Ammonium Nitrate Plants Capacity Increasing

Nitrogen + Syngas 2019
International Conference & Exhibition

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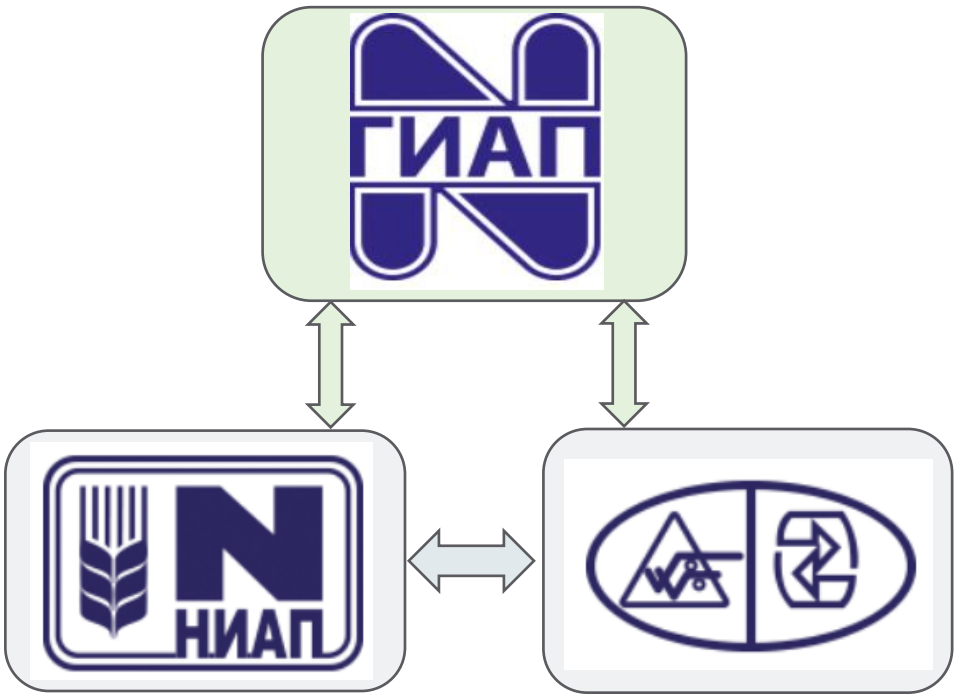
ALVIGO

ALVIGO Group of Company

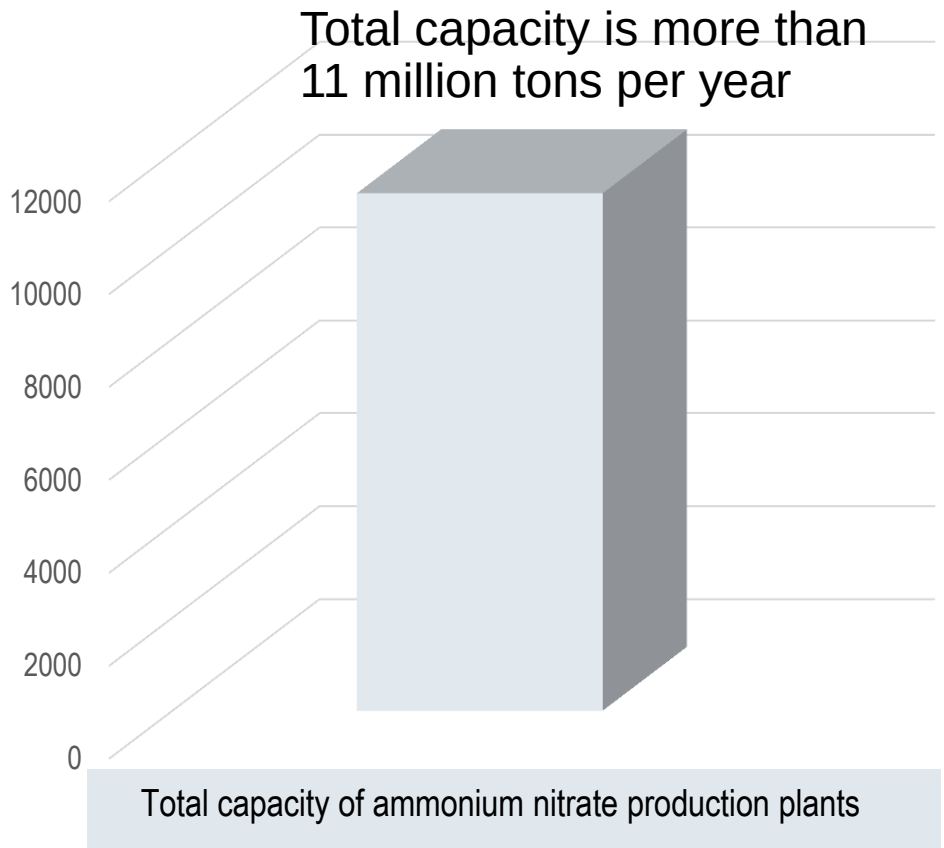


- JSC GIAP was founded in 1931;
- At present GIAP is included in ALVIGO Group of Company;
- ALVIGO is a group of Design Institutes, united in a single management complex;
- It also includes NIAP LLC and Khimtekhnologiya, Ltd design institutes;
- Activity of ALVIGO is focused on the production of ammonia, methanol, ammonium nitrate, nitric acid, acetylene, acetic acid, and other products of chemical industry.

Ammonium Nitrate Production Experience

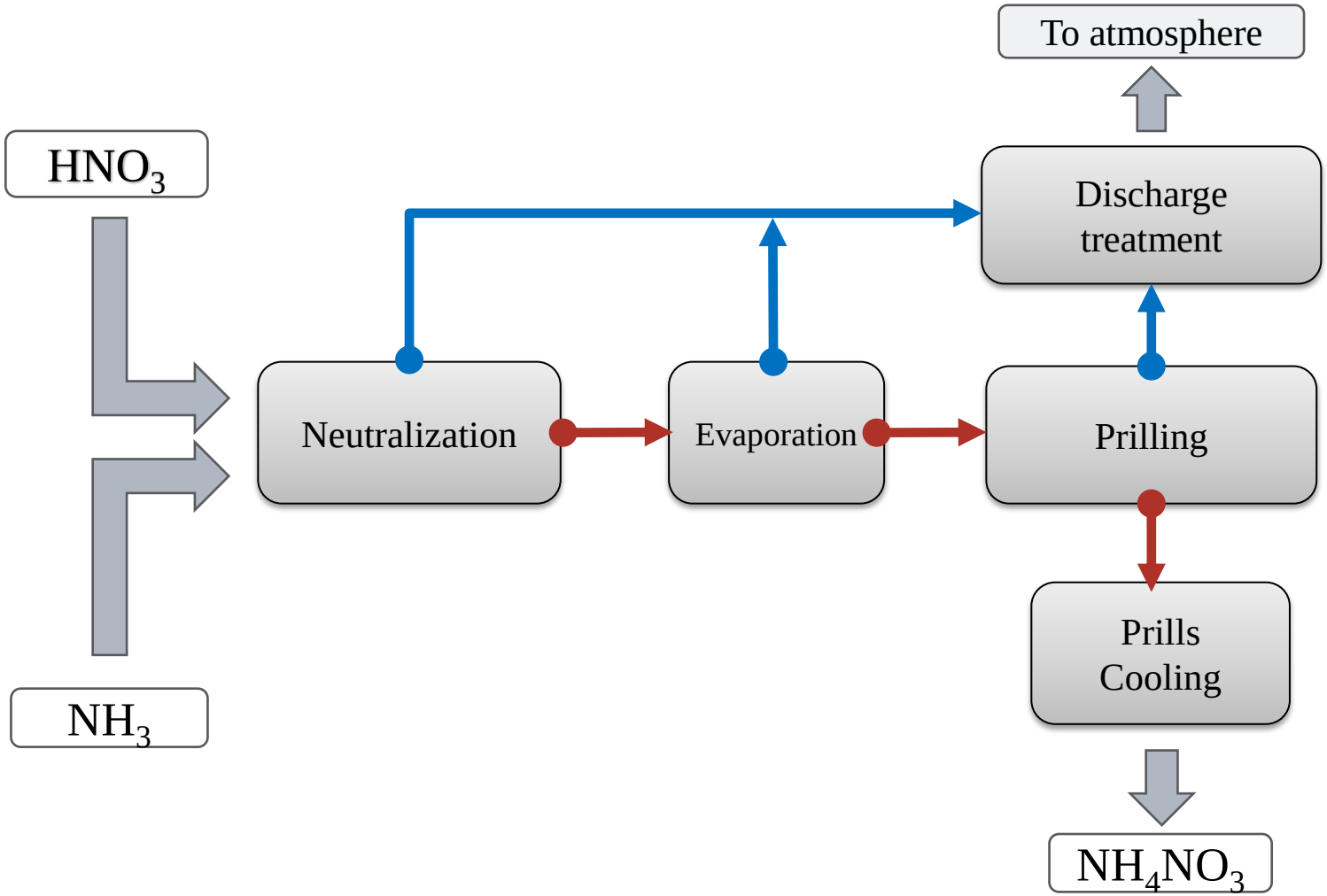
GIAP has designed 50+ ammonium nitrate production plants:

- ✓ AC-50 (4 plants)
- ✓ AC-60 (26 plants)
- ✓ AC-67 (7 plants)
- ✓ AC-72 and AC-72 M (16 plants)

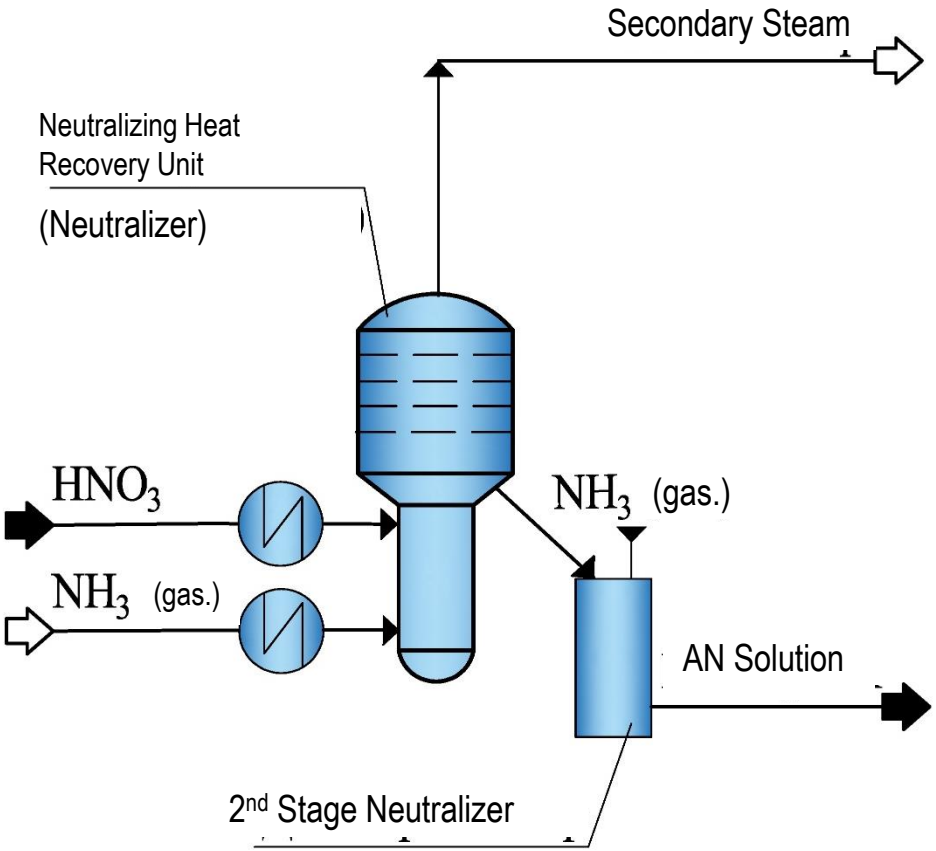


Ammonium Nitrate Technology

Prilled Ammonium Nitrate Process Stages

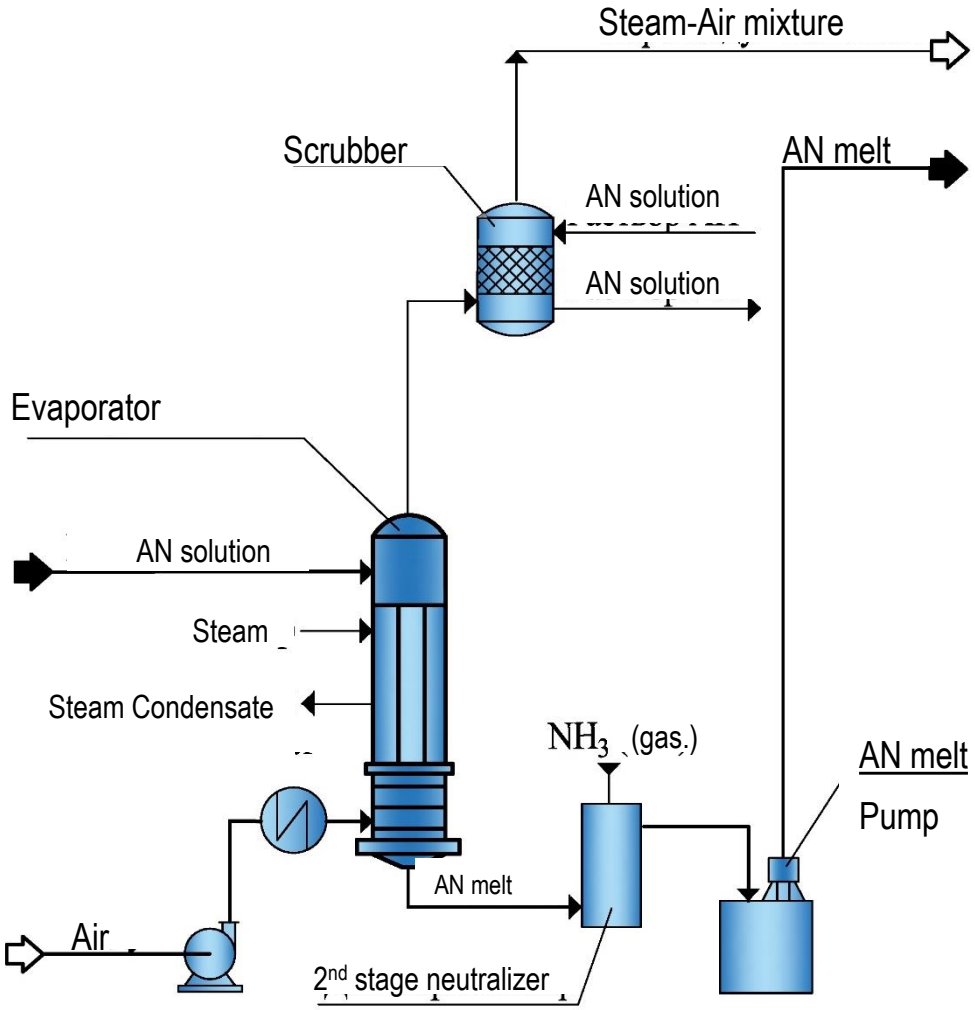


Neutralization Stage



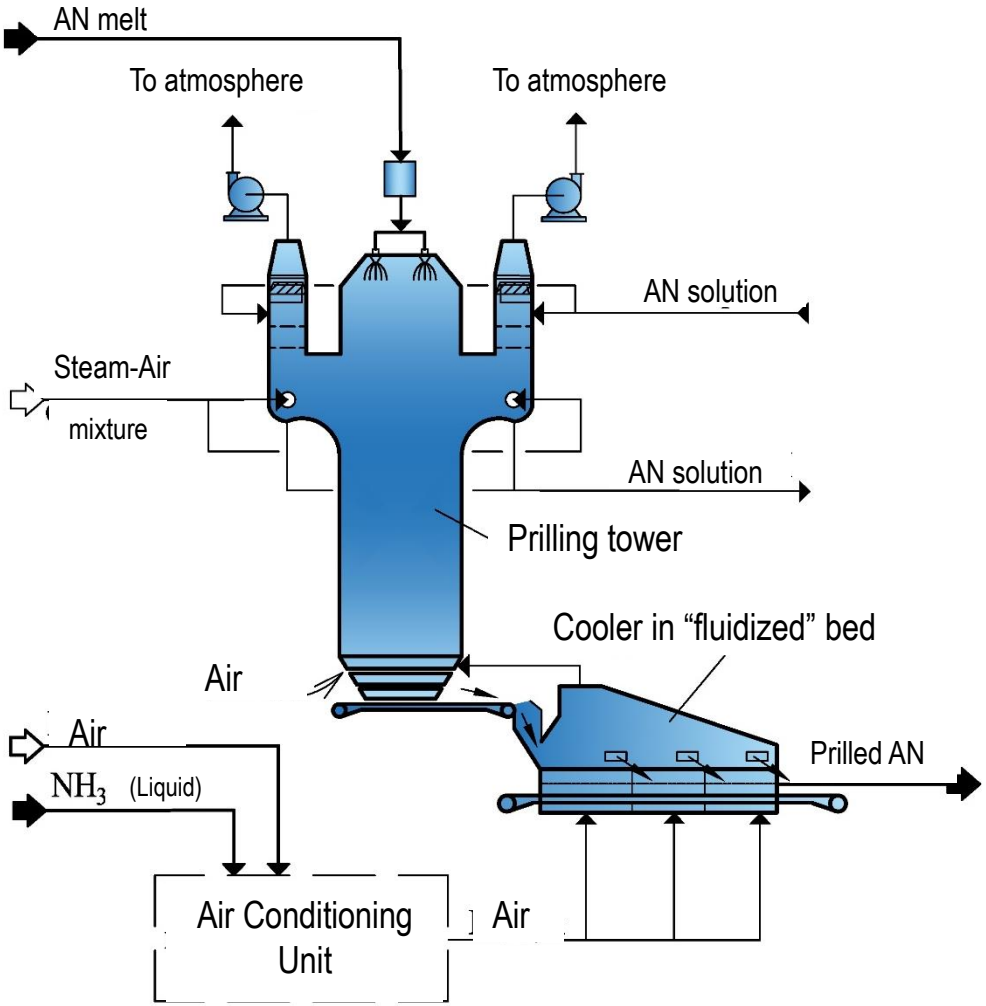
- Pressure of neutralization process is atmospheric;
- Natural circulation in vessel;
- Process is conducted with an excess of nitric acid;
- Local treatment of secondary steam;
- Concentration of solution at outlet is 89-93% wt.

Evaporation Stage



- Production of ammonium nitrate melt is in one stage at atmospheric pressure;
- Residual moisture content in melt is not more than 0.3 % wt;
- There is no necessity to locate evaporator unit on the top of prilling tower.

Prilling and Cooling Stage



- Prilling unit is a metallic tower of rectangular section
- Prills cooler is a 3-section device of “fluidized” bed
- High efficiency system of atmospheric discharge treatment

Quality Parameters of Finished Product

Parameter Name	GOST 2-2013 Grade B (higher grade)	Finished Product
Mass fraction of nitrogen, %, not less than	34.4	34.5-34.6
Mass fraction of water, %, not more than	0.3	0,2
Grain-size distribution:		
Mass fraction of prills:		
- from1 to 4 mm, %, not less than	95	98
- from 2 to 4 mm, %, not less than	80	85±5
- less than 1 mm, %, not more than	3	1
- more than 6 mm, %, not more than	0	0
Static strength of prills, calculated as prill, N/prill (kg/prill), not less	8 (0.8)	12(1.2)
Friability, %, not less than	100	100

Consumption Indices per 1t of Product

Name	Unit	Consumption with operational losses
Raw Material		
Gas Ammonia (100% NH_3)	kg	213
Nitric Acid (100% HNO_3)	kg	787
Utilities		
Saturated Steam P=1.5 MPa G	t	0.3
Circulating Water	m^3	7
Electrical Energy	kWh	25

AC-72 Plants
Capacity Increasing

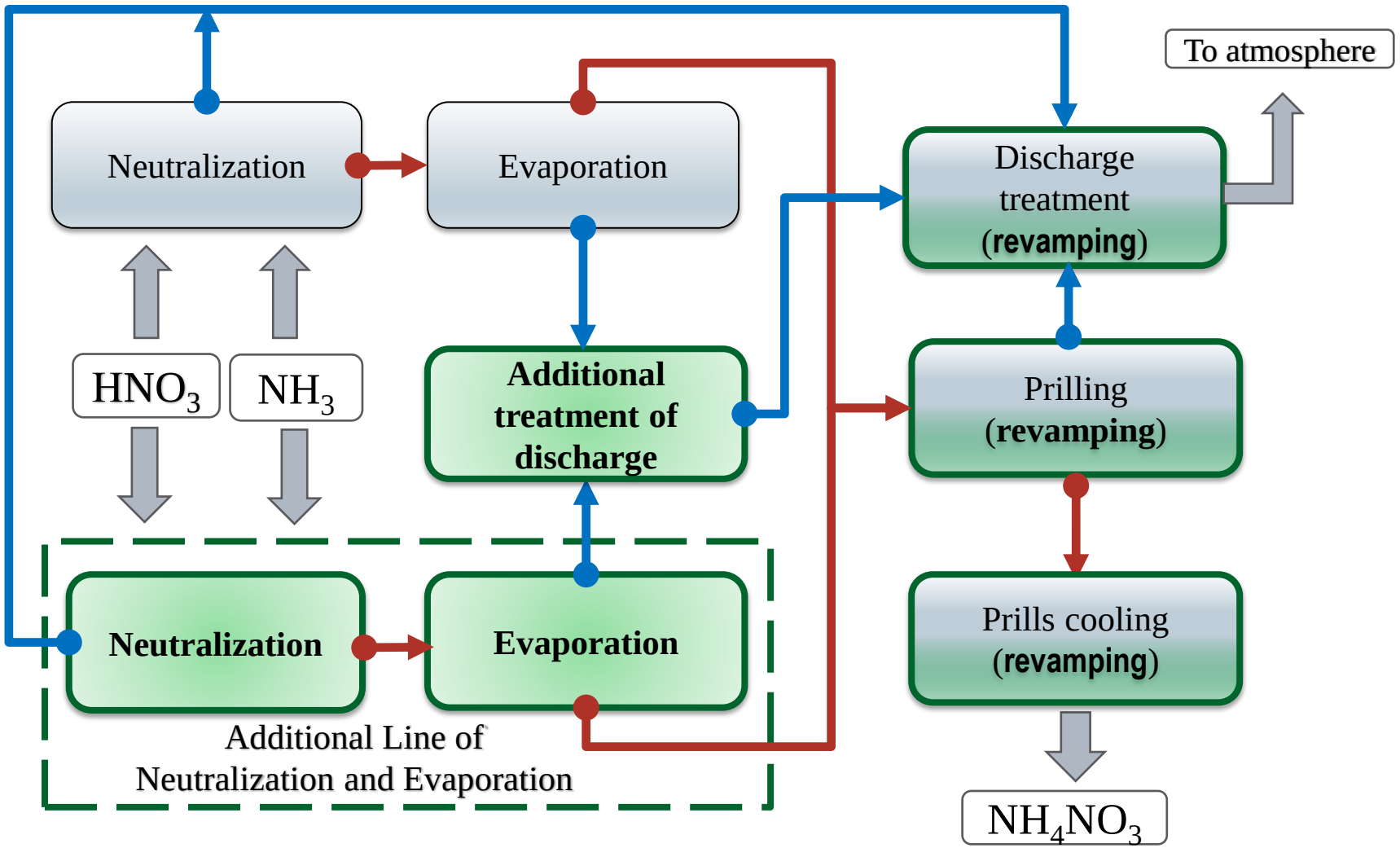
AC-72 Plants Capacities

Design Capacity
1360 tpd

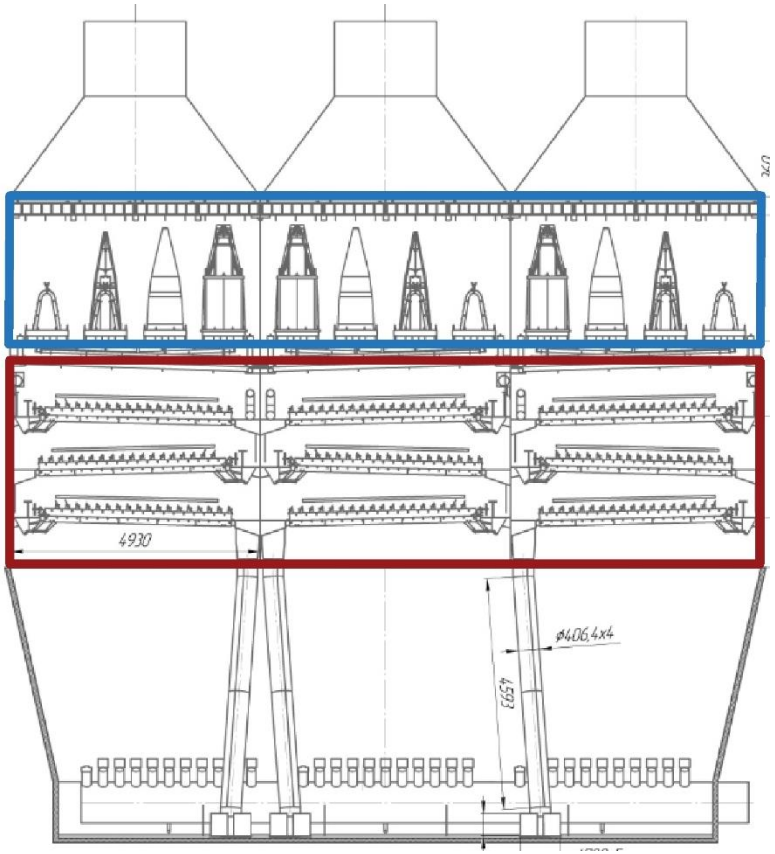
Achieved Capacity
1600 tpd

After Revamping
2200-2400 tpd

Revamping Scheme of AC-72 Plants



Air Treatment Scrubber Revamping of AC-72 Plants



2 stage – filtering treatment for entrapping of fine particles and ammonium nitrate aerosols

1stage – scrubber part with sieve trays

Main Revamping Parameters of AC-72 Plants

Parameter Name	Before Revamping	After Revamping
Plant Capacity, tpd	1600	2200-2400
Impurity Content in Air Discharged, mg/m^3:		
NH_4NO_3	> 100	30-50
NH_3	> 40	10-15

Track Record of Ammonium Nitrate Plants Revamped

Year	Customer	Services	Capacity, tpd
At progress	KuibyshevAzot, Togliatti, Russia	Ammonium nitrate granulation plant	2300
At progress	KemerovoAzot, Kemerovo, Russia	Revamping of AC-72/1,2 plants with c capacity increasing	2300
2018	Acron, Dorogobuzh, Russia	Revamping of AC-72/1,2 plants	2300
2017	FosAgro-Cherepovets, Cherepovets, Russia	Revamping of discharge treatment system	1800
2015	UralChem, Kirovo-Chepetsk, Russia	Revamping of AC-72 plant with capacity increasing and reduction of atmospheric discharge	2100
2007	Neochim, Dimitrovgrad, Bulgaria	Revamping of AC-72 plant with capacity increasing and reduction of atmospheric discharge	2150

Thank you for attention