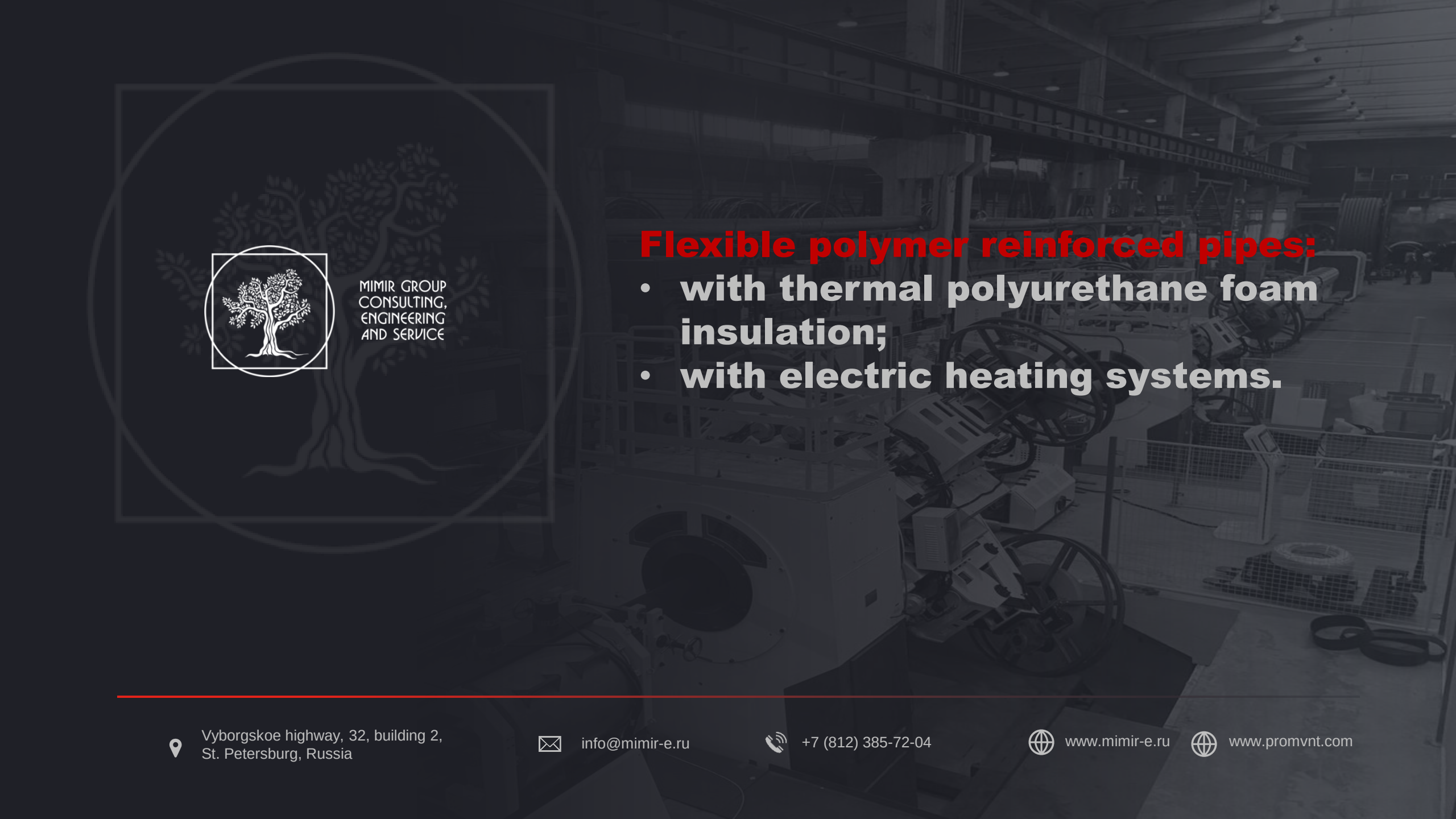

MIMIR GROUP
CONSULTING,
ENGINEERING
AND SERVICE

## Flexible polymer reinforced pipes:

- with thermal polyurethane foam insulation;
- with electric heating systems.

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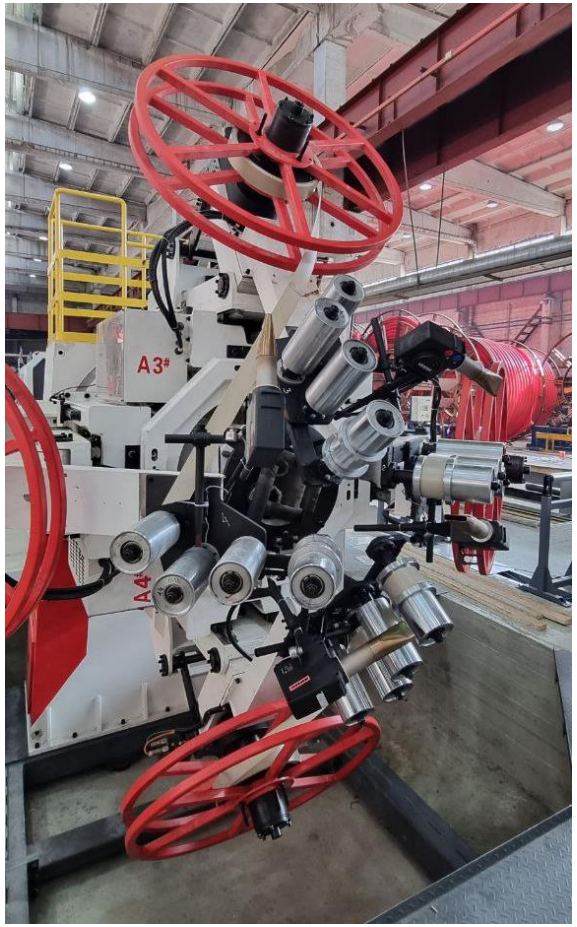
# About us

“Mimir Group” is a production and service group of companies specializing in making engineering solutions.

We provide a full range of services, including: pre-project inspection of facilities, development of feasibility studies, development of technical solutions and design, supply of materials, components and equipment, construction, installation and commissioning work, as well as software development and integration.

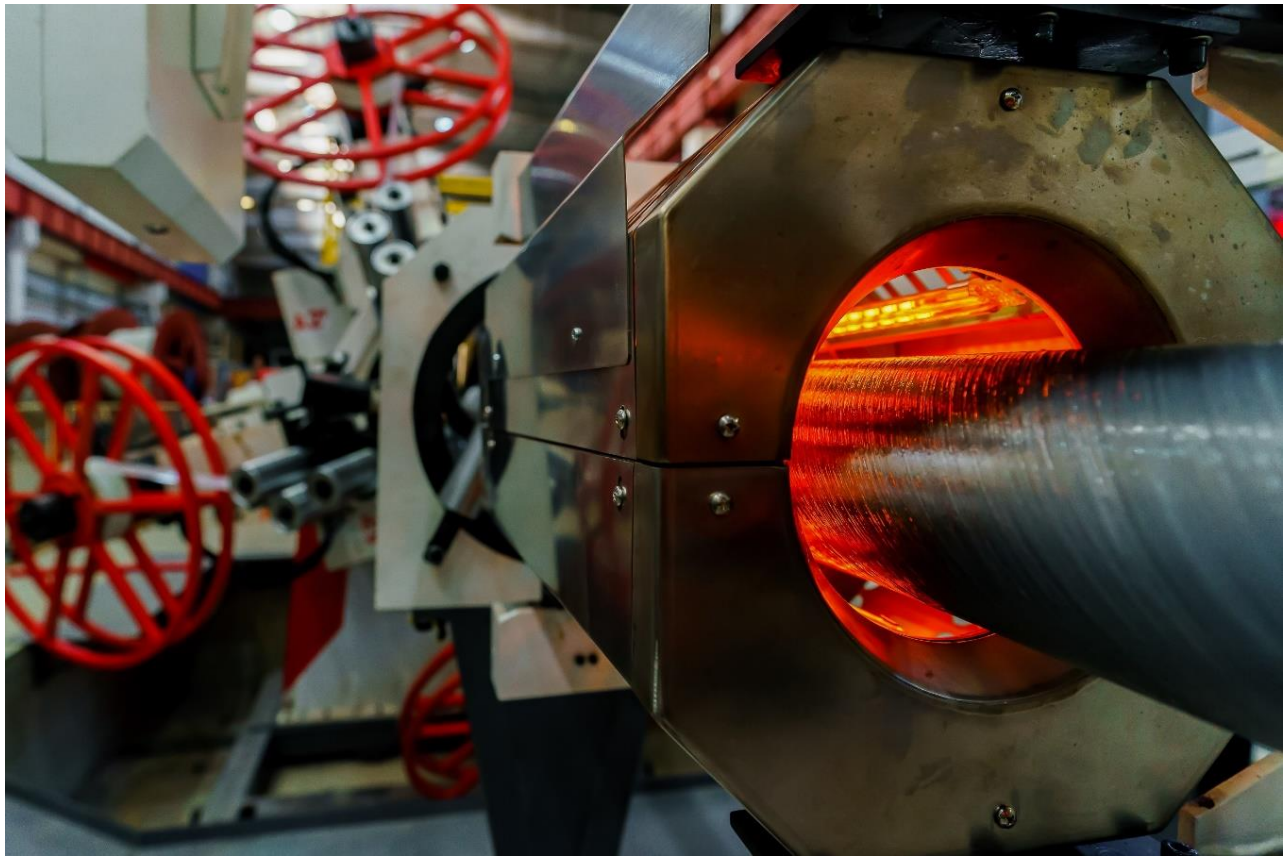
The production of flexible polymer reinforced pipes for medium and high pressure systems is one of the company’s main activities.

- In 2021, “Mimir Group” together with "Polymer Pipe Plant" started the production of polymer pipes.
- In 2022, the company installed new equipment that allowed the production of pipes for systems with a working pressure of up to 25 MPa (75 MPa tensile strength).
- In 2023, a line for the reinforcing UD tapes production was installed.



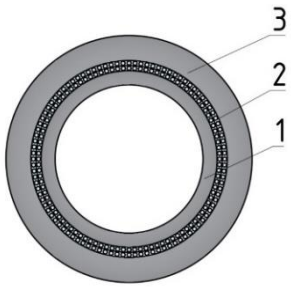
# Production technology

- The pipe production technology utilized by “Mimir Group” is the world standard for the production of flexible polymer reinforced pipes with bonded layers and complies with oil and gas industry standards such as, API RP 15S (2006) and DNVGL-ST-F119 (2018), GOST P 59834-2021 (2021) for oil and gas industry.
- Our products also comply with most standards of other industries and infrastructure, including certificates for use in drinking water supply systems.
- Flexible polymer reinforced pipes with a thermal layer of polyurethane foam insulation with a cable channel for electric heating systems in mobile design is a patented development of “Mimir Group” – patent No. 135963, dated 02/23/2023.



# Production technology

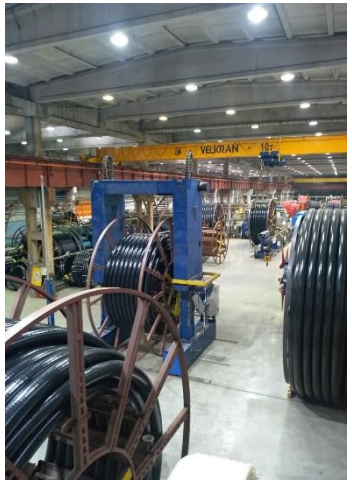
- For the main load-bearing pipe, our technology uses an internal liner, reinforcements and a protective liner, which are a fully-fledged homogeneous composite, i.e. all layers are connected by sintering.




1. Internal liner made of various types of polymers
2. UD–tape reinforcement
3. External jacket layer of various types of polymers is resistant to ultraviolet radiation

- Using this type of construction, the pipe has improved strength characteristics, including ring stiffness, but at the same time, has a significantly lower weight. When sintering the layers of the structure, a homogeneous composite is formed during gas diffusion, this structure prevents the formation of gas pockets and stress concentrators, and thereby prevents the formation of a corrosive environment in the body of the composite. In this technology, a gas removal system from the inter-ring space is not required.

# Flexible polymer reinforced pipes



Developed and manufactured flexible polymer reinforced pipe is a modern and effective solution for the tasks of creating various pipeline systems, including for use in extremely difficult climatic conditions, both on a temporary and permanent basis of application and operation.

The efficiency of replacing metal pipelines with flexible polymer reinforced ones is due to their unique properties, installation and operational characteristics such as:

- **High fault tolerance and reliability** of flexible polymer reinforced pipes, and pipes with insulation and electric heating systems that have a long service life;
- **Quick and easy installation;**
- **Efficient logistics** while delivering equipment to the facility
- **Low coefficient of pipe conductivity;**
- **Low hydraulic losses;**
- **High thermal insulation efficiency;**
- **Long range** from the connection point and energy efficiency **of the proposed electric heating systems;**
- **Absence of corrosion** and significant deposits on the walls of pipes;
- **No need for electrochemical protection** of the pipeline, including against stray currents.

# Flexible polymer reinforced pipes

**“Mimir Group” develops, manufactures, supplies, installs, maintains and disposes of polymer reinforced pipes. We install medium- and high-pressure reinforced polymer flexible pipes made of various types of polymers like PE 100, PR-RT II and PEX-A/B for:**

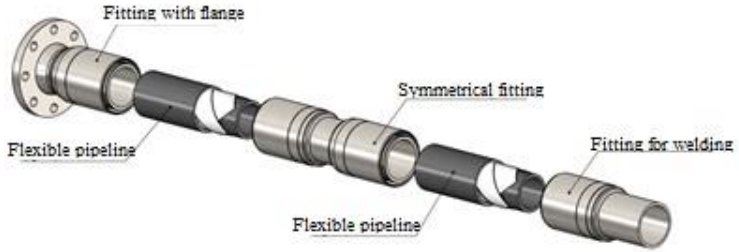
- Water pipelines including mobile sets of cold-water supply, whether drinking or technical;
- Drainage pipelines;
- Pipelines for transportation of working agents, oil and gas fluid, commercial oil, pulp and other agents;
- Pipelines for reservoir pressure maintenance systems;
- Pipelines for artificial snow formation systems;
- Industrial pipelines for other purposes.

**Pipe characteristics:**

- The main pipe is made with an internal diameter Ø 50, 75, 100, 125, 150, 200 mm;
- Pipes are produced for medium and high-pressure systems for operating modes up to 4/6,3/8/12/18/25 MPa;
- For transporting agents with temperatures up to 60/80/95°C;
- The minimum ambient temperature for the pipe operation is up to – 60 °C;
- Pipes are produced in coils sized between 25 to 600 meters, optionally they can be produced in segments (rods) with a length of 11.8 (12) meters;
- Service life of the pipe is up to 20 years and more.

# Fittings for flexible polymer reinforced pipes and UD-tape

- Pipes can be terminated and connected with various fittings: flanged, threaded, welded, quick-release connection;
- Pipes made of PE 100 and PE-RT II polymers reinforced with UD-tapes made of kevlar and fiberglass with a pressure of up to 5 MPa can be connected by end and electrofusion welding under the coupling.




- “Mimir Group” produces pipes using reinforcing UD-tapes with the following types of fillers:

- kevlar (aramid) threads;

- fiberglass;

- carbon threads;

- steel twisted threads (cord);

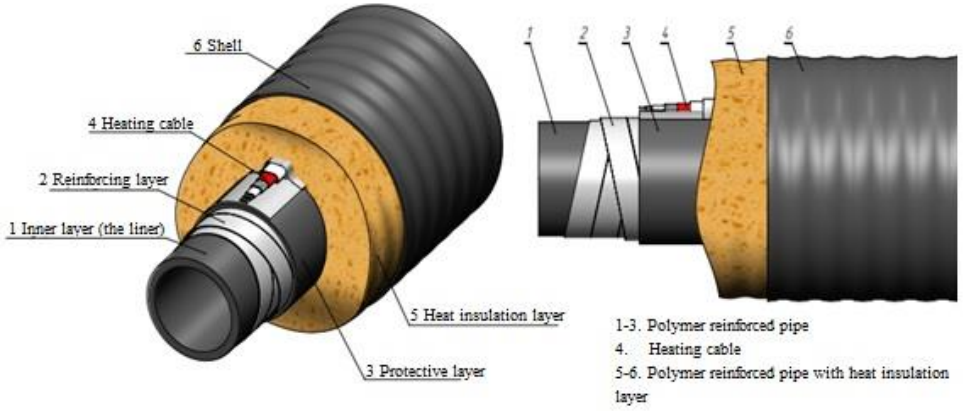
- The company independently develops and manufactures fittings for flexible polymer reinforced pipes on its own equipment.

# Fittings for flexible polymer reinforced pipes and UD-tape:

## Fittings for flexible polymer reinforced pipes and UD-tape:

# Flexible polymer reinforced pipes with polyurethane foam insulation

- Pipes up to 125 mm of internal diameter can be supplied in factory polyurethane foam insulation;
- Pipes with an internal diameter of more than 125 mm can be completed with hinged heat- and water-proof insulation;
- The effective thickness of the thermal insulation is determined using a thermal calculation, or is set according to customer requirements;
- The shell of the system is made of a polymer resistant to ultraviolet radiation;
- Joint insulation method of the pipeline elements in the presence of a thermal layer consists in the use of a protective sheath made of PE 100 polyethylene, heat-shrinkable sleeves and tapes; with the use of foamed polyurethane foam (PU foam) in the form of a two-component filler material.




1-3. Polymer reinforced pipe
4. Heating cable
5-6. Polymer reinforced pipe with heat insulation layer

# Flexible polymer reinforced pipes with electric heating system

- The design and contracting division of the “Mimir Group” has extensive experience in developing basic technical solutions, designing and working documentation of electric heating systems;
- Polymer reinforced pipe can be supplied with electric cable heating systems with the length of electric heating lines over 7.5/15 km;
- Electric heating systems are made on the basis of a high-voltage, resistive or self-regulating cable - depending on the length of the pipeline and heating technology;
- Electric heating systems can be combined with block modular complete transformer substations;
- Equipped with control panels;
- Monitoring and telemetry systems, communication networks;
- The electric heating systems set includes all fittings and accessories for installation work;
- We supply power cables and support;
- It is possible to equip pipelines with distributed temperature monitoring systems based on DTS fiber-optic technology. It allows the control of temperature on each section of the pipeline with an accuracy of 0.5-1.5 meters.

# Our work

## Polymer high-pressure reinforced pipes in thermal insulation with cable electric heating system on Tazovskoe-MeretoyakhaNeftegaz oil field (2021)

- The main pipe is PE 100 polyethylene;
- Reinforcement – aramid threads – Kevlar – weaving;
- The maximum operating pressure of the pipeline system at PN2 is up to 2.43 MPa, the maximum tensile strength is up to 5 MPa;
- Thermal PU insulation;
- Electric heating system with two complete transformer substations;
- The maximum temperature for the transported medium is +60°C;
- Minimum operating temperature is -60°C;
- Installation by “Mimir Group”.

## Our work

**Polymer high-pressure reinforced pipes in thermal insulation with cable electric heating system in Tazovskoe-MeretoyakhaNeftegaz oil field (2021)**



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# Our work

## Polymer high-pressure reinforced pipes without insulation or heating system in Lapasskoe oil field, Orenburg region (2022)






- The main pipe is made of PE 100 polyethylene for underground areas.
- For overpasses, the PE-RT II pipe is used as it has no insulation and requires protection from ultraviolet radiation.
- Polymer threads used for reinforcement.
- Maximum operating pressure of the pipeline system at PN2 is up to 6 MPa, maximum tensile strength is up to 9 Mpa.
- The maximum temperature for the transported medium is +60°C
- Minimum operating temperature is -60°C
- “Mimir Group” is the installation supervisor.

# Our work

## Polymer high-pressure reinforced pipes in thermal insulation with cable electric heating system on Elbrus Mountain (2022-2023)

- The main pipe is made of PE 100 polyethylene;
- Aramid threads Kevlar-weaving for reinforcement;
- The maximum operating pressure of the pipeline system at PN2 is up to 6.3 Mpa, tensile strength is up to 12.6 MPa;
- Thermal polyurethane insulation;
- Electric heating system with control cabinets;
- The maximum temperature for the transported medium is +60°C;
- Minimum operating temperature is -60°C.

# Our work

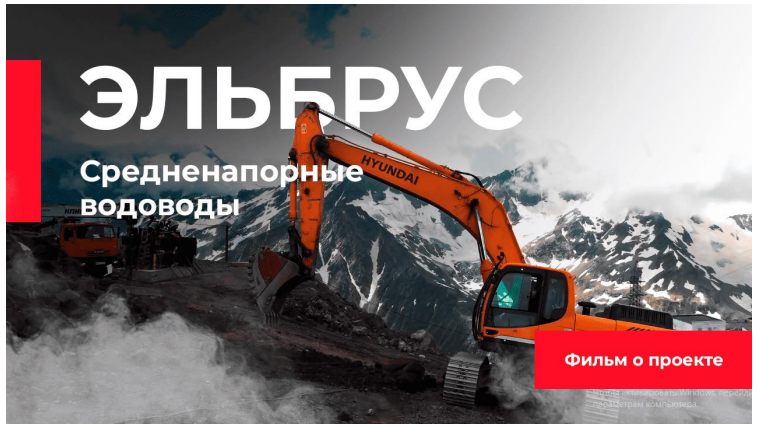
## Polymer high-pressure reinforced pipes in thermal insulation with cable electric heating system on Elbrus Mountain (2022-2023)





## Our work

**Polymer high-pressure reinforced pipes in thermal insulation with cable electric heating system on Elbrus Mountain (2022-2023)**





*Click to watch*

# Logistics, Design, Installation, Maintenance, Residual Resource Assessment, Disposal

- We supply products with our own and partner transportation – by road, railway, air and sea.
- We develop technical solutions, design and working documentation.
- We produce flexible polymer reinforced pipes in thermal insulation with electric heating systems.
- We complete the pipes with shut-off and control valves, mobile heat-insulated boxes for quick installation of control vales on objects, spacers, sleeves and other components.
- We carry out construction, installation and commissioning.
- We provide installation supervision services.
- We install not only pipelines, but also related electric heating, high-voltage cable routes, automation, telemetry and communication networks systems.
- We provide services for cleaning pipelines from deposits, assess the residual life of pipelines by destructive testing (sampling and laboratory evaluation and analysis).
- We carry out work on dismantling and disposal of pipelines.

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# Some solutions are based on the flexible polymer reinforced pipes system

# Solution

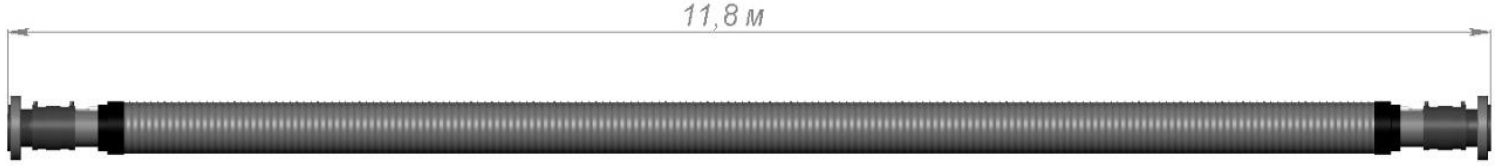
Our company has developed **an autonomous culvert kit with electric heating for hydraulic fracturing.**

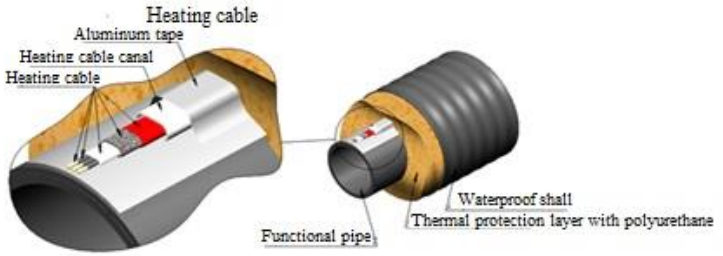
The system includes:

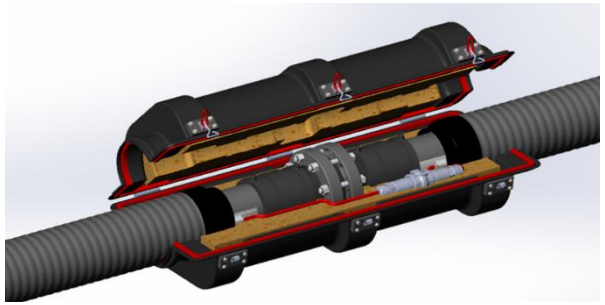
1. Prefabricated pipeline consisting of segments of polyethylene pipe DN 110 in 225 mm polyurethane insulation with a cable canal;

2. Autonomous module of the pumping diesel generator station;

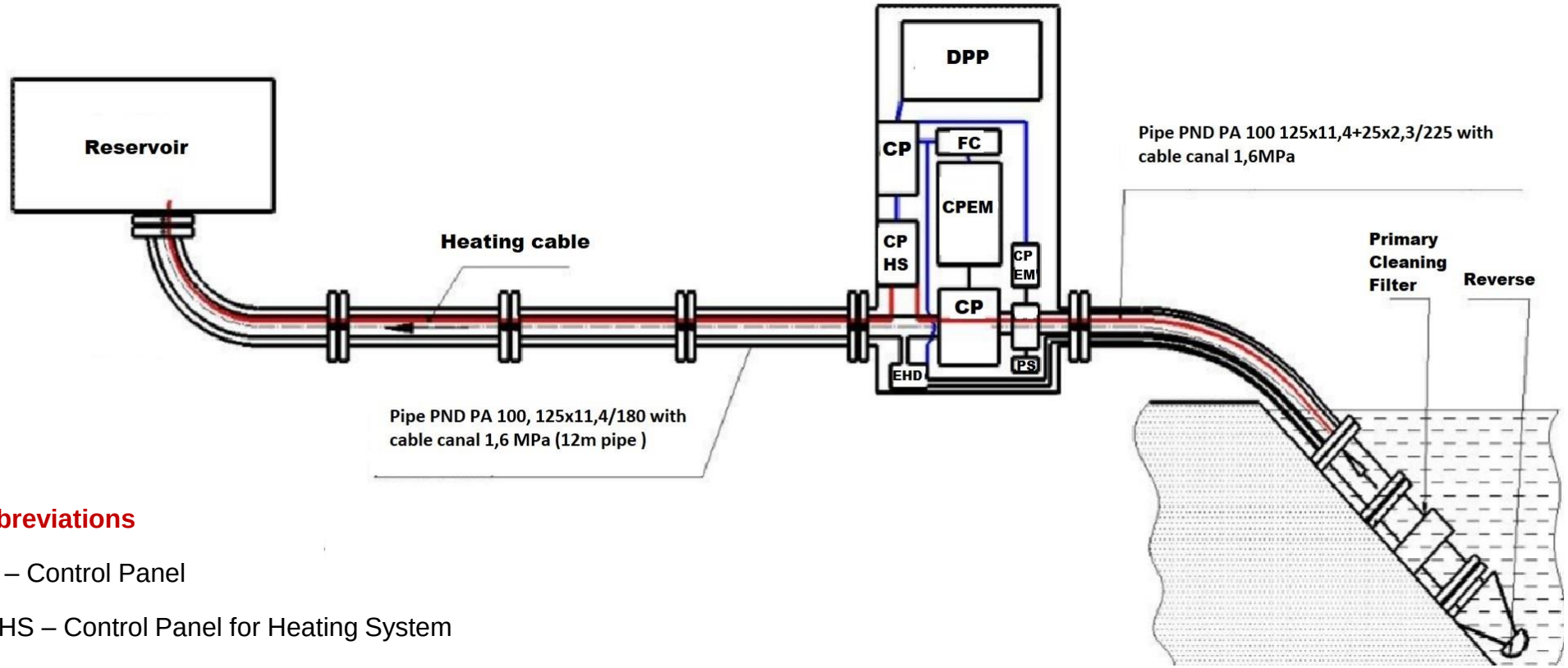
3. Water intake device with fish-proof head and flow-forming device.



# An autonomous culvert kit with electric heating for hydraulic fracturing




## Abbreviations

CP – Control Panel

CPHS – Control Panel for Heating System

DPP – Diesel Power Plant (160 kVt)

CP - Centrifugal Pump

CPEM – Centrifugal Pump Electric Motor (160 kVt)

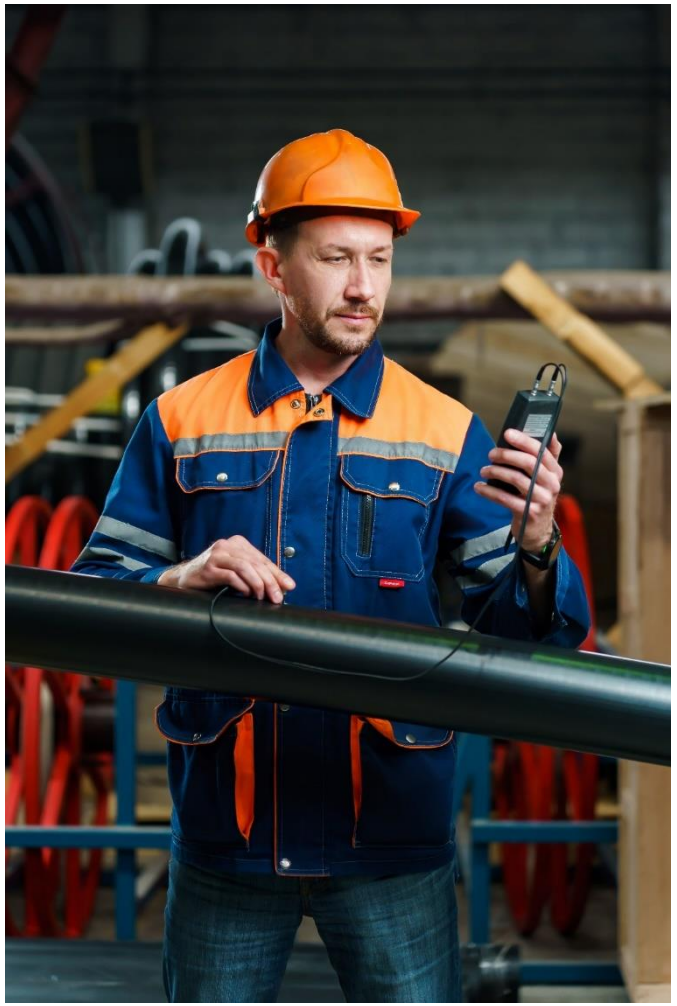
EHD – Electric Hydraulic Distributor

PC – Pressure Sensor

FC – Frequency Converter

## QUALITY POLICY AND OPERATION SAFETY

- “Mimir Group” specializes in the production of flexible polymer reinforced pipes, in thermal insulation with electric heating systems, reinforcing UD-tapes, fittings, components, winding devices and other types of goods for completing pipelines. The company strives to become a stable and competitive manufacturer both in the Russian and foreign markets. Ensuring the consistent high quality of our products is one of our main priorities.
- The management and employees of the company consider the life and health of the staff to be our main value. Safety is a key priority of “Mimir Group” and its partner enterprise "Polymer Pipe Plant".
- "Mimir Group" recognizes the importance of global environmental protection in the implementation of all types of activities. Environmental protection is an important part of the content of our daily work and one of the key drivers for our success.



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**“Mimir Group”** works in various industries and infrastructure projects. The company specializes in providing full-cycle services in the field of industrial engineering and servicing.

The main activities of our group of companies:

- Supply of Russian and imported equipment and components;
- Development and production of materials and equipment;
- Design;
- Production of construction and installation works, installation supervision and commissioning works;
- Software development, implementation and integration;
- Service and maintenance.

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