to client requirements, are the key advantages of the ESPINDESA process.



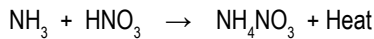
# AMMONIUM NITRATE SOLUTION

The required quality of Ammonium Nitrate Solution can be obtained by means of ESPINDESA process.

## PROCESS DESCRIPTION

### Neutralization Zone

Ammonia gas is mixed with nitric acid in a reactor, where the following reaction takes place:



This neutralization reaction is done under a precise control of the ratio of each reactant, in order to achieve the optimum performance in the reactor, by performing a perfect mixing of the reactants and ensuring a safe operation.

This neutralization is an exothermic reaction that produces a great amount of heat, which is used to increase the temperature of the AN solution, while generating process steam, that can be used within the process.

The ammonium nitrate solution and the generated process steam are disengaged in the reactor. The resulting ammonium nitrate solution, with a concentration ranging from 78 – 92% depending on the operating pressure selected, is collected in a holding tank, from where it can be sent either to storage or to further concentration.

### AN Solution Concentration Zone

In order to concentrate the Diluted AN Solution up to 96%, the Ammonium Nitrate is sent to a falling film evaporator, which operates under vacuum conditions.

The diluted ammonium nitrate solution feeding the Falling Film Evaporator falls wetting the walls of the exchanger tubes. The steam produced during the AN solution concentration goes to a separator prior to be sent to a Scrubber, and the concentrated AN solution leaves the bottom of the Falling Film Evaporator and is collected in holding tank, from where it will be pumped to the final consumer.

### Process Steam/Condensate zone

The AN content of the process steam (reactor process steam and falling film process steam) is lowered by a liquid washing of the process steam done in two stages in a Scrubber: first by washing this steam in a packing bed with diluted ammonium nitrate solution and later it is washed in several special trays using condensate as washing fluid.

The process steam leaving the scrubbers is then, if possible, used within the plant and the rest of process steam is condensed and collected in a Vessel. This process condensate is further used by different consumers within the plant and the remaining condensate will be sent out of the plant for further use.

To improve the ammonium nitrate recovery within the plant, the purge of the scrubbers is recycled back the process.

### Typical Operating Consumptions, per ton of product (as 100% AN basis)

Ammonia	213 kg
Nitric Acid	789 kg

## PROCESS FLOW DIAGRAM

