НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ
И ПРОЕКТНЫЙ ИНСТИТУТ
КАРБАМИДА

JSC NIIK's best solutions on the way to reach food safety: 1 million TPY Urea Unit based on JSC NIIK's process

НИИК

December 2025

NIIK AS A TECHNOLOGY CENTRE

TECHNOLOGY DEVELOPMENT – BUSINESS CORE

115+ proprietary patents

TECHNOLOGY IMPLEMENTATION – ENGINEERING & PROCUREMENT

500+ implemented projects

COMPETENCES ARE A KEY VALUE

500+ employees across 5 locations

MARKET RECOGNITION

122+ Customers worldwide

OUR CAPABILITIES

- R&D
- TECHNOLOGY LICENSING
- DESIGN & ENGINEERING
- EQUIPMENT DESIGN AND PROCUREMENT
- CONTROL AND SUPERVISORY ENGINEERING
- EQUIPMENT AFTERSALES SERVICES
- TESTING FACILITY / LABORATORY

PRODUCTS

- UREA + CO_2
- HYDROGEN + CO_2
- AMMONIA + CO_2
- MELAMINE
- NITRIC ACID
- AMMONIUM NITRATE
- METHANOL
- UAN
- AUS 32 for SCR
- ANHYDROUS CALCIUM NITRATE
- COMPOUND FERTILIZERS

FROM TECHNOLOGICAL

SOVEREIGNTY

TO TECHNOLOGICAL

LEADERSHIP

SERVICES

CONSTRUCTION OF UREA UNIT BASED ON JSC NIIK'S PROCESS

LICENSE,
PDP/FEED

EQUIPMENT PROCUREMENT

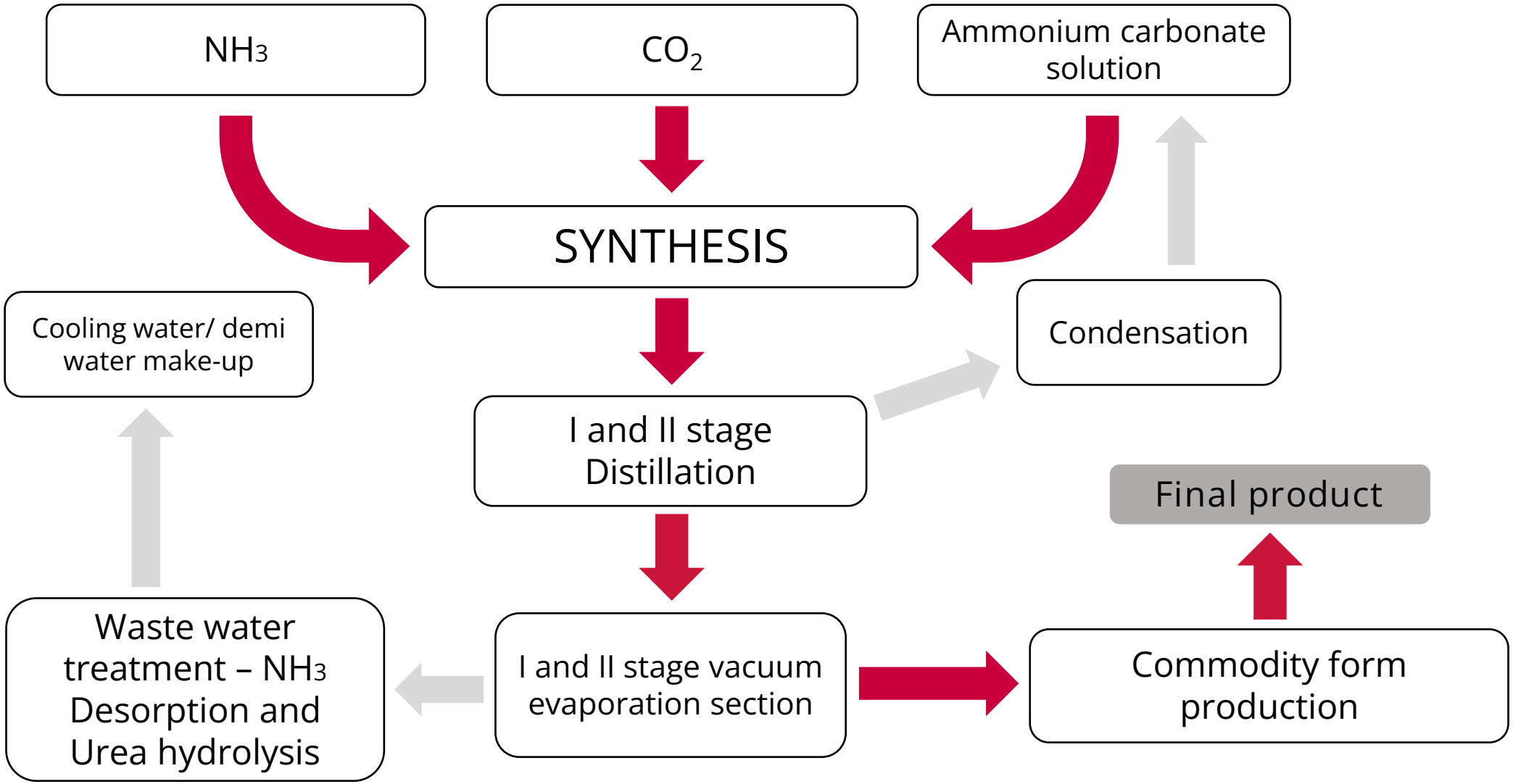
DEVELOPMENT OF PROJECT DOCUMENTATION IN ACCORDANCE WITH REGULATION REQUIREMENTS

CONSTRUCTION SUPERVISION IN ACCORDANCE WITH REGULATION REQUIREMENTS

OBTAINING APPROVAL OF ALL KINDS OF EXPERTISES

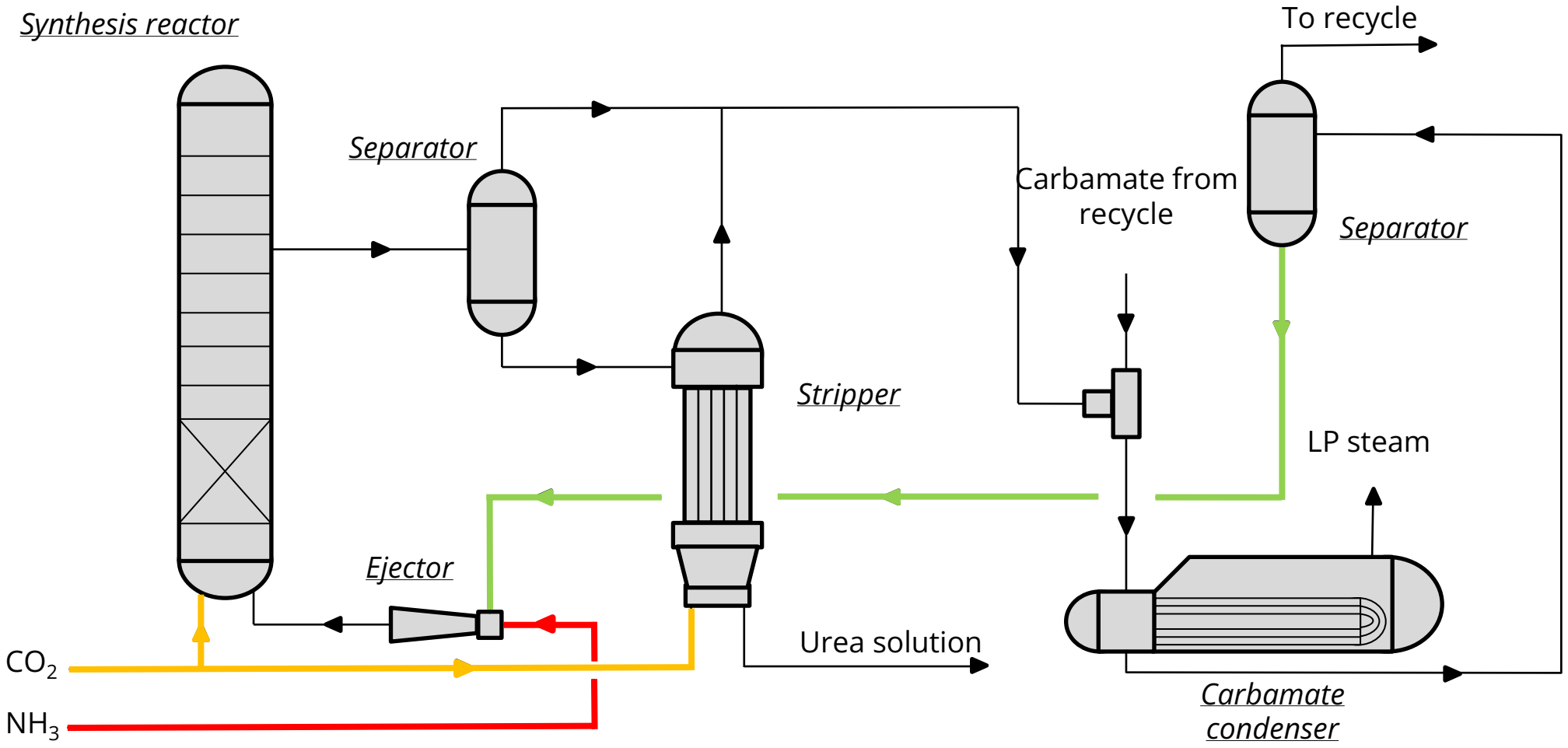
DETAIL ENGINEERING

UREA UNIT FLOW DIAGRAM



URECON® Stripping 3000. SYNTHESIS SECTION. LICENSED SOLUTIONS

Patent for invention no.2811862 “Method and plant for urea production”
Priority date of invention: February 16, 2023. State registration: January 18, 2024.



ADVANTAGES OF STRIPPING PROCESS

01 INCREASED VOLUME OF THE SYNTHESIS SECTION

02 MORE EFFICIENT SYNTHESIS DUE TO RECYCLE OF UNREACTED SUBSTANCES IN THE FORM OF GAS

03 A MINIMUM QUANTITY OF WATER IS RETURNED TO SYNTHESIS - CONTRIBUTING TO A MAXIMUM CONVERSION DEGREE

04 DECREASED PARTIAL PRESSURE OF AMMONIA VAPORS IN GAS PHASE CONTRIBUTES TO STRIPPING PROCESS AT A LOWER TEMPERATURE

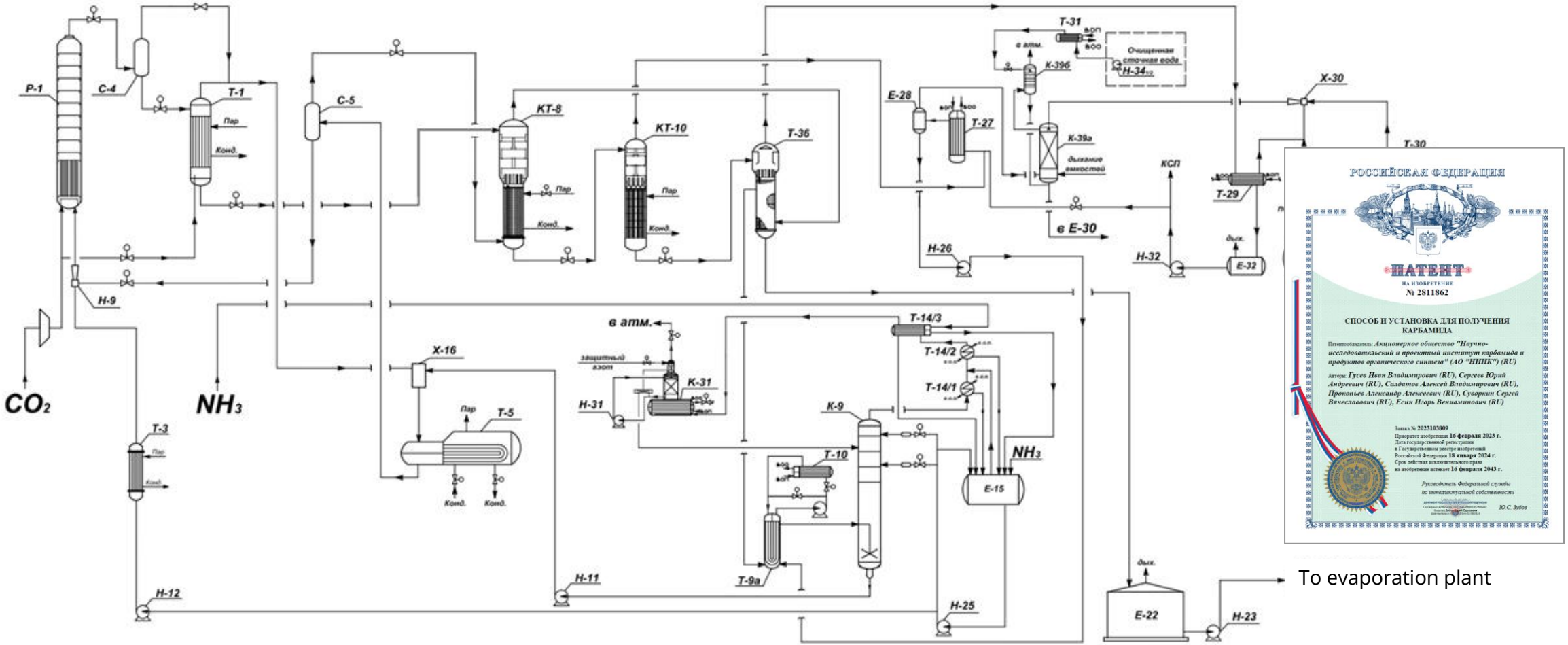
05 INCREASED SERVICE LIFE OF EQUIPMENT

06 DECREASED CORROSION EFFECTS TO EQUIPMENT DUE TO CO_2 SUPPLY TO THE STRIPPER

07 POSSIBILITY TO USE EJECTORS INSTEAD OF PUMPS

08 AMMONIUM CARBAMATE IS FORMED AT HIGHER TEMPERATURES ALLOWING STEAM TO BE PRODUCED UP TO 4.5 ATA FOR OWN NEEDS (UP TO 60 TPH)

PROCESS FLOW DIAGRAM BASED ON URECON® STRIPPING 3000 PROCESS



TECHNOLOGY READINESS LEVEL AS PER ISO 16290:2013 – TRL 9

URECON® STRIPPING 3000 PROCESS. KEY ADVANTAGES

- High performance reserve and a wide range of stable operation at over-design changes in process parameters, flexibility in control.
- NIIK offers solutions with vertical reactor models and improved designs of stripper and HP condenser. The vertical arrangement significantly reduces the space required for installation.
- Use of available 25-22-2 urea-grade steel ensures a balance between capital costs and reliability of equipment operating in the highly corrosive environment of urea production.

CONSUMPTION RATES COMPARISON

Index	Meas. Unit	Process				
		Liquid Recycle	New processes			
			TEC	Saipem (Snamprogetti)	Stamicarbon	JSC NIIK's URECON® Stripping 3000
Ammonia flow rate	kg/t	575,0	570,0	570,0	570,0	569,0
Steam	Gcal/t	0,860	0,805	0,664	0,986	0,733
Electricity (if the compressor has an electric motor)	kWh/t	150,0	140,0	160,0	150,0	140,0-160,0
Cooling water	m^3/t	125,1	85,1	71,0	110,0	95,0

LICENSED SOLUTIONS

Set of internals for the synthesis reactor

Set of sectionalizing mass-exchanging trays

- Decrease of longitudinal mixing
- Increase of efficient mixing in the space between the trays

Conversion booster

- High conversion degree of carbamate

Vortex mixer

- Complete mixing of source raw material


РОССИЙСКАЯ ФЕДЕРАЦИЯ

ПАТЕНТ

НА ИЗОБРЕТЕНИЕ

№ 2261141

ВНУТРЕННЕЕ УСТРОЙСТВО РЕАКТОРА

Патентообладатель(и): Открытое акционерное общество "Научно-исследовательский и проектный институт карбамида и продуктов органического синтеза" (ОАО НИИК) (RU)

Автор(ы): см. на обороте

Заявка № 2004121511

Приоритет изобретения 13 июля 2004 г.

Зарегистрировано в Государственном реестре изобретений Российской Федерации 27 января 2005 г.

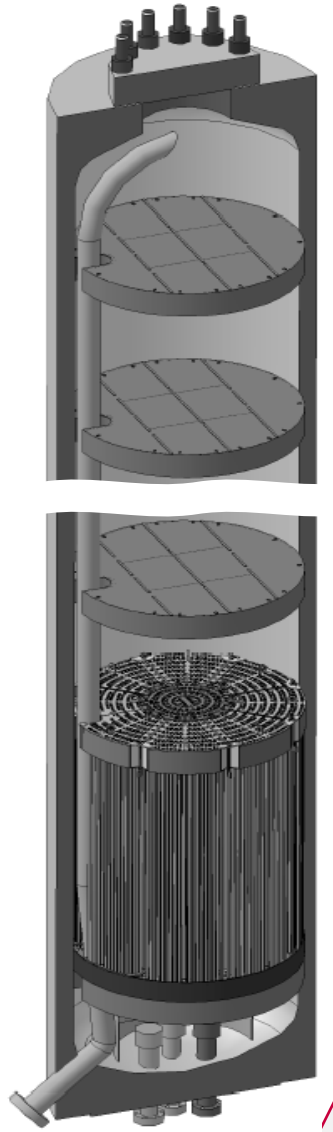
Срок действия патента истекает 13 июля 2024 г.

Руководитель Федеральной службы по интеллектуальной собственности, патентам и товарным знакам

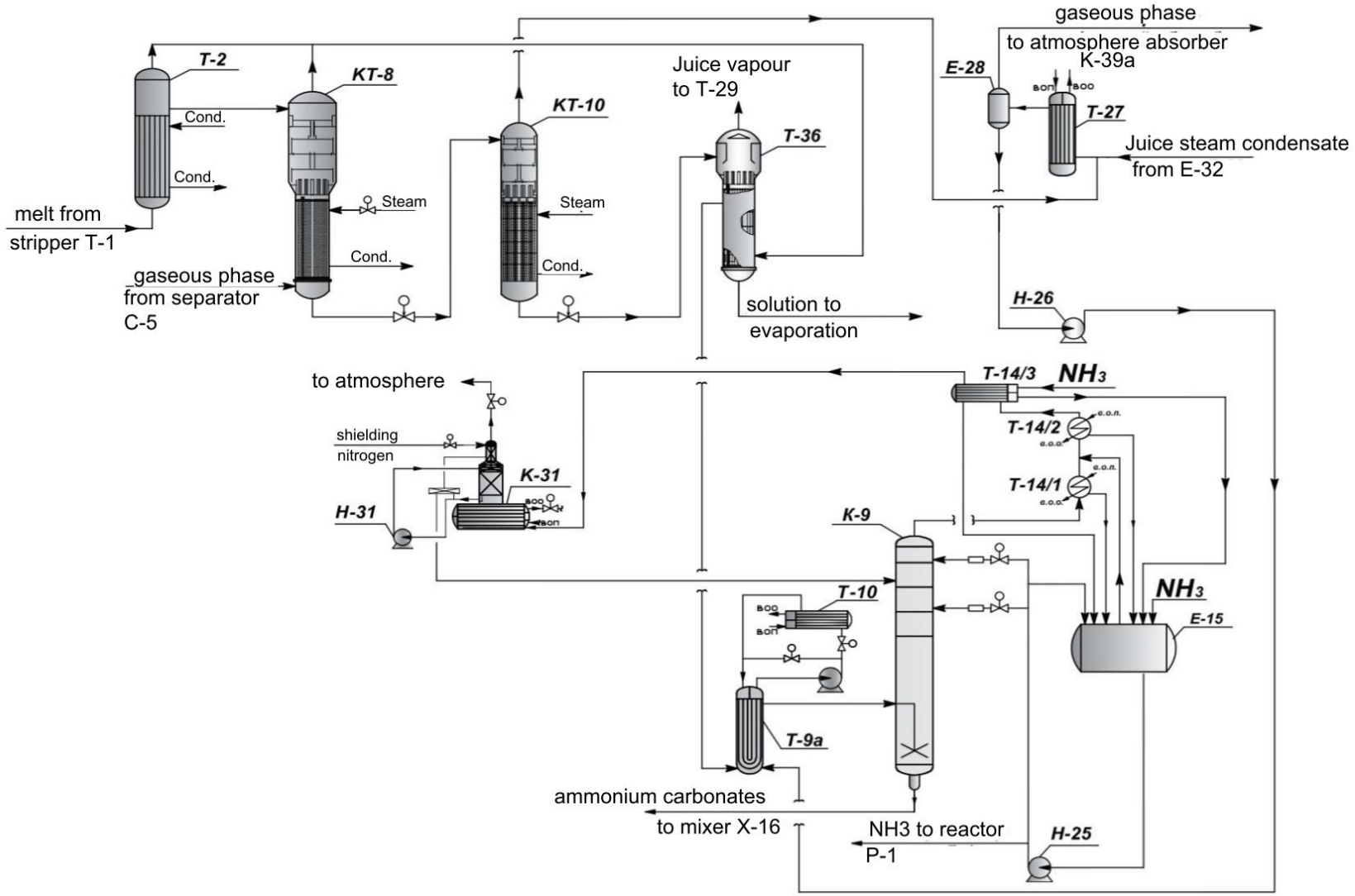
Area of urea formation

Area of carbamate formation

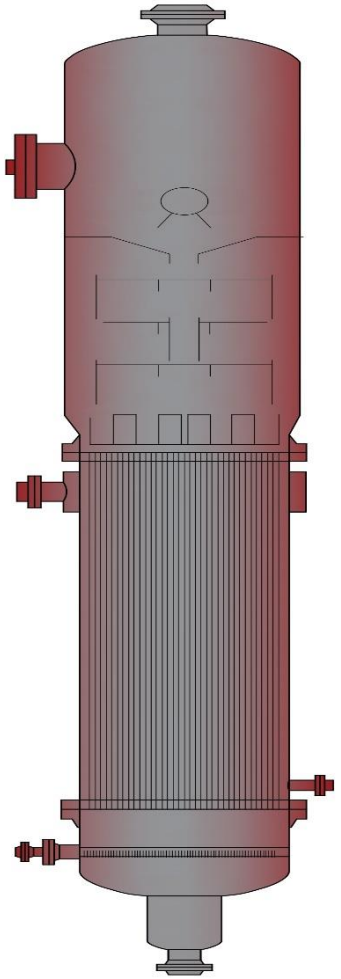
Mixing area



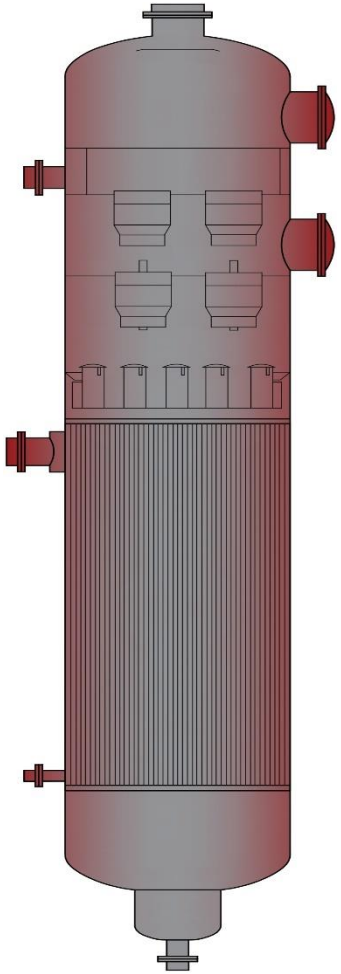
DISTILLATION AND PRE-EVAPORATION SECTION



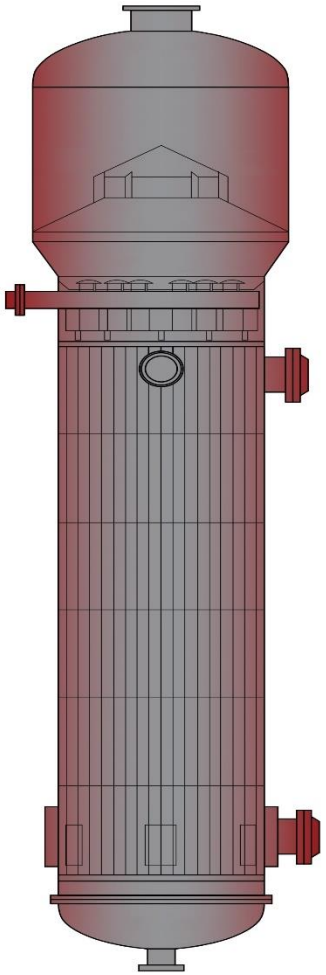
LICENSED SOLUTIONS



MP distillator

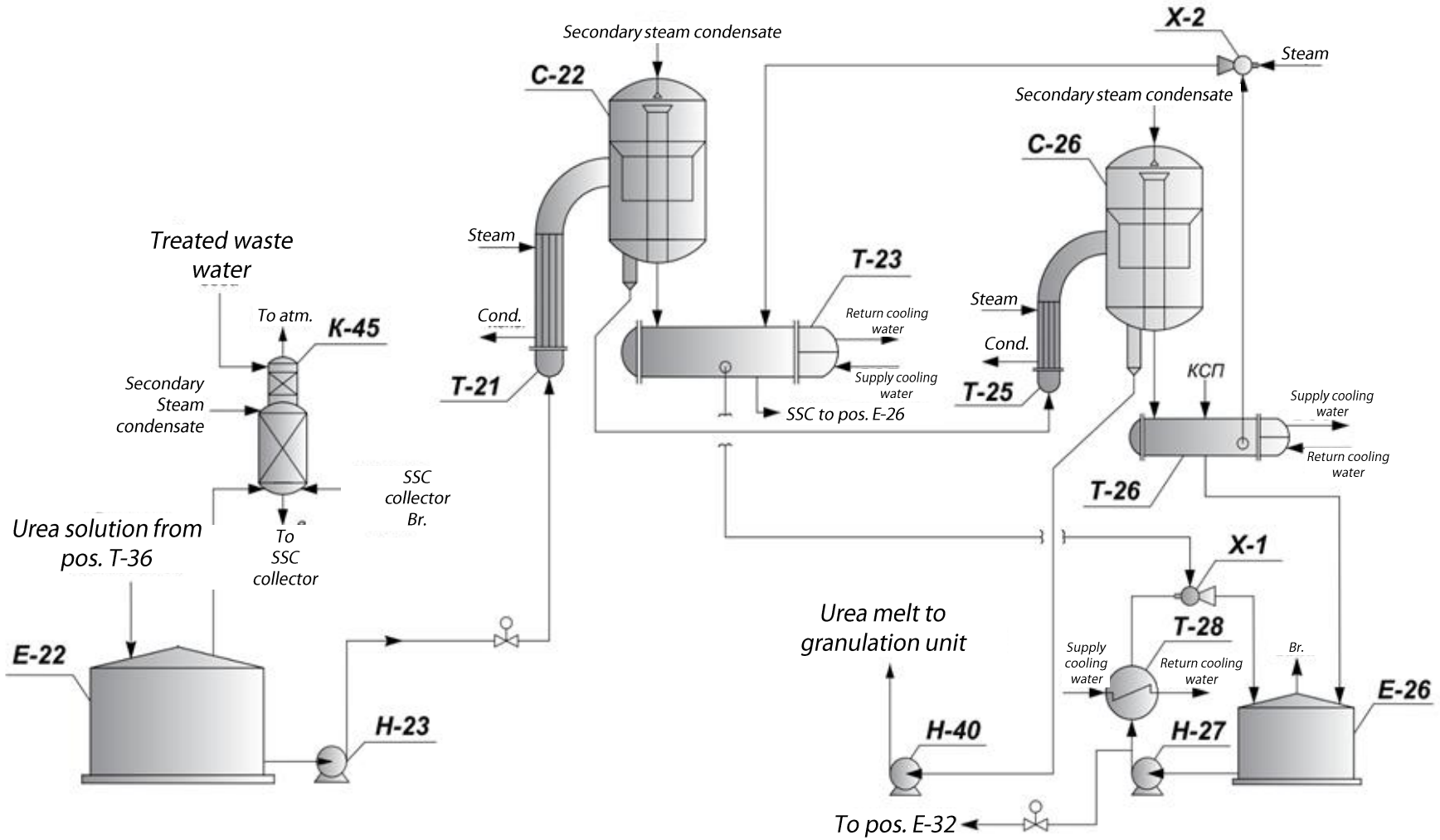


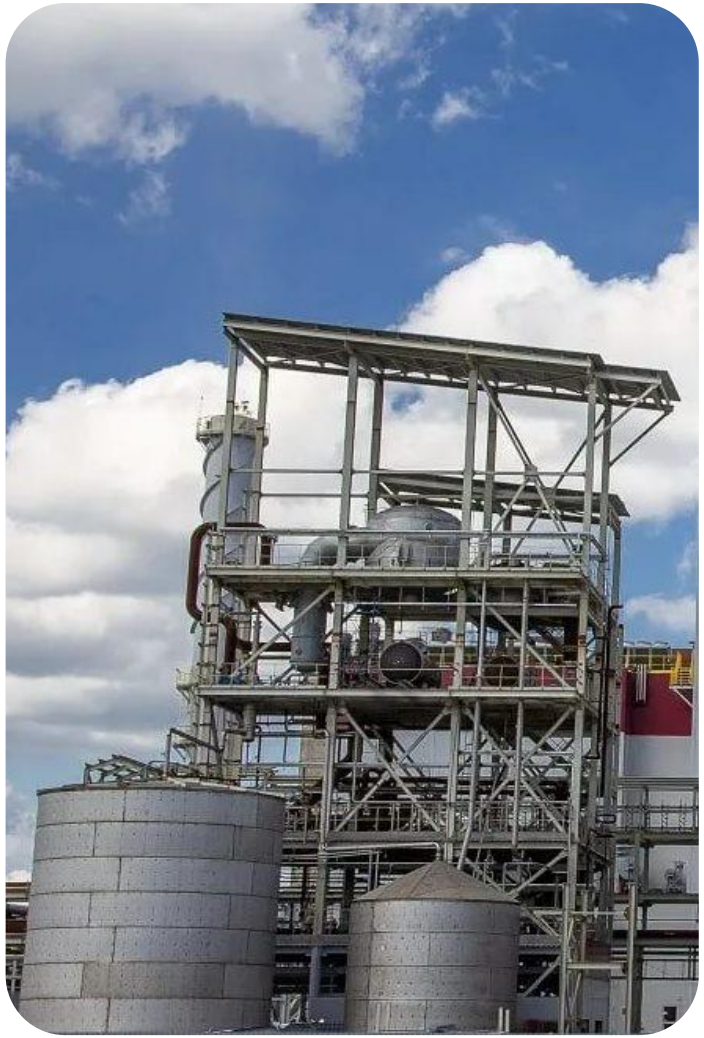
LP distillator



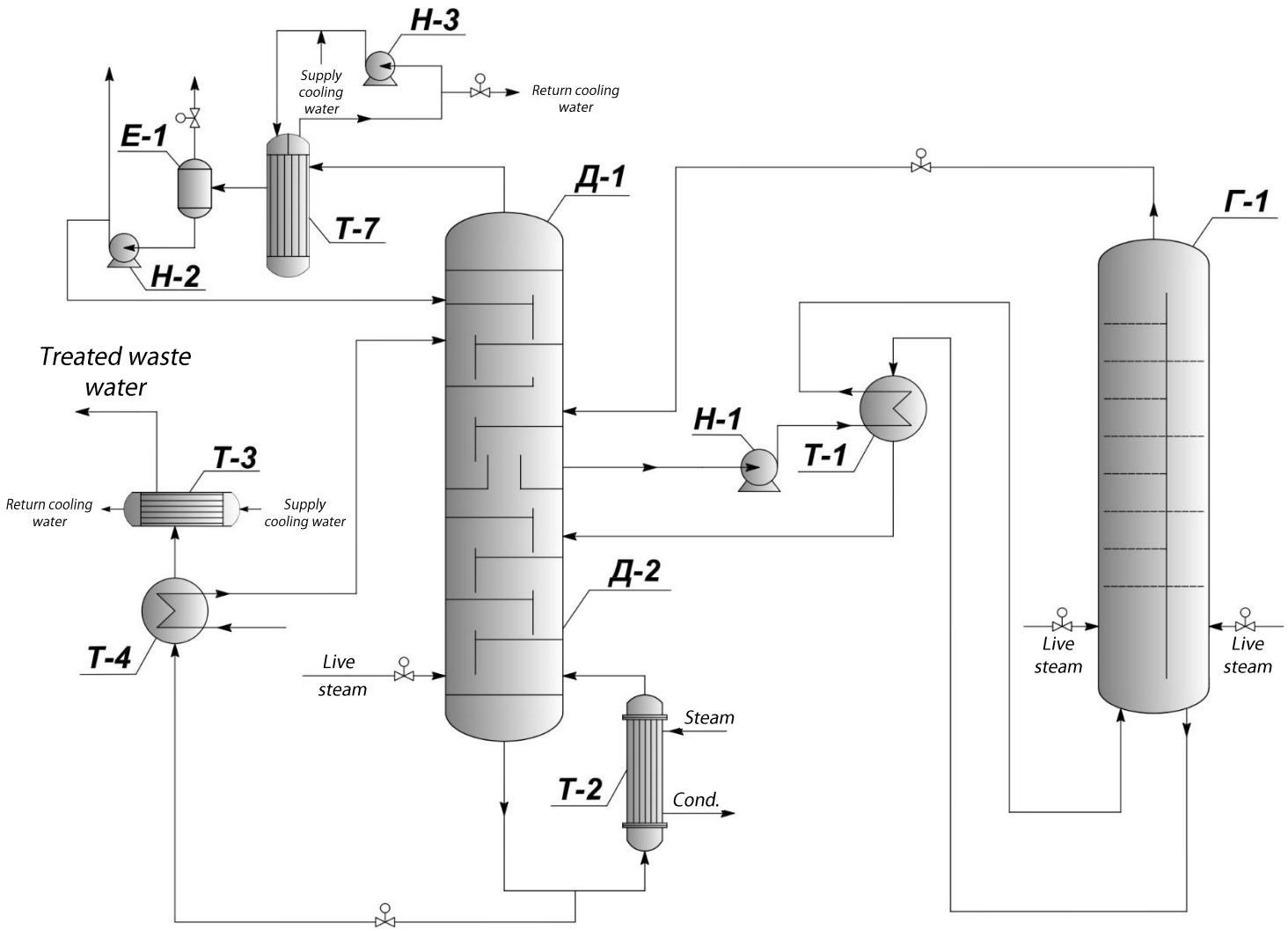
Recuperator

VACUUM EVAPORATION SECTION





DESORPTION AND HYDROLYSIS SECTION



LICENSED SOLUTIONS

URECON® Stripping 3000. STATE SUPPORT

Russian Federation Government Executive Order

ПРАВИТЕЛЬСТВО РОССИЙСКОЙ ФЕДЕРАЦИИ

РАСПОРЯЖЕНИЕ

от 12 августа 2024 г. № 2141-р

МОСКВА

About inclusion of URECON Stripping 3000 technology into the list of modern technologies for special investment contracts with government support ...

Утвердить прилагаемые изменения, которые вносятся в перечень видов технологий, признаваемых современными технологиями в целях заключения специальных инвестиционных контрактов, утвержденный распоряжением Правительства Российской Федерации от 28 ноября 2020 г. № 3143-р (Собрание законодательства Российской Федерации, 2020, № 50, ст. 8251).

URECON® Stripping 3000 process by NIIK is included in the list of modern technologies of the Russian Federation for the conclusion of SPIC contracts (Special Investment Contracts with Government Support)

URECON® Stripping 3000 process is valid for SPIC until January 26, 2043

URECON® Stripping 3000 process is one of the priorities for Russia's research and technological development, as set out in the Presidential Decree “On the Strategy for Research and Technological Development of the Russian Federation”

285[3].	Технология производства карбамида URECON ™ Stripping 3000 или эквивалента со стриппинг-процессами	карбамид	20.15.31.000	технические характеристики карбамида по ГОСТ 2081-2010 "Карбамид. Технические условия". Требования к технологии: исходным сырьем являются аммиак и диоксид углерода; синтез карбамида производится с применением наилучших доступных технологий;	26 января 2043 г.	да	обязательно	данной технологией предусмотрен комплекс мероприятий, направленных на более полное использование энергоресурсов, в том числе вторичных, обеспечи-вающих конкурентоспособность продукции, улучшение экономических и экологических параметров производства:

SUCCESSFUL START-UP

ACHIEVED CAPACITY 2650 MTPD

AUGUST 2021

SUCCESSFUL OPERATION START OF UNIT NO.6 FOR UREA PRODUCTION AT PJSC ACRON BASED ON URECON® Stripping 3000 PROCESS

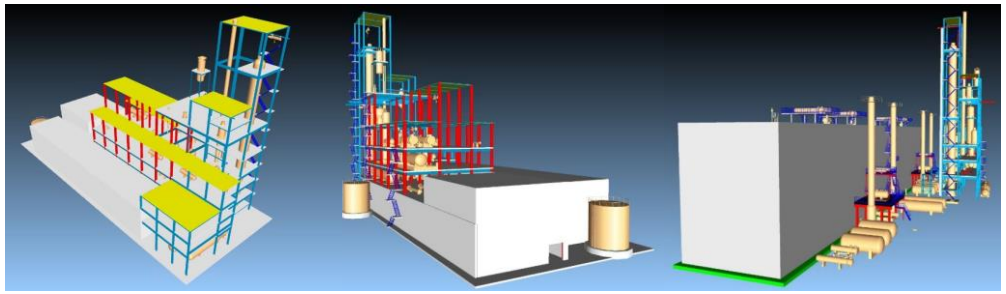
All guarantee values are confirmed
(capacity, solution concentration, biuret content).

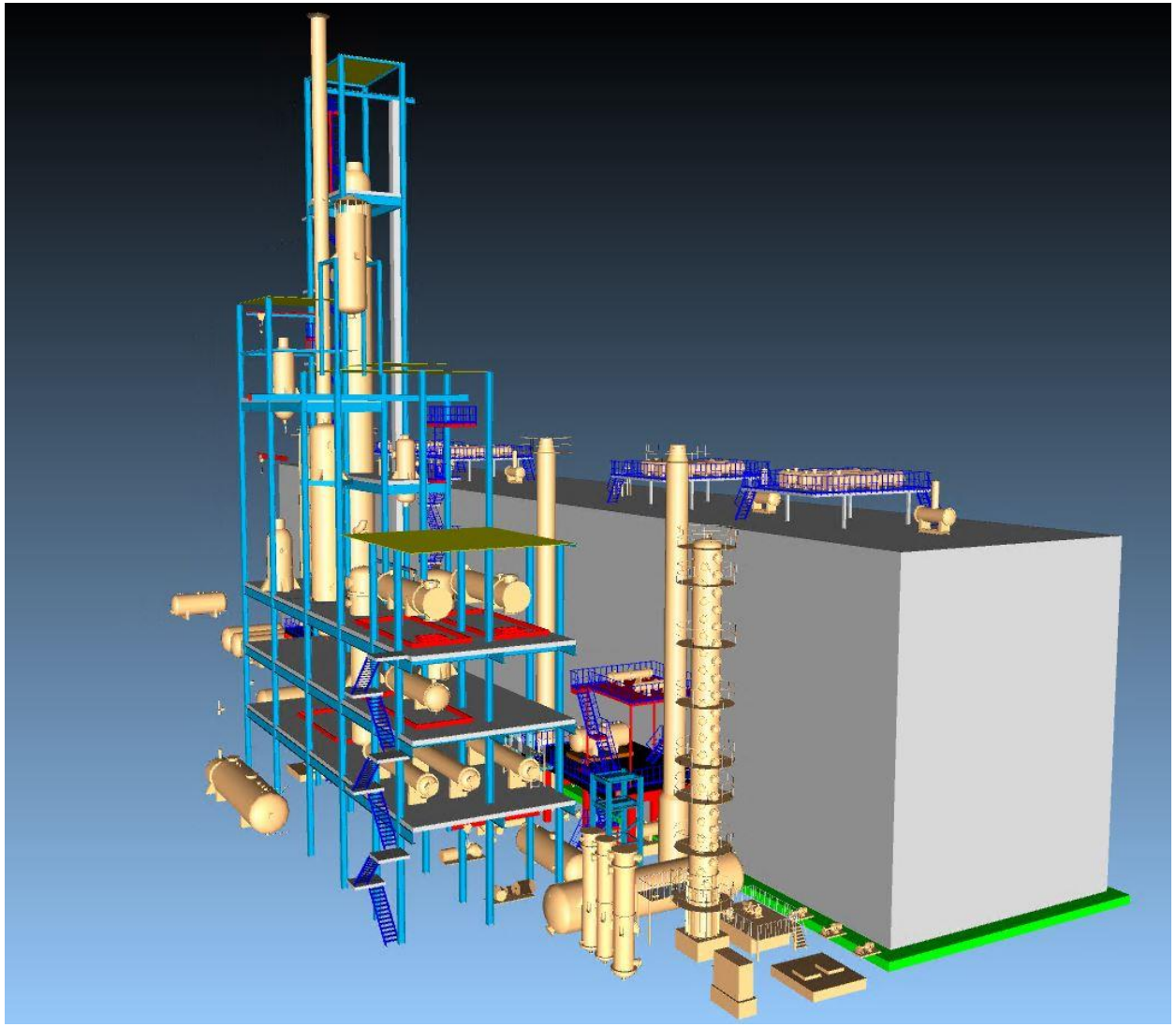
GREAT OPPORTUNITIES

Construction of new
3100 MTPD Urea Unit
at PJSC ACRON based on
URECON® Stripping 3000 process

NIIK process – for our customers

Commissioning is scheduled on 2026.





UREA PROJECTS

BASED ON NIIK'S PROCESSES (since 2015)

CLIENT	PROJECT	COMPLETION DATES	JSC NIIK SCOPE OF WORKS
Nondisclosed	Urea Unit Technical Upgrade with capacity increase up to 1730 MTPD	2024 – till now	Main Technical Solutions Development, Detailed Engineering, Equipment supply, Site Supervision, Commissioning
AO FARG'ONAAZOT	Urea Unit Revamp with capacity increase up to 1,500 MTPD	2024	BEP package development
PJSC TOGLIATTIAZOT	2200 MTPD Urea Unit Construction	2022	• BEP package development for the Prilling Tower based on JSC NIIK process • Equipment supply for the Prilling Tower, development of Project Documentation and Detailed Engineering • Construction Site Supervision
PJSC METAFRAX CHEMICALS	Ammonia, Urea, Melamine complex Construction	2022	• BEP package development • Development of Project Documentation and Detailed Engineering • Equipment supply for the Prilling Tower
OJSC MINUDOBRENIYA (PERM)	Urea Revamp with capacity increase up to 2700 MTPD	2019 (suspended)	• Licensor's BEP package adaptation • BEP package development for the Prilling Tower based on JSC NIIK process • Development of Project Documentation and Detailed Engineering
JSC APATIT	1500 MTPD Urea Unit Construction	2017	• BEP package development for the Prilling Tower based on JSC NIIK process • Equipment supply for the Prilling Tower • Development of Project Documentation and Detailed Engineering • Construction Site Supervision
LLC GAZPROM NEFTEKHIM SALAVAT	Urea Unit no.24 Revamp with capacity increase up to 1400 MTPD	Under review	Input data development

UREA PROJECTS

BASED ON NIIK'S PROCESSES (since 2015)

CLIENT	PROJECT	COMPLETION DATES	JSC NIIK SCOPE OF WORKS
JSC NEVINNOMYSSKY AZOT	Technical Upgrade of Evaporation Section in Urea Unit no. 2A	2021	Development of Detailed Engineering
PJSC ACRON	Revamp of Unit no. 6 with increase of capacity to 2050 MTPD	2021	• License • Development of Project Documentation and Detailed Engineering • Assistance at critical equipment manufacturing
	2000 MTPD Urea Granulation Unit	2018-2020	Development of Project Documentation and Detailed Engineering
	600 MTPD Urea Unit construction	2018	• License • Development of Project Documentation and Detailed Engineering • Supply of critical equipment
	Urea Unit no.5 Technical Upgrade with capacity increase up to 1250 MTPD	2017	• Development of BEP based on JSC NIIK process • Development of Project Documentation and Detailed Engineering
PJSC KUYBYSHEVAZOT	Urea Unit no.4 Technical Upgrade	2019	Development of Project Documentation and Detailed Engineering
JSC NAK AZOT	Urea Unit no.2 Technical Upgrade with capacity increase up to1500 MTPD	2017	• Development of BEP based on JSC NIIK process, Project Documentation and Detailed Engineering
LLC GAZPROM NEFTEKHIM SALAVAT	Granulation Unit at Urea Unit no.24	2010-2011	• Adaptation of Licensor's basic design • Development of Project Documentation and Detailed Engineering

YOUR PLANS – OUR TECHNOLOGIES

606008 Russia, Nizhny Novgorod Region
Dzerzhinsk, Griboyedov Street, 31
+7 (8313) 39-49-00
niik@niik.ru

FROM TECHNOLOGICAL SOVEREIGNTY
TO TECHNOLOGICAL LEADERSHIP