



Highly effective heat exchange
equipment and water
management solutions for
industrial companies

reinnolc.com



About us

ReinnoIC is a Russian engineering company that has unique expertise in development and manufacturing of highly efficient heat exchange equipment and water treatment and recycling industrial waste solutions.

12 years

of development and
manufacturing of highly
efficient equipment

350+

units of unique equipment
have been produced

3000 m²

production facilities in
Russia



Minister of Economic Development of Russian Federation Maxim Reshetnikov, Presidential Plenipotentiary Representative in the Ural Federal District Vladimir Yakushev and Governor of Sverdlovsk Region Evgeny Kuivashev visit ReinnoIC production site



Russian
engineering and
manufacturing



Resident of Sverdlovsk High
Technology Technopark



Resident of Innovative
Center "Skolkovo"
(Moscow)



ReinnolC mission

Making industrial world more efficient
and more environmentally friendly to
create conditions that
help people realize their life potential



"We believe that only efficient production leads to long-term sustainable development, improves life standards and leads to rational use of natural resources"

Pavel Blokhin
CEO ReinnolC

ReinnolC team

We are a team of professionals who value your time and resources.

More than 130 specialists provide the full productional cycle^ from development to shipment of equipment. This allows us to find the most effective solutions and control product quality at every stage.



Customers

50+

Russian enterprises trust us with their important technological processes and choose the ReinnoLC engineering



Engineering

We create unique products that allow us to solve the tasks of each specific industry. We take into account the properties of flow process parameters and technological purposes in order to achieve maximum efficiency.

We produce:

- heat exchange equipment
- thermal desalination units
- deaeration equipment

We develop technologies:

- water treatment
- waste water recycling



Research and Development

We have our own thermotechnical and physical-chemical laboratories.

That allows us to improve products and introduce new items of equipment to the market every year.

up to **150**

experiments per year are carried out by our thermotechnical and physical-chemical laboratories

17

intellectual property objects

5

employees have PhD degrees in technical science



Quality control



Certified
• staff
• technologies
• equipment



Non-destructive
testing laboratory



Verified
measuring
instruments

ReinnoIC quality management system is certified by



GOST R ISO 9001-2015 №
RAR.4.0009
dated October 31, 2022 in
Rosatomregister
certification system



GOST R ISO 9001-2015 №
ROSS RU.13CK03.01088
dated October 31, 2022 in
Rosakkreditatsiya
certification system



ISO 9001:2015 №
RU.097A.00418
dated 10/31/2022 in the
IAF certification system,
Accredia

Data accuracy
audits have been
passed



РОСАТОМ



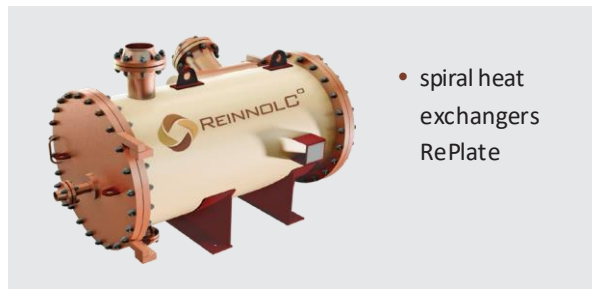
РОСНЕФТЬ



Heat exchange equipment

We have background and expertise that allows us to design and manufacture the most efficient heat exchange equipment for each specific industry.

We study the tasks that our equipment has to solve and create an optimal design that will ensure high intensity of heat exchange processes and would be convenient in service.



Profiling options depend on the customer's task

The advantages of ReinnoIC technologies

To intensify heat transfer we use tubes with transverse ring turbulators — TRT-tubes. The unique profile of the tube surface turbulizes the flow — increases heat transfer and prevents the formation of deposits.

↑ 70%

thermal efficiency

↓ 40%

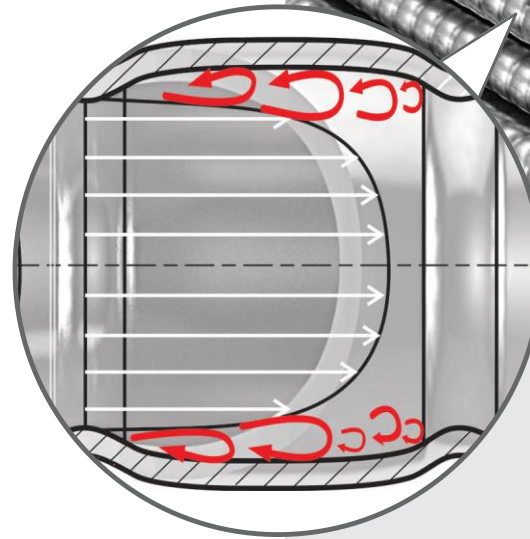
reduction of heat exchange
surface

↓ up to 2
times

reduction of the amount
of deposits in the tube

↓ 2-3 times

reduction of the capital (CAPEX)
and operating (OPEX) expenses



Watch the video to
see how the tube with
transverse ring
turbulators cleans
itself

GreenTube STX-R

Highly efficient shell-and-tube heat exchanger

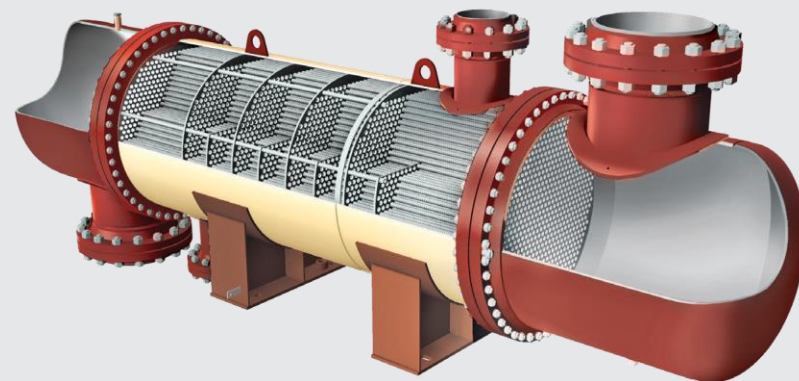
Patented development
of ReinnoIC



Highly efficient shell-and-tube heat exchanger uses tubes with transverse ring turbulators.

Specifications

- withstands temperature from -200 °C to 450 °C
- pressure: from vacuum to 18 MPa in the tube space
- material design: carbon, stainless steel, titanium, alloys based on chromium and nickel



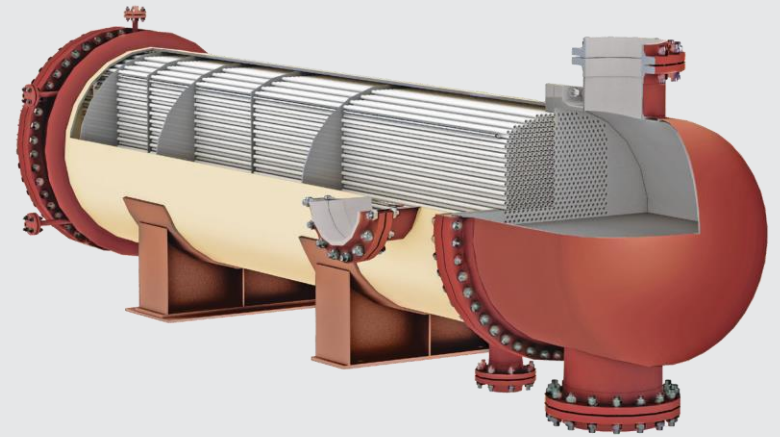
GreenTube STX-S Shell-and-tube heat exchanger

Classic heat exchanger is designed to suit the customer's individual needs.

We calculate the optimal dimensions and area of the heat transfer surface to increase equipment efficiency and reduce maintenance cost.

The equipment is effective for such tasks as:

- import substitution
- maintaining functionality of the existing technology



RePlate SPHX Spiral plate heat exchanger

The design of the unit allows it to work with contaminated and highly viscous substances.

Specifications

- temperature: from -200 °C to 450 °C
- pressure: 6 MPa
- material design: carbon and stainless steel, duplex alloys, nickel alloys



RePlate GPHX

Dismountable plate heat exchanger

It is used as a condenser, evaporator, recuperator for heating and cooling liquids and gaseous substances. The number and configuration of plates is selected to suit the customer's individual needs.

Specifications

- temperature: from -20°C to 180°C
- pressure: 2,5 MPa
- material design: stainless steel and alloys

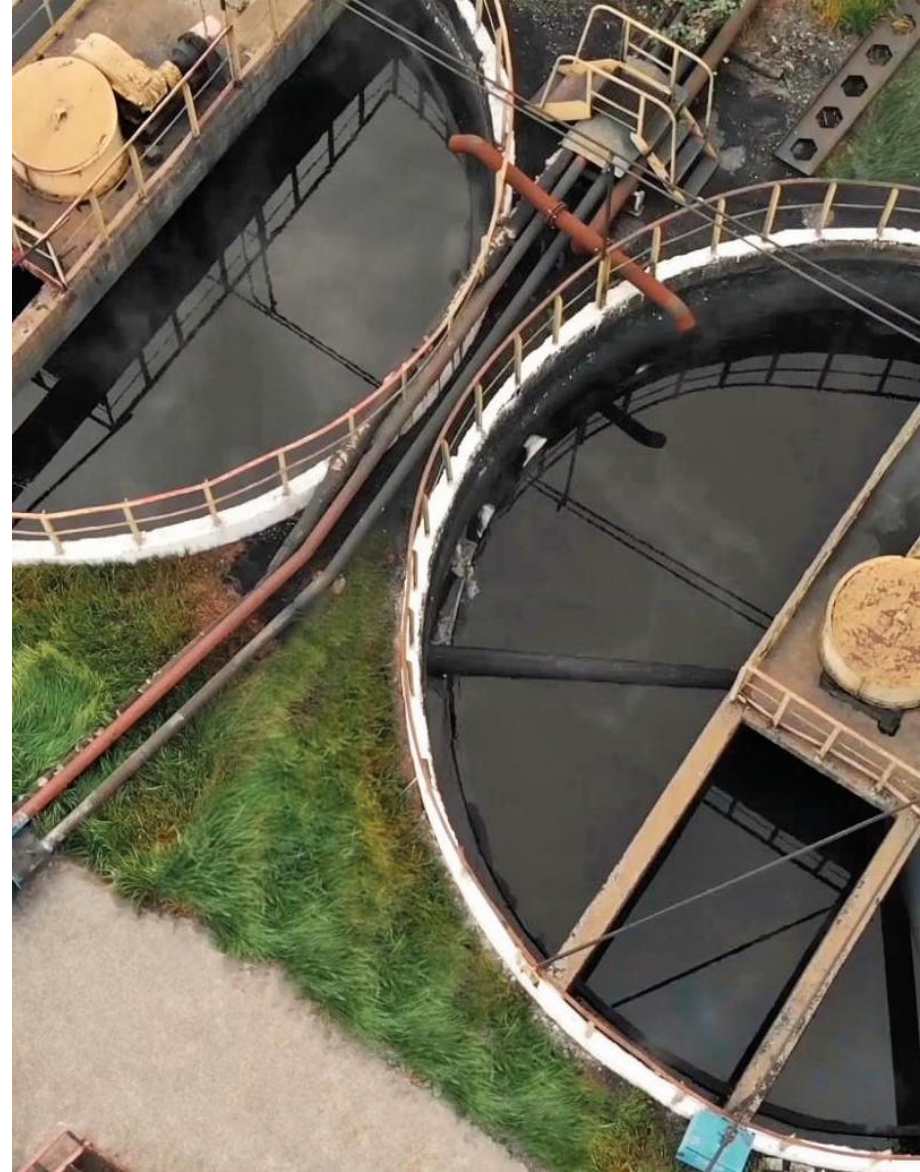


Waste treatment and water desalination equipment

We develop complex solutions based on the thermal distillation method in an Exerger FVE (flash vertical evaporator).

Technologies for effective water management of enterprises:

- TDU
(termodistillation unit)
water thermal
desalination
- WTU
(wastewater treatment unit)
industrial waste treatment





Exerger FVE. Advantages

Exerger FVE is a vertical type flash evaporator. It is a multi-stage unit based on the principle of boiling water under vacuum conditions. Steam condenses on heat exchange tubes at each stage - this allows the steam to be used repeatedly.



Low requirements to source water



High quality desalted water



Energy efficiency — creates the means to deploy the existing low-grade coolants



Thermal efficiency with minimal weight and size characteristics



Environmentally friendly process and equipment



Minimal susceptibility to scale formation

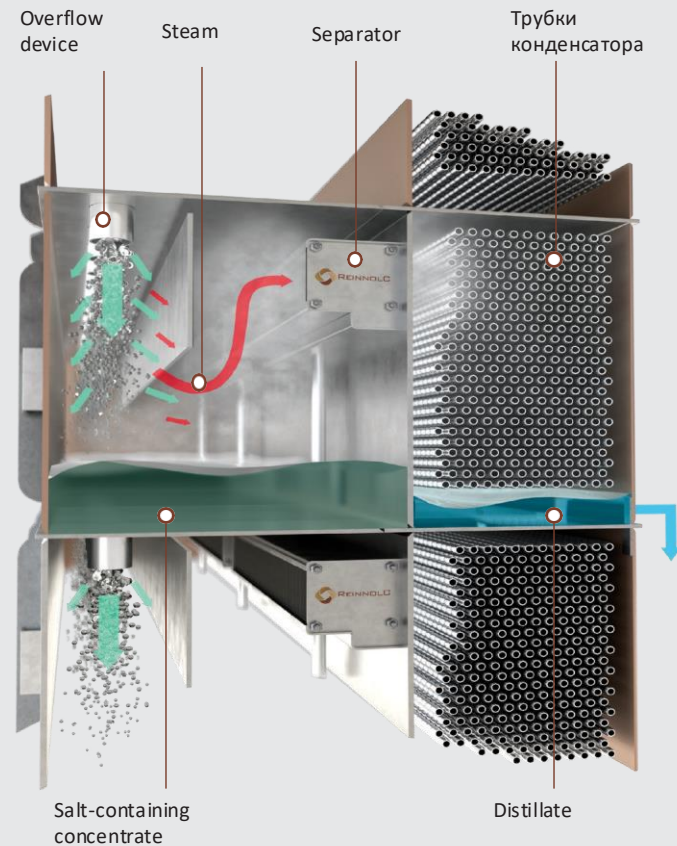


Russian production and engineering

Flash evaporator stage operating principle

Water boils in vacuum in the free volume of the expansion chamber, steam passes through the separator and condenses on the heat exchange tubes.

The use of heat exchange tubes with transverse ring turbulators ensures high thermal efficiency, and the design of the unit ensures scale-free operation.



Exerger FVE stage using tubes with transverse ring turbulators

Exerger TDU. Thermal desalination unit based on Exerger FVE

A modern method of preparing water for feeding steam boilers. An effective and environmentally friendly replacement for membrane and ion exchange technologies.

0,12 MPa

required steam pressure
for operation of the unit

0,08-0,17 tons steam

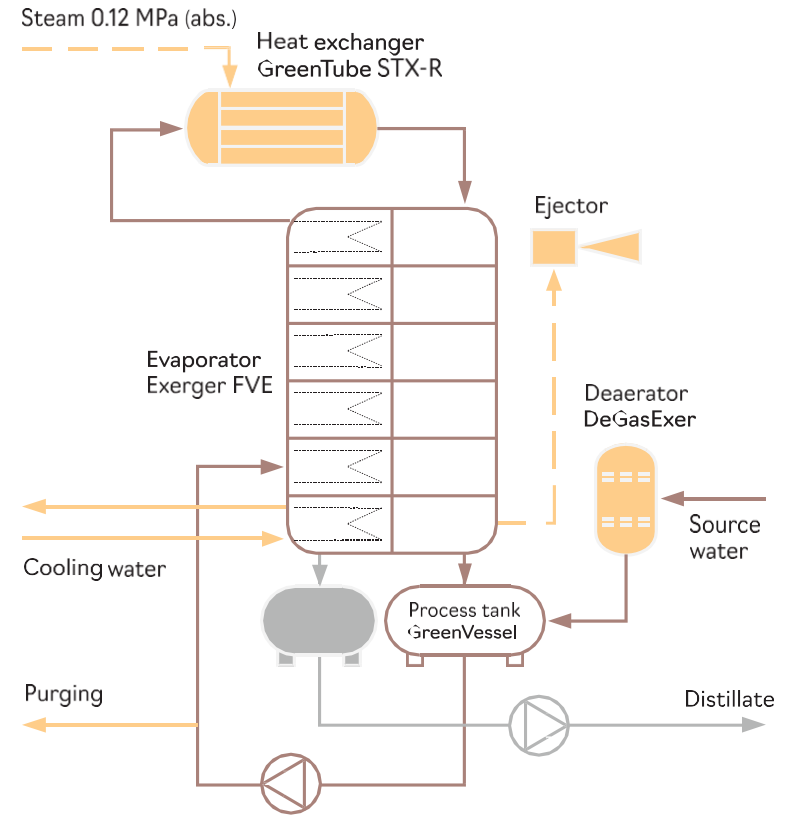
steam is needed to produce 1 ton of
demineralized water

0,5-2 mg/dm³

salt content in the resulting
distillate

30 years

estimated service life



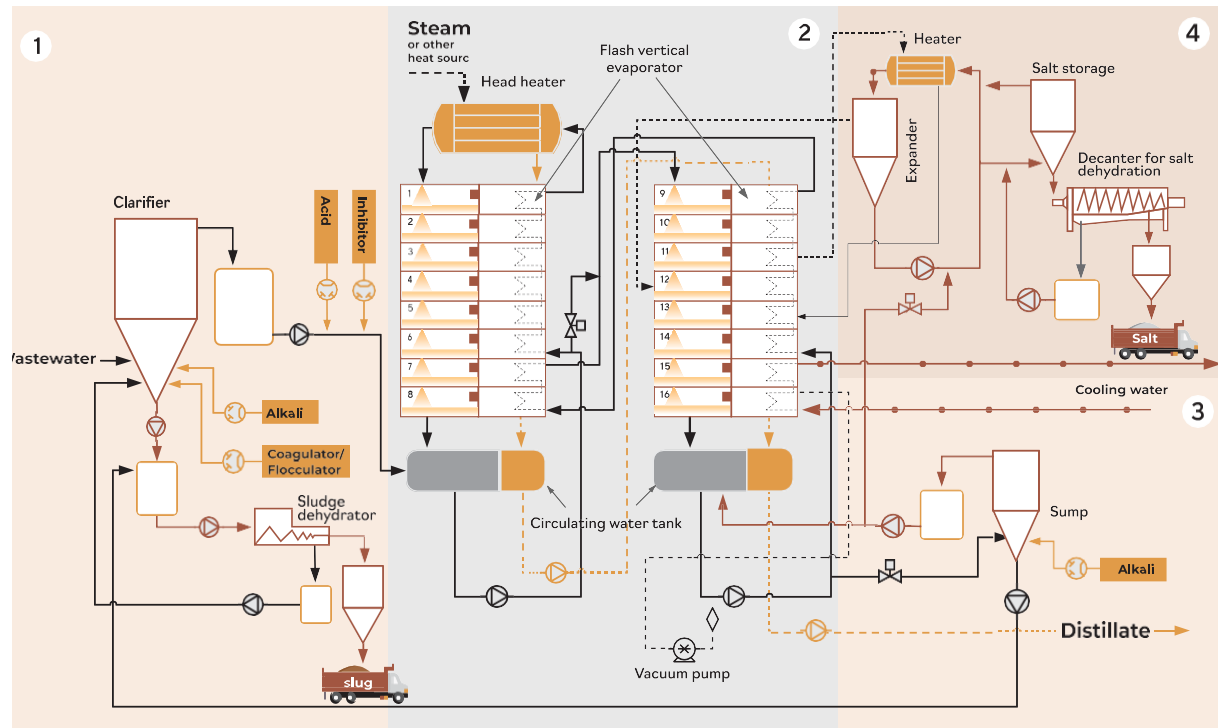
Process flow diagram of the Exerger TDU thermal desalination unit

Exerger WTU. Industrial wastewater treatment technology

Innovative technology completely recycles salt-containing wastewater, as well as obtains a secondary resource.

Effluent processing products:

- distillate with a salt content of 1-5 mg/dm³
- sludge containing calcium sulfate, calcium carbonate and magnesium hydroxide
- salt concentrate or mixture of crystalline salts



Exerger WTU Process Diagram

1. Pre-cleaning unit

2. Concentrating unit on the evaporator

3. Block for removing hardness salts from the sump

4. Evaporation and crystallization unit

Exerger WTU. The result of technology implementation at the coke oven gas processing site



Industrial waste
entering into the
installation

Industrial
wastewater after
pre-treatment unit

Distillate
after flash
evaporator



Significant
reduction in water
consumption from
open sources



Zero liquid
discharge scheme



Obtaining a
secondary product
for technological
needs



Implementation result

Comparison of industrial wastewater treatment technologies

	Comparison factor	Technology Exerger® WTU	Conventional evaporator with forced circulation	Reverse osmosis	Electrodialysis
Requirements to feedwater	Reagents use	minimal	medium	high	medium
	Suspended matter, organic admixtures, petroleum products	acceptable	acceptable	not acceptable	not acceptable
	Dependency on salt content	weak	weak	strong	strong
Technology products	Cleaned water deaeration	yes	yes	no	no
	Concentration degree, g/l	max (>250)	max (>250)	20	60
	Full disposal of liquid discharge	yes	yes	no	no
	Production of crystallized salts of required quality or their strong solutions suitable for re-use or sale	yes	yes	no	no
	Desalinated water conductivity, $\mu\text{S}/\text{cm}$	1-10	20-150	30-200	100-600
Operation conditions	Steam parameters, MPa	$\geq 0,02$	$\geq 0,4$	$\geq 0,02\text{MPa}$	$\geq 0,02\text{MPa}$
	Specific steam consumption per 1m^3 of wastewater, t/m^3	0,1-0,18	0,3-1,1	0,02-0,03	0,02-0,03
	Specific energy consumption, kWh/m^3	4,5-6	8-30	2-6	10-20
	Reagents-free cleaning/washing	yes	yes	no	no
	Equipment service life	30 years	30 years	15 years	15 лет
	Maintainability	high	high	low large-node replacement	low large-node replacement
	Spare parts, consumables and their replacement intervals required	no		yes every 2-4 years	yes every 2-4 years
	Dependency of imported spare parts	low	low	high	medium

Exerger WTU. Areas of use

Exerger WTU technology is especially effective in the industries that have a discharge of heat (low- grade steam, flue gas) and wastewater. For example, in thermal and nuclear energy, ferrous and non- ferrous metallurgy, chemical and pulp and paper industries, oil and gas and mining industries

- Reverse osmosis effluents (concentrate, cleaning solutions)
- Processing of Na-cationization wastewater (spent regeneration solutions and rinsing water)
- Processing of chemical desalination wastewater (spent regeneration solutions and rinsing water)
- Recycling of circulating systems purges
- Wastewater from chemical cleaning and equipment preservation
- Effluent from biochemical unit (BCU) treatment of coal coking wastewater and purification of coke oven gas
- Spent etching solutions, electrolytes, rolling mill rinse water
- Processing of rinse water used for oil desalting
- Quarry, dump and mine water
- Wastewater from mining and processing plants
- Wastewater from wood processing industries
- Sulfate wastewater from pulp and paper production
- Wastewater from chemical production (mineral fertilizers, polymers)



Deaeration equipment

The equipment is designed using modern technologies and provides deep deaeration of water with residual oxygen content of no more than $7 \mu\text{g}/\text{dm}^3$. The design ensures stable operation over the entire load range.

Depending on the tasks, we produce various deaerators:

- vacuum
- high pressure
- atmospheric
- deaeration condensate collectors





Vacuum deaerator

- Capacity 50-2000 m³/h
- Compact design
- Reliability (overhaul interval 10 years)
- Works on low-grade heat sources
- Low sensitivity to load fluctuations



Atmospheric deaerator and high pressure deaerator

- Capacity 5-5000 m³/h
- Original design of steam bypass valve
- Stable foam-bubbling mode in the bubbling area
- Evaporation is minimized due to the advanced jet compartment
- Provides high-quality deaeration at feed water temperature of 55-93 °C

Examples of equipment implementation



Watch video cases



Modernization of methanol production



Modernization of thermal power plants



Pilot test of Exerger WTU by Reinnolc



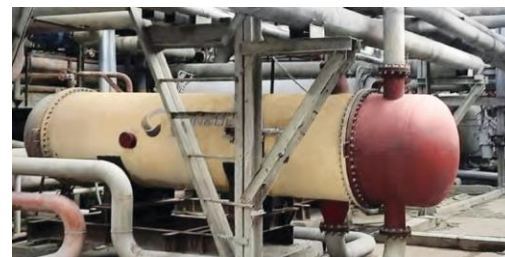
Read more on the website



Ultra high pressure heater for a large petrochemical production



Replacement of imported equipment in the formaldehyde workshop of Metafrax Chemicals PJSC



Heat exchanger for isobutane dehydrogenation unit



More about the technology

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