

BUSINESS UNIT  
CHEMICALS FOR DRILLING  
AND RECOVERY

CATALOGUE  
OF CEMENTING  
REAGENTS



MIRRICO  
GROUP OF COMPANIES

# ABOUT COMPANY

Chemicals for Drilling and Recovery Business Unit (CDR BU) deals with synthesis, customized selection, and supply of a wide spectrum of complex chemicals with high engineering content for well construction and oil recovery

## Business Domains of Chemicals for Drilling and Production Business Unit (CDP BU) of the Mirrico Group

### TRADING

- **WELL CONSTRUCTION**  
Chemicals for drilling fluids (water-based), well construction (oil-based), and cement slurries.
- **OIL PRODUCTION**  
Chemicals for bottom-hole zone treatment, water shut-off, injection profile conformance, squeeze cementing, and hydraulic fracturing.

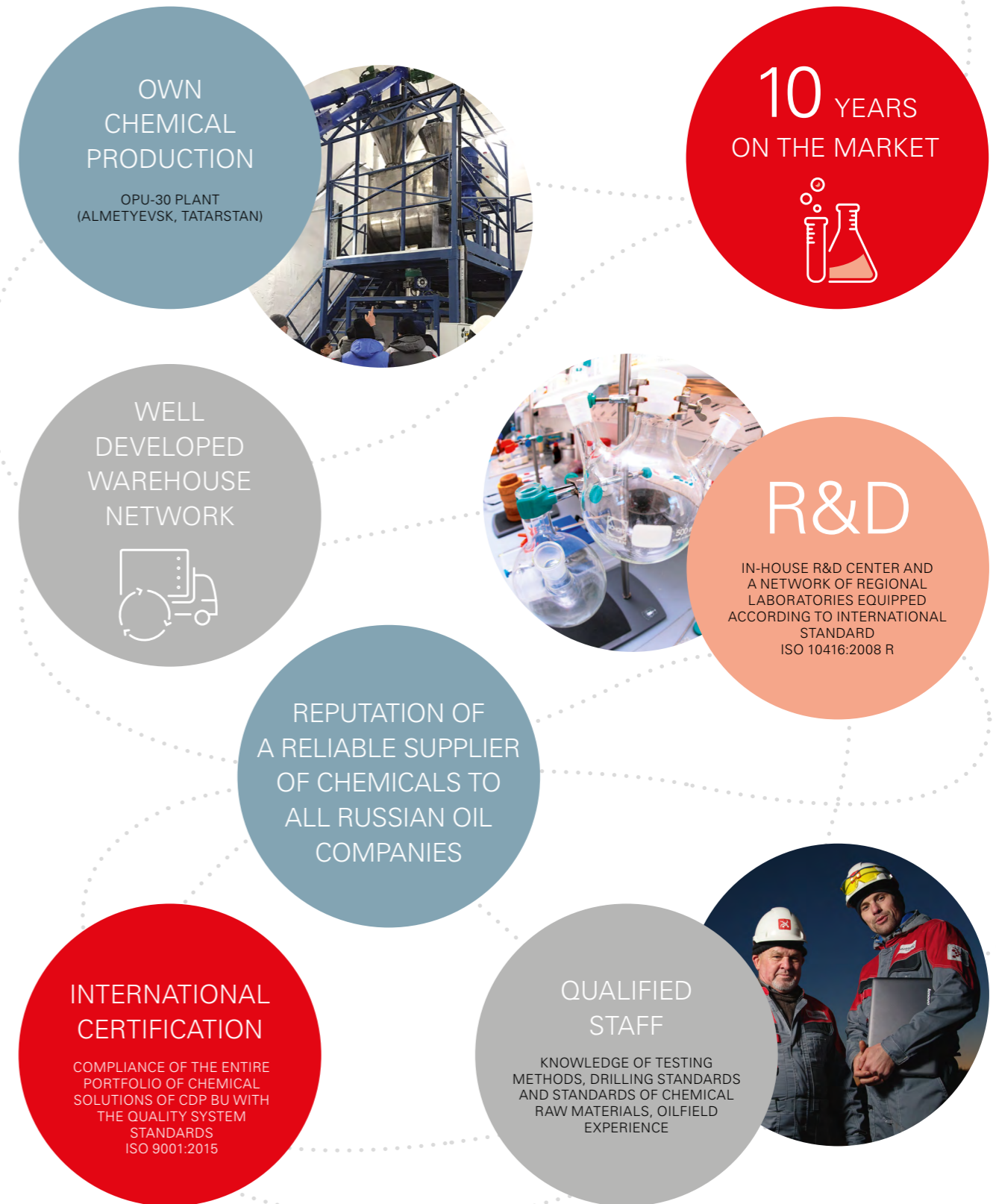


The CDP BU includes both standard drilling mud systems for the most common wellfield conditions and innovative technologies to resolve specific issues and bottlenecks occurring during drilling, cementing and oil production.

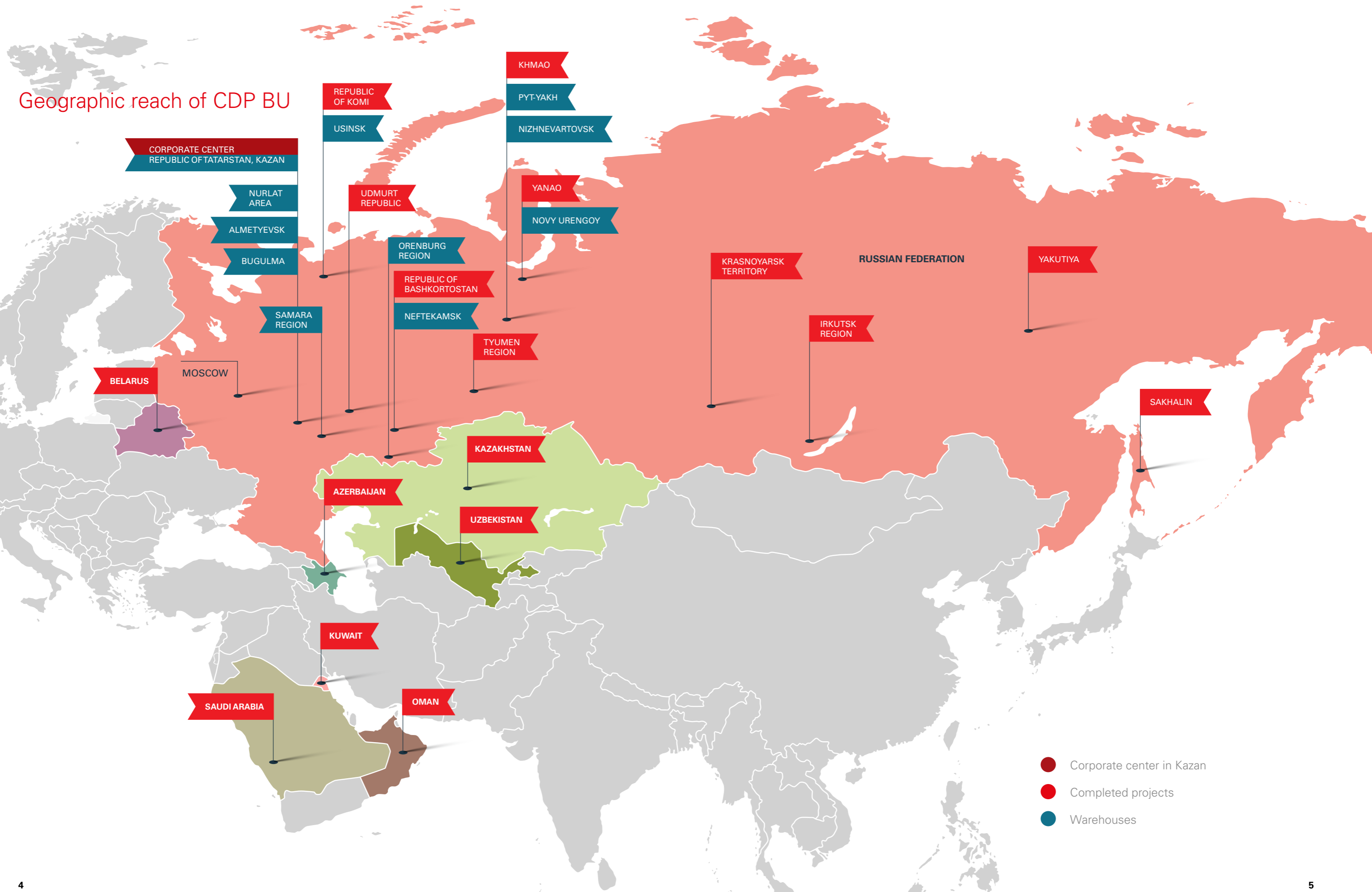
### ENGINEERING

- **CREATING SYSTEMS OF DRILLING FLUIDS AND CEMENT SLURRIES.**
- **SELECTION OF PROCESS FLUIDS FOR OIL PRODUCTION AND HYDRAULIC FRACTURING.**
- **ENGINEERING SUPPORT IN THE IMPLEMENTATION OF THE DEVELOPED CHEMICAL SOLUTION.**
- **AUDIT AND SUPERVISION.**

## What you need to know about the CDP BU



### Geographic reach of CDP BU



- Corporate center in Kazan
- Completed projects
- Warehouses

## Structure

### DRILLING AND PRODUCTION REAGENTS BUSINESS UNIT

SALES DEPARTMENT  
OF CHEMICAL REAGENTS  
FOR WELL CONSTRUCTION  
(DRILLING, CEMENTING)

SALES DEPARTMENT  
OF CHEMICAL REAGENTS  
FOR OIL PRODUCTION

PROCESSING  
SERVICE

SCIENTIFIC RESEARCH  
LABORATORY

CONTRACT  
PERFORMANCE BOND  
DEPARTMENT

PRODUCT MARKETING  
DEPARTMENT

## Quality management system

Drilling and Production Reagents Business Unit is certified by the quality management system according to requirements of international standard ISO 9001: 2008.

In the near future Drilling and Production Reagents Business Unit is expected to master international standard ISO 9001: 2015.

## Our customers



# CATALOG OF CEMENTING CHEMICALS

Solutions for cementing chemistry

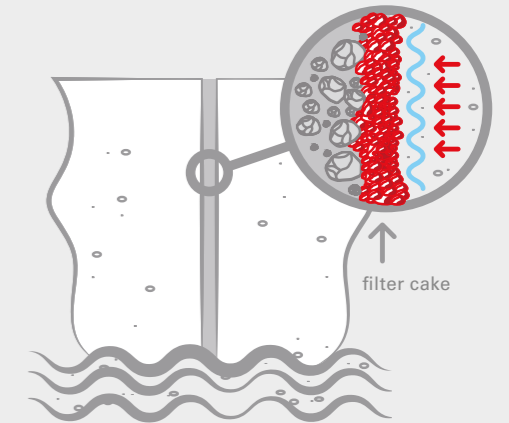
Task:	<b>Cement slurry filtering regulation</b>
Solution: <b>Fluid loss additives</b>	Atren Cem 1 Atren Cem Premium Atren Cem Ultra Atren Cem GMM Atren Cem PHV Atren Cem 1L, Cem 1LS
Task:	<b>Регулирование реологических свойств цементного раствора</b>
Solution: <b>Rheological (thickening) additives</b>	Atren Cem LV Atren Cem HV
Task:	<b>Preventing gas migration</b>
Solution: <b>Gas blocking additives</b>	Atren Expand Atren Cem GBL
Task:	<b>Cement slurry dispersion</b>
Solution: <b>Plasticizers</b>	Atren Plast A Atren Plast B Atren Plast C Atren Plast D Atren LPC-50
Task:	<b>Slowing down the thickening time of cement slurry</b>
Solution: <b>Thickening time retarding additives</b>	Atren Ret G Atren Ret L
Task:	<b>Cement density control</b>
Solution: <b>Lightweight additives</b>	Atren Light Atren LB
Task:	<b>Increasing slurry density</b>
Solution: <b>Heavyweight additives</b>	Atren Heft
Task:	<b>Defoaming</b>
Solution: <b>Defoamers</b>	Atren Antifoam C Atren Antifoam P

Task:	<b>Well flushing before cementing</b>
Solution: <b>Flushing spacer</b>	Atren Spacer W Atren Spacer WP
Task:	<b>Well flushing before cementing after OBM drilling</b>
Solution: <b>Flushing spacer for OBM solutions</b>	Atren Spacer O Atren Spaser VR
Task:	<b>Total drilling mud displacement</b>
Solution: <b>Separating spacer</b>	Atren Spacer S
Task:	<b>Circulation loss prevention / cement stone reinforcement</b>
Solution: <b>Micro-reinforcing agents</b>	Atren Fiber Atren Arm
Task:	<b>Casing quality improvement</b>
Solution: <b>Increasing adhesion of cement stone to the casing pipe metal</b>	Atren SE марки A, B
Solution: <b>Increasing strength of cement stone without increasing density of the cement slurry</b>	Atren Solid марки O, Z
Solution: <b>Additive for volumetric expansion of cement stone</b>	Atren Wide
Solution: <b>Additive for accelerating setting time and starting strength gain at low formation temperatures</b>	Sapsan Kuper

Task:	<b>Self-healing of cement stone fractures</b>
Solution:	Atren Recad
Task:	<b>Cementing of long side tracks, cementing of well sections for carrying out multi-stage hydraulic fracturing</b>
Solution: <b>Additive giving elastic properties to cement stone</b>	Atren Flex
Task:	<b>Cementing of zones with extended salt layers</b>
Solution: <b>Magnesia cements</b>	Basis of magnesia cement slurry Atren Warp, Atren Wizard. Basis of magnesia cement slurry Atren Frame. Additive for cement setting acceleration Atren Spire. Strengthening additive of magnesia cement Atren Firm. Additive for regulation of rheological properties of magnesia cement slurry Atren Flow. Retarding agent for magnesia cement slurry setting time Atren Extend.

## TASK: CEMENT SLURRY FILTERING REGULATION

## SOLUTION: FLUID LOSS ADDITIVES



## ATREN CEM 1

**Description:** water-soluble modified polysaccharide for cement slurries.

**Application:** reducing fluid loss and filtration by structuring the cement paste and giving filter cake forming properties to the cement slurry.

**Recommended consumption:** additive concentration range is 0.20–0.8% of the dry cement weight depending on application temperature and formulation of the cementing slurry. Increase in the application temperature requires increase in the dosage. Recommended for moderate reservoir temperatures — up to 100 °C.

### Specific features:

- easily disperses in water with following dissolution;
- shows high salt resistance;
- environmentally friendly product that undergoes biological decomposition and does not form harmful substances;
- has a slight effect of slowing down the setting time, which can be successfully implemented at high downhole temperatures.

### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powder, from white to gray in color
Bulk density, g/cm <sup>3</sup>	0,5–0,85
Hydrogen-ion activity (pH) of 1 wt% water solution, units	6–11

## ATREN CEM PREMIUM

**Description:** fluid loss reducing agent for cement slurries based on synthetic sulfonated polymers.

**Application:** as an effective fluid loss controller for cement slurries used in construction and workover of oil and gas wells. It is successfully used in primary cementing and remedial cementing operations related to squeeze cementing.

**Recommended consumption:** 0.2–0.6 % of the dry cement weight to effectively reduce the fluid loss rate; 0.60–0.80% of the dry cement weight as an agent preventing behind-the-casing migration of formation fluids (behind-the-casing flows). The concentration should be chosen according to specific formulation and parameters.

**Specific features:**

- provides low cement slurry filtration at high temperatures (up to 180 °C);
- does not slow down the cement slurry setting time;
- does not cause negative impact on the strength gain time and on the value of the initial and final strength;
- effectively reduces the cement slurry water loss, reduces water separation.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder, from white to gray in color
Bulk density, g/cm <sup>3</sup>	0.4–0.7
Hydrogen-ion activity (pH) of 1 wt% water solution, units	6–11

## ATREN CEM GMM

**Description:** cement slurry fluid loss controller based on highly purified synthetic polymers.

**Application:** during construction and workover of oil and gas wells as an effective cement slurry fluid loss controller.

**Recommended consumption:** 0.40–0.8 % of the dry cement weight to effectively reduce the fluid loss. The concentration should be adjusted to a specific formulation and parameters.

**Specific features:**

- provides low fluid loss at temperatures of up to 180 °C;
- does not thicken the cement slurry, does not require addition of plasticizers;
- does not cause foaming of the cement slurry;
- has an effect of slowing down the setting time, which can be successfully implemented at high downhole temperatures;
- resistant to salts and saturated brines.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder, from white to gray in color
Bulk density, g/cm <sup>3</sup>	0.5–0.8
pH factor of ion activity, 1% wt water solution, units	5–8

## ATREN CEM ULTRA

**Description:** cement slurry fluid loss controller based on an acrylamide derivative.

**Application:** as an effective fluid loss controller of cement slurries in the construction and workover of oil and gas wells. It is successfully used in primary cementing and remedial cementing operations related to squeeze cementing. It prevents formation of channels that let reservoir fluids migrate in cement stone at the initial stage of the cement stone formation.

**Recommended consumption:** 0.2–0.6 % of the dry cement weight to effectively reduce the fluid loss rate; 0.60–0.80 % of the dry cement weight as an agent to prevent behind-the-casing migration of reservoir fluids. The concentration should be chosen according to specific formulation and parameters.

**Specific features:**

- effective in a wide temperature range (from 25 to 210 °C) and in solutions with high mineralization;
- effective in salt-saturated systems;
- in most cases, does not require addition of plasticizer.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder of red to dark brown color
Bulk density, g/cm <sup>3</sup>	0.55–0.85
pH factor of ion activity, 1 wt% water solution, units	6–8

## ATREN CEM PHV, ATREN CEM UHV

**Description:** mixture based synthetic polymers — fluid loss controllers. The mixed fluid loss reducing agent has properties specified by the customer according to individual requirements, which cannot be implemented in standard fluid loss reducing agents.

**Application:** to reduce the water loss of cement slurries in the technological processes of well casing operations.

**Рекомендуемый расход:** 0.3–0.80% of the dry cement weight to effectively reduce the fluid loss and gain the necessary useful properties.

**Specific features:**

- ensures low fluid loss at temperatures of up to 180 °C;
- since the chemicals are of common nature, they easily form a homogeneous mixture. This mixture is homogeneous in fractions, does not decompose, the properties from batch to batch are the same;
- the chemical undergoes 3 stages of quality control: upon receipt of raw materials, after getting finished chemicals for mixing, after getting finished mixed product. Each batch is checked for compliance with the basic functional properties (fluid loss, thickening time, rheology) before sending to the customer;
- in most cases, does not require addition of plasticizer.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 22–23 °C	Powdery substance of white color, cream color hue of various levels of intensity is allowable
Bulk density, g/cm <sup>3</sup>	0.50–0.85
Hydrogen-ion activity (pH) of 1 wt% water solution, units	7.5–11.0



## ATREN CEM 1L, 1LS

**Description:** liquid fluid loss controller for cement slurries Atren Cem 1L, 1LS is a solution based on synthetic polymers in a specialty solvent.

**Application:** it is used in the oil production industry, in technological processes of well casing to reduce the cement slurry fluid loss and water loss properties; it is also used in the simplified technological process schemes of cement slurry preparation when there is no possibility of «dry» admixing additives in cement.

**Recommended consumption:** added to the grouting liquid at a concentration of 2–4 % of cement weight (depending on the application conditions).

**Specific features:**

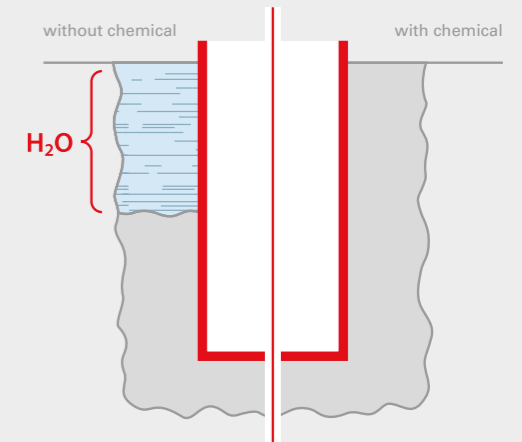
- effective at temperatures of up to 160 °C;
- used both in fresh and salt-saturated systems;
- does not cause negative impact on the cement stone strength;
- does not require a mud hopper when adding a chemical;
- compatible with other additives improving the well casing quality.

### Physical and chemical properties

Indicator	Standard value
Appearance at 22–23 °C	Liquid, from colorless to beige color, opalescence is allowable
Water loss of cement slurry (at T = 50 °C), ml, max	50
Congelation temperature, °C, max	-30

## TASK: REGULATION OF THE RHEOLOGICAL PROPERTIES OF CEMENT SLURRY

### SOLUTION: SEDIMENTATION STABILITY ADDITIVE



## ATREN CEM LV

**Description:** water-soluble modified polysaccharide for cement slurries.

With an increase in the application temperature an increase in the dosage is required. The application temperature is up to 80 °C.

**Application:** reducing the water separation properties, improve the cement slurry rheology (thickening), give sedimentation stability to the cement slurry. Designed for cement slurries of various densities, including cement slurries used for cementing the producing interval of wells.

**Recommended consumption:** additive concentration range is 0.20–0.8 % of the dry cement weight depending on the application temperature and composition of the cement slurry formulation.

**Specific features:**

- easily disperses in water with the following dissolution;
- shows high salt resistance;
- significantly reduces shrinkage of the cement slurry;
- does not affect the cement slurry strength;
- environmentally friendly product that undergoes biological decomposition and does not form harmful substances;
- has a slight effect of slowing down the setting time, which can be successfully implemented at high downhole temperatures.

### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powder, from white to gray in color
Bulk density, g/cm <sup>3</sup>	0.5–0.8
Hydrogen-ion activity (pH) of 1 wt% water solution, units	5–8

## ATREN CEM HV

**Description:** water-soluble modified polysaccharide with high molecular weight for cement slurries.

**Application:** to reduce the water separation indicators, improve the cement slurry rheology (thickening), give sedimentation stability to the cement slurry. It is designed for lightweight cement slurries.

**Recommended consumption:** additive concentration range is 0.1–0.8 % of the dry cement weight depending on the application temperature and composition of the cement slurry formulation. With an increase in the application temperature, an increase in the dosage is required. The application temperature is up to 80 °C.

**Specific features:**

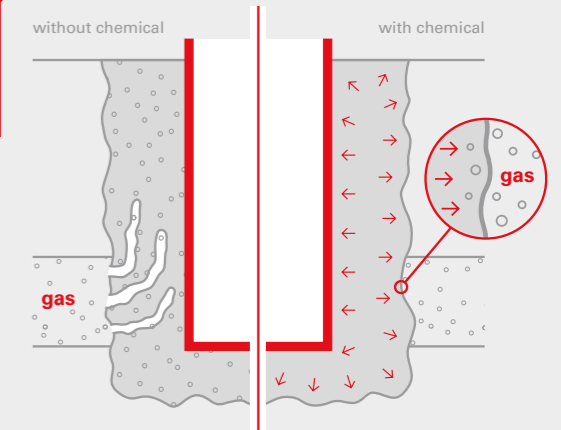
- easily disperses in water with following dissolution;
- shows high salt resistance;
- significantly reduces shrinkage of the cement slurry;
- does not affect the cement stone strength;
- environmentally friendly product that undergoes biological decomposition and does not form harmful substances;
- can be used in flush fluids as a thickener.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder, from white to gray in color
Bulk density, g/cm <sup>3</sup>	0.5–0.8
Hydrogen-ion activity (pH) of 1wt% water solution, units	5–8

## TASK: GAS MIGRATION PREVENTING

## SOLUTION: GAS BLOCKING ADDITIVES



## ATREN EXPAND

**Description:** mixed product based on finely dispersed metals with modifying additives.

**Application:** in the oil production industry, in the technological processes of well casing in order to prevent gas migration and improve the casing quality and adhesion quality on the «formation rocks — cement stone» and «cement stone — casing» surface borders due to creating internal pressure in the cement slurry.

**Recommended consumption:** ATREN EXPAND is added to the dry cement mixture at a concentration of 0.1 to 0.4 % of the dry cement weight (depending on the application conditions).

**Specific features:**

- expanding effect of ATREN EXPAND is achieved by release of hydrogen microbubbles during the chemical reaction in the alkaline environment of cement slurry, the gas stays in the dissolved and compressed condition, so the stone does not become porous;
- it is used to control the gas migration by creating pressure inside the slurry that compensates reduction in hydrostatic pressure during cement hardening;
- the process of gas formation begins only after the grouting mixture is injected into the well and left for the WOC time due to a special coating that slows down the beginning of the reaction.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powdery substance of gray and silver color
Bulk density, g/cm <sup>3</sup>	1.30–1.80
Moisture content, max, %	0.8

## ATREN CEM GBL

**Description:** liquid gas blocking additive for cement slurries Atren Cem GBL based latex polymer.

**Application:** in the oil production industry, in the technological processes of well construction, as an additive to cement slurries to control gas migration, it acts as an agent that reduces the cement slurry water loss, as well as contributes to stabilizing and preventing premature setting of the cement slurry.

**Recommended consumption:** Atren Cem GBL is added to the grouting fluid at concentration of 2–10 % of the cement weight (depending on the application conditions).

**Specific features:**

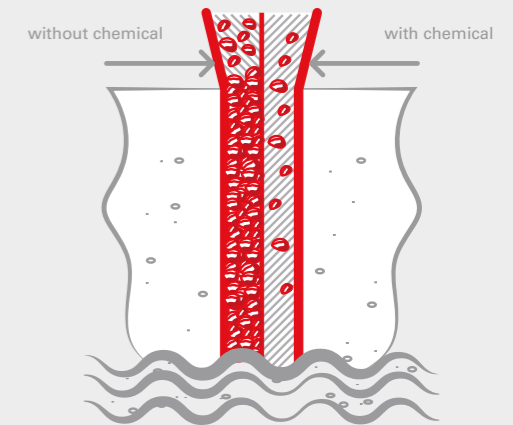
- the gas blocking effect is achieved by slowing down the growth of the gel static shear stress; it creates conditions for transfer of hydrostatic pressure of the cement column to the gas-bearing layers;
- effectively reduces the cement slurry water loss;
- improves adhesion properties of the cement stone and reduces its permeability;
- slowing down the thickening time of cement slurry;
- prevents cement shrinkage.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 22–23 °C	White fluid
Density at 20 °C, g/cm <sup>3</sup>	0.9–1.1
Dry solids weight ratio, min, %	40

## TASK: CEMENT SLURRY DISPERSION

### SOLUTION: PLASTICIZERS



## ATREN PLAST A

**Description:** plasticizer based on polycarboxylate polymer.

**Application:** in well cementing as a dispersing additive in cement slurries in order to control their rheological properties, reduce the hydraulic resistance of the cement slurry, reduce injection and squeeze pressure. The functioning principle is based on dispersion of cement particles due to electrostatic and steric effects of adsorbed plasticizer molecules.

**Recommended consumption:** added into grouting fluid as well as into dry cement. The recommended range of additive concentrations is 0.05–0.4 % of the dry cement weight. The concentration should be chosen according to specific formulation and parameters.

**Specific features:**

- remains efficient at temperatures up to 160 °C;
- increases the efficiency of fluid loss reducing agents;
- environmentally friendly product, belongs to low-hazard substances.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder, from light gray to yellow in color
Bulk density, g/cm <sup>3</sup>	0.6–0.9
pH value of 1 % water solution	7–10
Dry solids weight ratio, min, %	92

## ATREN PLAST B

**Description:** plasticizer based on sulfonic-naphthalene derivatives.

**Application:** in well cementing as a dispersing additive to cement slurries in order to control their rheological properties, reduce the hydraulic resistance of the cement slurry, reduce injection and squeeze pressure. The functioning principle is based on dispersion of cement particles due to electrostatic and steric effects of adsorbed plasticizer molecules.

**Recommended consumption:** added into grouting fluid as well as into dry cement. The recommended range of additive concentrations is 0.20–0.80 % of the dry cement weight. The concentration should be selected according to specific formulation and parameters.

**Specific features:**

- remains efficient at temperatures up to 80 °C;
- environmentally friendly product, belongs to low-hazard substances;
- reduces rheological parameters of cement slurry.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder of red to dark brown color
Bulk density, g/cm <sup>3</sup>	0.6–0.9
pH value of 1 % water solution	8–11
Dry solids weight ratio, min, %	88

## ATREN PLAST C

**Description:** plasticizer based on sulfonic-melamine derivatives.

**Application:** used in well cementing processes as a plasticizing additive to cement slurries in order to regulate their rheological properties, to reduce hydraulic resistance of cement slurries, and to reduce pumping and squeezing pressure. The functioning principle is based on dispersion of cement particles due to electrostatic and steric effects of adsorbed plasticizer molecules.

**Recommended consumption:** added into grouting fluid as well as into dry cement. The recommended range of additive concentrations is 0.1–0.80 % of the dry cement weight. The concentration should be selected according to specific formulation and parameters.

**Specific features:**

- preserves its efficiency at temperatures of up to 160 °C;
- environmentally friendly product, refers to low-hazard substances;
- has no side properties on cement slurry.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder of white to light-yellow color
Bulk density, g/cm <sup>3</sup>	0.55–0.9
pH value of 1 % water solution	7.5–9.5
Dry solids weight ratio, min, %	90

## ATREN PLAST D

**Description:** plasticizer based on acetone-formaldehyde derivatives.

**Application:** used in well cementing processes as a plasticizing additive to cement slurries in order to regulate their rheological properties, to reduce hydraulic resistance of cement slurries, and to reduce pumping and squeezing pressure. The functioning principle is based on dispersion of cement particles due to electrostatic and steric effects of adsorbed plasticizer molecules.

**Recommended consumption:** added both into the grouting fluid and dry cement. The recommended range of additive concentrations is 0.1–0.9 % of the dry cement weight.

**Specific features:**

- remains efficient at temperatures up to 160 °C;
- reduces rheological parameters of cement slurry;
- belongs to low-hazard substances. Biologically degradable without forming harmful substances.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder, from dark brown to red brown in color
Bulk density, g/cm <sup>3</sup>	0.6–0.8
pH value of 1 % water solution	8.5–12
Dry solids weight ratio, min, %	90

## ATREN LPC 50

**Description:** liquid plasticizer of cement slurries Atren LPC 50 is based on ethers of polycarboxylates in liquid form.

**Application:** in well cementing as a dispersing additive in cement slurries in order to control their rheological properties, reduce the hydraulic resistance of the cement slurry, reduce injection and squeeze pressure. The functioning principle is based on dispersion of cement particles due to electrostatic and steric effects of adsorbed plasticizer molecules.

**Recommended consumption:** added into the grouting fluid at a concentration of 0.2–1 % (depending on the application conditions) by cement weight. The concentration should be chosen according to specific formulation and parameters.

**Specific features:**

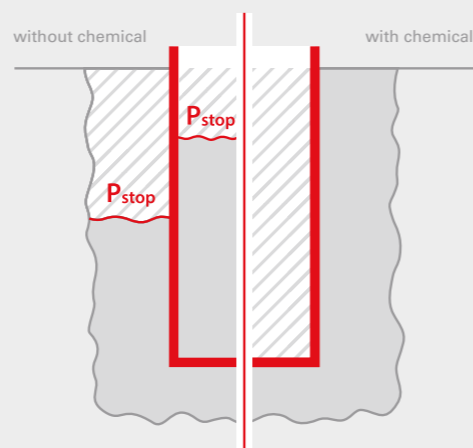
- remains efficient at temperatures up to 160 °C;
- shows high plasticizing effect;
- does not cause negative impact on the cement stone strength gain;
- compatible with all types of cement slurry additives;
- stable at high temperatures.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Transparent liquid
Density at 22–23 °C, g/cm <sup>3</sup>	1.1
pH value of 10 % water solution	4–5

## TASK: SLOWING DOWN THE THICKENING TIME OF CEMENT SLURRY

### SOLUTION: THICKENING TIME RETARDING ADDITIVES



## ATREN RET G

**Description:** additive slowing down the thickening time of cement slurry for static temperatures in the well up to 130 °C; it is based on a mixture of synthetic polymers.

**Application:** in the oil and gas industry in the technological processes of well casing operations in order to increase the mobility and setting time of cement slurry and to improve its rheological parameters.

**Recommended consumption:** added into the grouting fluid or mixed with cement in dry form. The recommended range of additive concentrations is 0.03–0.3 % of the dry cement weight depending on the static temperature in the well. The concentration should be chosen according to specific formulation and parameters.

#### Specific features:

- interacts in the water phase with calcium ions, forming an insoluble and impenetrable layer on the surface of the cement grains. This slows down the hydration, creates a negatively charged layer, which leads to an increase in the setting time and dispersion of cement particles in the slurry;
- compatible with all types of cement, applicable to all types of cement slurries, based on both fresh or salt mixing water;
- has plasticizing and dispersive effect.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powder, from white to yellowy in color
Bulk density, g/cm <sup>3</sup>	0.8–1.15
pH value of 1 % water solution	6–10

## ATREN RET L

**Description:** additive for slowing down the thickening time of cement slurry at moderate static temperatures in the well; it is based on a lignin derivative.

**Application:** in the oil and gas industry in the technological processes of well casing operations in order to increase the mobility and setting time of cement slurry and to improve its rheological parameters.

**Recommended consumption:** 0.1–0.8 % of the dry cement weight. The concentration should be chosen according to specific formulation and parameters.

#### Specific features:

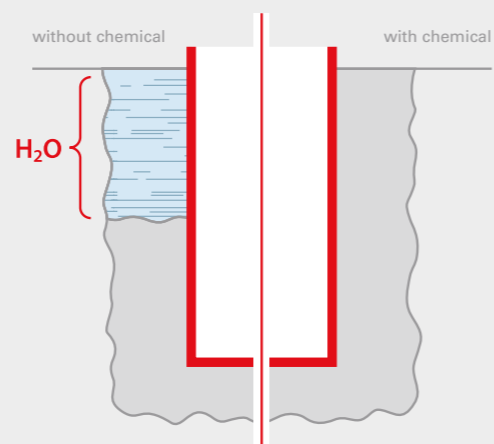
- adsorbed on the surface of the cement particles during the hydration process and prevents their contact with water, slowing down the thickening time;
- compatible with all types of cement, applicable to all types of cement slurries, based on both fresh or salt mixing water;
- has a slight plasticizing and dispersive effect;
- preserves its efficiency at temperatures of up to 110 °C.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powdery substance of light to dark brown color
Bulk density, g/cm <sup>3</sup>	0.4–0.8
pH value of 1% water solution, units	4–8

## TASK: CEMENT DENSITY CONTROL

### SOLUTION: LIGHTWEIGHT ADDITIVES



## ATREN LIGHT

**Description:** chemical based on sodium silicate.

**Application:** in the oil and gas industry in construction and workover of wells as a technological additive to cement slurries for obtaining lightweight sedimentation stable cement slurries and accelerating the strength gain of cement stone.

**Recommended consumption:** ATREN LIGHT additive concentration range is 0.5–3 % of the dry cement weight depending on the cement grade, additional additives and the density to be obtained. The additive can be added both to the cement in dry form and to the grouting fluid.

#### Specific features:

- slightly affects the rheological properties of the cement slurry;
- reacting with calcium ions, gives the cement slurry a gel-like structure, which helps to reduce water separation and stabilization of the dispersion phase;
- can be applied as an accelerator in cement slurries of normal density with the use of fluid loss additives based on polysaccharides, as well as in lightweight slurries with the use of bentonite;
- compatible with most classes of cements and additives to cement slurries, which indicates its versatility.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powdery substance of white color
Bulk density, g/cm <sup>3</sup>	1.05–1.50
pH value of 1 % water solution, units	11–13.5
Moisture content, max, %	15

## ATREN LB

**Description:** lightweight additive Atren LB is presented in the form of aluminosilicate microsphere.

**Application:** for industrial use in oil production industry, in construction of wells, as a technological additive to cement slurries in order to reduce their density.

**Recommended consumption:** the recommended concentration of Atren LB is 1–25 % of the dry cement weight depending on the cement grade, additional additives, and the density to be obtained.

#### Specific features:

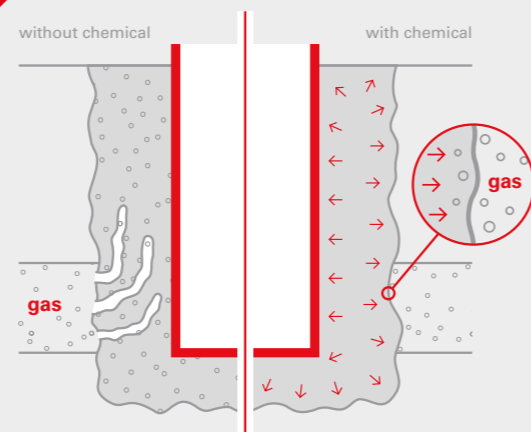
- the additive is used to effectively reduce the density of cement slurry, while maintaining sedimentation stability;
- provides the necessary height of cement lift, reducing pressure on formations and preventing hydraulic fracturing
- during cementing;
- inert additive, does not change the chemical composition of the cement slurry.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powder, from light gray to dark gray in color
Bulk density, g/cm <sup>3</sup>	0.35–0.55
Dry solids weight ratio, min, %	98

## TASK: INCREASING DENSITY OF CEMENT SLURRY

### SOLUTION: WEIGHTING ADDITIVES



## ATREN HEFT

**Description:** weighting additive Atren Heft is a fine product with large surface area, effectively increasing the density of the cement slurry at low consumption rates.

**Application:** Atren Heft is used to weight the cement slurry to a density of 2.2–2.3 g/cm<sup>3</sup> and above.

**Recommended consumption:** the recommended concentration of Atren Heft is 5–20 % of the dry cement weight depending on the cement grade, additional additives, and the density to be obtained.

#### Specific features:

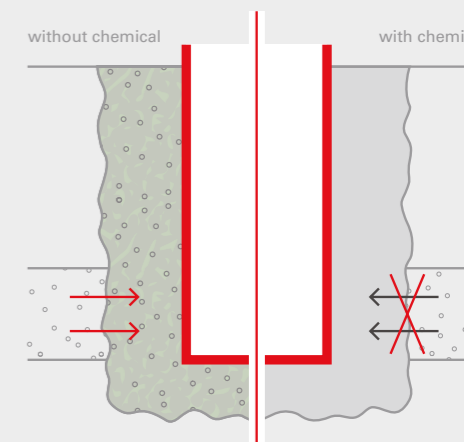
- effective heavyweight additive enabling to increase the cement slurry density at a low flow rate;
- inert additive, slightly alters the cement slurry properties;
- adds good sedimentation stability to the cement slurry.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	Powder, from light brown to dark brown in color
Bulk density, g/cm <sup>3</sup>	1.20–1.90
Moisture content, max, %	10

## TASK: DEFOAMING

### SOLUTION: DEFOAMERS



## ATREN ANTIFOAM C

**Description:** liquid anti-foaming agent into combat foaming in various technological fluids.

**Application:** for use in cement slurries and all types of water-based drilling muds to effectively eliminate and prevent the formation of extensive and surface foam.

**Recommended consumption:** the range of additive concentration is 0.1–0.4 % of the dry cement weight.

#### Specific features:

- used as an anti-foaming additive to the grouting fluid for preparation of drilling muds and cement slurries;
- does not have a negative effect on the rheologic and fluid-loss properties of the slurry;
- does not lose its properties in case of multiple freezing/thawing cycles;
- designed for both fresh and highly mineralized drilling fluids;
- effective as an additive to the technological fluids for perforation, well killing and suspension.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	ΠTransparent liquid, from colorless to brown in color, opalescence is allowable
Bulk density, g/cm <sup>3</sup>	0.84–1.05
Anti-foaming efficiency, min, %	70



## ATREN ANTIFOAM P

**Description:** powdered anti-foaming agent designed to combat foaming in various technological fluids.

**Application:** as an anti-foaming additive to cements for preparation of grouting mixtures, compatible with all classes of API cements and additives regulating properties of cement slurry. It can be used as an anti-foaming additive to bulk foaming chemicals.

**Recommended consumption:** when used in cement slurries, the dry blend method is recommended. In other technological fluids, it may be dissolved in water before use. The optimum concentration of the chemical is 0.1–1.5 %.

**Specific features:**

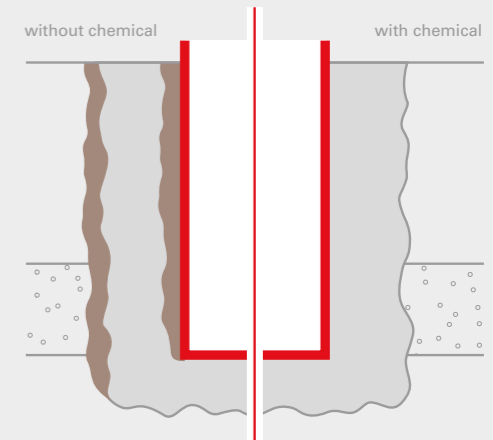
- does not have a negative effect on the rheologic and fluid-loss properties of the slurry;
- designed for both fresh and highly mineralized solutions;
- effective as an additive to ready-made grouting mixtures;
- it is possible to add to the grouting fluid.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powdery substance from white to cream color. The presence of lumps of low density up to 20 mm in size is allowed
Bulk density, g/cm <sup>3</sup>	0.4–0.8
Anti-foaming efficiency, min, %	70

## TASK: WELL FLUSHING BEFORE CEMENTING

## SOLUTION: FLUSHING SPACER



## ATREN SPACER W

**Description:** liquid flushing composition.

**Application:** to improve quality of the cement stone adhesion to rocks and casing by destroying and removing mud cake.

**Рекомендуемый расход:** 0.5 % per 1 m<sup>3</sup> of flushing liquid.

**Specific features:**

- shows high washing capacity, which allows to effectively prepare the well bore for successful cementing job;
- effective when used in wells drilled with mud laden fluids, polymer and mud laden fluids, inhibiting polymer fluids, KCL polymer drilling muds;
- compatible with all chemicals used for treatment of drilling muds and cement slurries, as well as all grades of cements.
- does not lose its properties in case of multiple freezing/defrosting cycles.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Liquid, from light brown to dark brown in color
Density at 20 °C, g/cm <sup>3</sup>	1.33–1.38
pH value of 1 % water solution, units	11–13.5

## ATREN SPACER WP

**Description:** powdered mixture of surfactants.

**Application:** to improve quality of the cement stone adhesion to rocks and casing by destroying and removing mud cake.

**Recommended consumption:** 5–10 kg per 1 m<sup>3</sup> of flushing liquid.

**Specific features:**

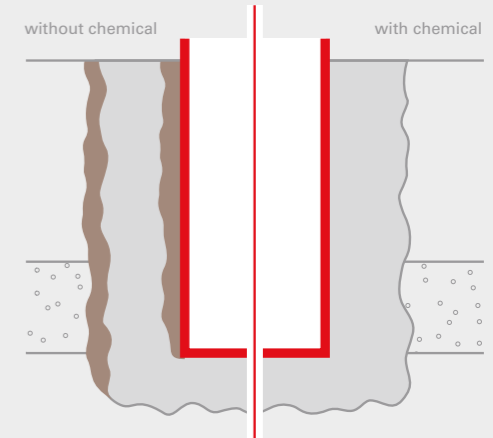
- shows high washing capacity, which allows to effectively prepare the well bore for successful cementing job;
- effective when used in wells drilled with mud laden fluids, polymer and mud laden inhibiting fluids, KCL polymer drilling muds;
- compatible with all chemicals used for treatment of drilling muds and cement slurries, as well as all grades of cements.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder or granules, white to gray in color (lumps allowed)
Bulk density, g/cm <sup>3</sup>	1.05–1.35
Hydrogen-ion activity (pH) of 1wt% water solution, units	10–12

## TASK: WELL FLUSHING BEFORE CEMENTING AFTER OBM DRILLING

## SOLUTION: FLUSHING SPACER FOR OBM SOLUTIONS



## ATREN SPACER O

**Description:** mixed product based on surfactants of different nature in the hydrocarbon solvent.

**Application:** in oil industry in order to remove the filter cake from the wellbore walls, formed by hydrocarbon-based drilling muds. It effectively prepares the well bore for the successful cementing of casing strings; it is effective when used in wells drilled with the use of hydrocarbon-based drilling muds.

**Recommended consumption:** dosage per 1 m<sup>3</sup> of flushing liquid:

- ATREN SPACER, brand O: 10–20 %;
- hydrocarbon solvent: 30–40 %;
- water: 50 %.

**Specific features:**

- effectively prepares the well bore drilled with OBM, for successful casing cementing;
- actively removes the filter cake
- formed by hydrocarbon-based drilling mud.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Homogeneous oil fluid from light brown to black in color, solid sediment is allowed
Density at 20 °C, g/cm <sup>3</sup>	0.75–1.1
Acid number, max, mg KOH/g	30

## ATREN SPACER VR

**Description:** flushing spacer for OBM Atren Spacer VR is a mixture based on surfactants and dispersers in a special solvent.

**Application:** used in the oil production industry in the technological processes of well construction to clean the well from the remains of hydrocarbon-based drilling mud from the walls of the well before cementing. This effect is achieved due to effective liquefying, dissolving and dispersing of the mud remains and the solid phase.

**Recommended consumption:** recommended dosage of Atren Spacer VR is 5–20 % depending on spacer volume.

**Specific features:**

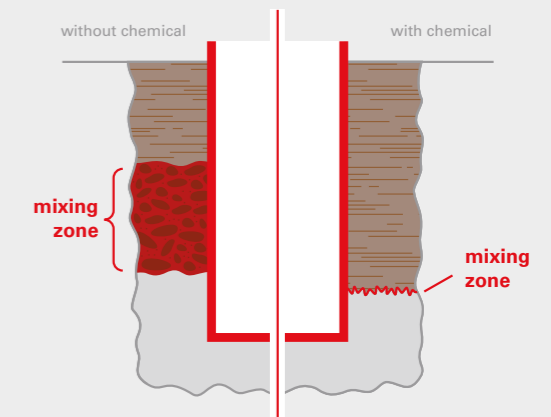
- contributes to improved quality of preparation of the well bore to casing cementing operations, drilled using OBM;
- effectively liquefies and dissolves drilling mud cake;
- during well bore flushing, changes the type of well bore wettability to hydrophilic.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 22–23 °C	Colorless, slightly oily fluid
Density at 20 °C, g/cm <sup>3</sup>	0.809–0.811
Weight percentage of the main substance, min, % wt	5

## TASK: TOTAL DRILLING MUD DISPLACEMENT

## SOLUTION: SEPARATING SPACER



## ATREN SPACER S

**Description:** composition based on polymeric chemicals and filler.

**Application:** in the oil and gas industry to prevent mixing of drilling mud and grouting fluid, as well as to completely remove the drilling mud from the casing string annulus, which significantly improves the quality of the well casing operations according to CBT.

**Recommended consumption:** 10–25 kg per 1 m<sup>3</sup> of spacer.

**Specific features:**

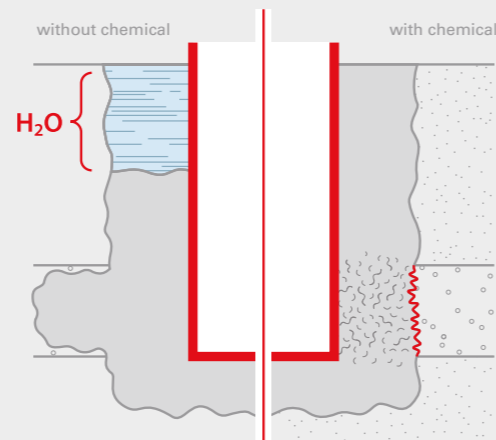
- gives the spacer a color different from the color of cement slurry and drilling mud, which allows you to effectively separate the technological fluids during cementing;
- the increase in the density of the buffer bench created on the basis of ATREN SPACER S can be achieved by adding weighting agents;
- compatible with all types of cement slurries and drilling mud and does not affect their rheological characteristics.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Powder or granules of white, gray or brown color
Bulk density at 20 °C, g/cm <sup>3</sup>	0.85–1.15
pH value of 1 % water solution, units	8–11

## TASK: CIRCULATION LOSS PREVENTION / CEMENT STONE REINFORCEMENT

### SOLUTION: MICRO-REINFORCING AGENTS



## ATREN FIBRE

**Description:** inert material resistant to acids, alkalis, and salts.

**Application:** for reservoir clogging and preventing circulation loss of cement slurry and drilling mud during squeezing into the annular space due to structuring of the cement paste framework and clogging of the formed cavities.

**Recommended consumption:** added directly to the cement slurry. The concentration range is 0.5–2.0 kg per 1 m<sup>3</sup> of slurry.

**Specific features:**

- increases mechanical characteristics, the cement stone resistance to the impact of various loads, including during perforation;
- reduces permeability of the cement stone. The finest fibers add to the slurry sedimentation stability;
- ability of ATREN FIBRE fibers to be mixed ensures their uniform distribution in cement slurry and reinforcement of cement stone throughout the whole volume.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Fibrous colorless material
Moisture content, max, %	1.0

## ATREN ARM

**Description:** special alkali-resistant material for micro-reinforcement of cement paste matrix.

**Application:** for reservoir clogging and preventing circulation loss of cement slurry and drilling mud during squeezing into the annular space due to structuring of the cement paste framework and clogging of the formed cavities.

**Recommended consumption:** added in dry form or directly to the cement slurry with the recommended concentration of 0.5–5.0 kg per 1 m<sup>3</sup> of cement slurry.

**Specific features:**

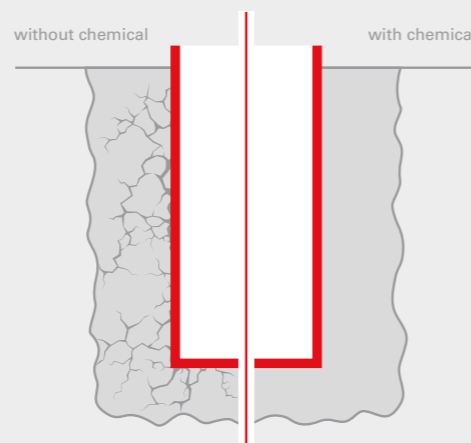
- easily and evenly distributed in the volume of dry mix and cement slurry, does not float;
- acts as reinforcement in the cement stone matrix. The mineral origin and density of the material, close to the cement density, ensures an ideal binding adhesion of fiber with the matrix, without having a negative impact on the results of the study of cementing quality by acoustic methods;
- increases mechanical characteristics, the cement stone resistance to the impact of various loads, including those occurring during perforation.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 20 °C	Fibrous colorless material
Moisture content, max, %	1.0

## TASK: MOUNTING QUALITY IMPROVEMENT

### SOLUTION: INCREASE OF THE CEMENT STONE ADHESION TO THE CASING PIPE METAL



### ATREN SE MAPKI A, B

**Description:** mixed product based on silicon and aluminum oxides, which increases the cement slurry adhesion.

The recommended range of additive concentration is 2–5 % of the dry cement weight.

#### Specific features:

- has large surface area;
- environmentally friendly material;
- can fix alkalis. This property provides reliable protection of the cement stone from destruction caused by silicate-alkaline reaction.
- contributes to significant reduction of free water in the cement slurry.

**Application:** during well cementing operations in order to increase the cement stone strength and adhesion to the casing pipe metal.

**Recommended consumption:** added to dry cement (uniform distribution is required); besides that, the chemical also can be added to the grouting fluid, if necessary.

#### Physical and chemical properties

Indicator	Standard value	
	A	B
Appearance at 22–23 °C	Powder, from light pink to dark pink in color	Fine powder of gray or dark grey color
Bulk density at 22–23 °C, kg/m <sup>3</sup>	Not standardized	150–600
Weight percentage of the main substance, min, %	90	

### SOLUTION: INCREASING STRENGTH OF CEMENT STONE WITHOUT INCREASING CEMENT SLURRY DENSITY

### ATREN SOLID MAPKI O, Z

**Description:** mineral residue of minerals burning, consisting of clinker phases.

#### Specific features:

- environmentally friendly material;
- increases the strength properties of the stone by 20 % or more;
- perfectly increases the solid phase content in the cement slurry, which is especially effective in lightweight cement slurries.

**Application:** during well cementing operations in order to increase the strength of the cement stone.

**Recommended consumption:** added to dry cement, uniform distribution is required. The recommended range of additive concentrations is 10–15 % of the dry cement weight.

#### Physical and chemical properties

Indicator	Standard value	
	O	Z
Appearance at 22–23 °C	Powder, from white to dark gray in color, possibly yellowish	
Chloride content, %	0.6	
Mass fraction of the residue on the sieve No. 008, max, %	No applicable regulations	5–35

## SOLUTION: ADDITIVE FOR VOLUMETRIC EXPANSION OF CEMENT STONE

### ATREN WIDE

**Description:** composition of inorganic materials, which gives the property of linear expansion to the cement stone.

**Recommended consumption:** added to dry cement, uniform distribution is required. The recommended range of additive concentrations is 5–10 % to the dry cement weight.

**Application:** in the construction and cementing of wells to obtain the expanding grouting composition with preservation of strength characteristics of the cement stone.

**Specific features:**

- composition of inorganic, environmentally friendly materials;
- gives the cement stone the linear expansion property up to 10% or more depending on the concentration.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 22–23 °C	Powder, from beige to gray in color
Moisture content, max, %	0.5

## SOLUTION: ADDITIVE TO ACCELERATE SETTING AND STRENGTH GAIN TIME AT LOW RESERVOIR TEMPERATURES

### SAPSAN KUPER

**Description:** mixture based on alkali salts and synthetic polymers.

**Specific features:**

- used for installation of cement plugs at moderate and low temperatures;
- easy application of mixture in field conditions: the mixture contains all the necessary additives. The mixture is added into dry cement as well as into grouting fluid before mixing with cement;
- effectively accelerates the setting time of the cement slurry;
- The mixture accelerates the early strength gain of the cement stone at low reservoir temperatures.

**Application:** in the oil production industry when drilling and workover of oil, gas and water wells as a highly active technological additive in well cementing to accelerate the early strength gain of the cement stone.

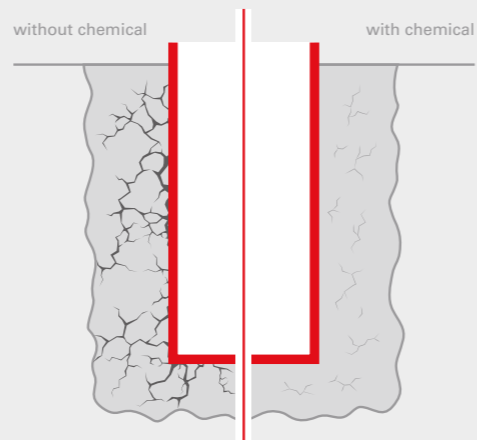
**Recommended consumption:** 2–5 % of Sapsan Kuper chemical per 1 ton of cement.

**Physical and chemical properties**

Indicator	Standard value
Appearance at 22–23 °C	Powdery substance of white to gray-brown color
Bulk density, g/cm <sup>3</sup>	1.20–1.80
Weight percentage of the main substance, min, %	90

## TASK: SELF-HEALING CEMENT STONE FRACTURES

### SOLUTION: ATREN RECAD



## ATREN RECAD

**Description:** mixture of active substances of different nature; when interacting with water and fluid of the oil reservoir, they start self-healing of the formed fractures.

**Application:** for self-healing of fractures formed in the cement stone.

**Recommended consumption:** 2.5 to 5 % bwoc. Delivery point and optimum dose are determined by laboratory and/or pilot tests for every specific use case.

#### Specific features:

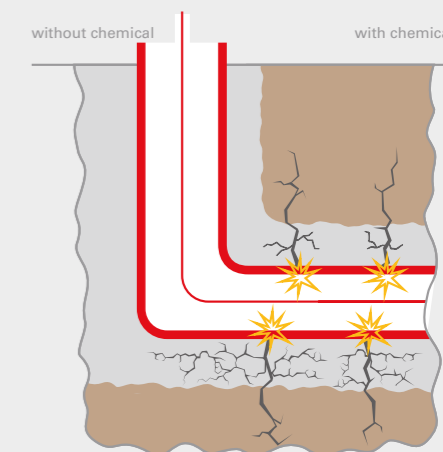
- starts the process of self-healing of microfractures in the cement stone that have formed, for example, after years of stress on the cement stone or after perforation or formation hydraulic fracturing;
- causes recrystallization of the cement stone under the influence of water-based formation fluid;
- swells at contact with hydrocarbons;
- prevents penetration of fluid further into the cement body;
- prevents loss of strength of the cement stone;
- extends the service life of wells and reduces the probability of channeling;
- environmentally friendly material.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 22–23 °C	Powdery substance of gray color, presence of inclusions from white to yellow color is allowed
Bulk density at 22–23 °C, kg/m <sup>3</sup>	0.7–0.9
Moisture content, max, %	2.5

## TASK: CEMENTING OF LONG SIDE TRACKS, CEMENTING OF WELL SECTIONS FOR CARRYING OUT MULTI-STAGE HYDRAULIC FRACTURING

### SOLUTION: ADDITIVE GIVING ELASTIC PROPERTIES TO CEMENT STONE



## ATREN FLEX

**Description:** mixture based on synthetic polymers.

**Application:** in the oil production industry during drilling and workover operations on oil, gas, and water wells to preserve the strength of the cement stone during multistage hydraulic fracturing, and to prevent penetration of fluids into casing string annulus during well operation.

**Recommended consumption:** 2–6 % of cement weight.

#### Specific features:

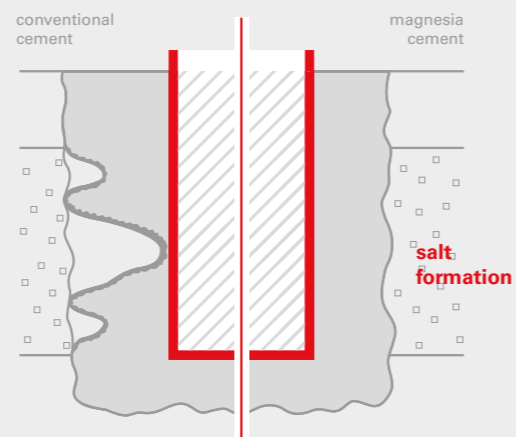
- gives damping properties to the cement stone;
- increases rheological properties and reduces free water;
- increases the water-proof properties of the cement stone;
- increases the strength properties of the cement stone and adhesion of the cement stone to metal;
- can be used as an additive to increase the gas blocking properties by increasing the viscous-fluid features of the cement slurry.

#### Physical and chemical properties

Indicator	Standard value
Appearance at 20 °C	White powder

## TASK: CEMENTING ZONES WITH EXTENDED SALT LAYERS

### SOLUTION: MAGNESIA CEMENTS



#### ATREN WARP

Modified inorganic chemical based on magnesium salts (completely dissolves in water during preparation). It serves as a basis for magnesium cement solution.

#### ATREN WIZARD

Mixed product based on magnesium oxide (insoluble in water, acts as a solid phase in magnesia cement slurry and serves as a framework for future crystal lattice of cement stone).

#### ATREN SPIRE

Modified inorganic chemical based on magnesium salts (completely dissolves in water during preparation and is designed to reduce the transition time from the liquid state to the state of stone — setting peak).

#### ATREN FLOW

Modified inorganic chemical. It does not dissolve in water during preparation;

it is designed to control the rheological properties of the obtained slurry over a wide range. AsNII-Kegel of the obtained slurries may vary from 180 to 250 mm, and it is also possible to fine-tune rheological properties, for example, static gel strength. It is an inorganic additive, i.e. the rheology of the obtained slurry would not depend on the temperature rise, and percentage of application does not affect the stone strength.

#### ATREN FIRM

Modified inorganic chemical (completely dissolves in water during preparation and is designed to increase strength properties of stone from 10 to 30 %, depending on the dose).

#### ATREN EXTEND

Modified inorganic chemical based on sodium salts (completely dissolves in water during preparation and is designed to extend the setting time of cement slurry. Injection of the additive enables to increase the setting time from half an hour to several hours in the temperature range from 70 to 130 °C).

### BUSINESS DOMAINS OF MIRRICO GROUP

#### DRILLING AND PRODUCTION CHEMICALS

(Promyshlennaya khimiya LLC)

#### WATER TECHNOLOGIES AND SERVICE DIVISION

(Osnova LLC Chemical Group)

#### PRODUCTION DIVISION

(Upstream Chemicals ana Solutions)  
(MIRRICO LLC (Kazan))

#### OIL AND GAS REFINERY AND PETROCHEMICAL INDUSTRY

(Osnova LLC Chemical Group)

#### DRILLING FLUIDS AND TECHNOLOGIES

(Modern Service Solutions LLC)

#### CHEMICAL WELL TREATMENT

(DELICA LLC)

### INDUSTRIES AND FIELDS OF USE



CONSTRUCTION AND REPAIR WELL



PIPELINE TRANSPORTATION OF HYDROCARBONS



COAL MINING AND BENEFICIATION



NON-FERROUS AND FERROUS METALLURGY



CHEMICAL AND PETROCHEMICAL INDUSTRY



OIL AND GAS PROCESSING



WATER AND WASTE TREATMENT





**MIRRICO**  
GROUP OF COMPANIES

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