The Modular Refinery

Who we are, What we do

Oil & Fuels Engineering L.L.C-FZ
Business Center 1, M Floor, The Meydan Hotel, Nad Al Sheba, Dubai, U.A.E
License # 2306679 - Phone: +971 50 9173748 - e-mail: info@oilandfuels.me

Who we are

Mr. Silvio Tozzoli,
CEO

Mr. Favasim Mingazetdinov,
Director Engineering

Oil & Fuels Engineering is EPC company engaged in Engineering, procurement and construction of equipment, materials and components for oil refining and production of petroleum products.

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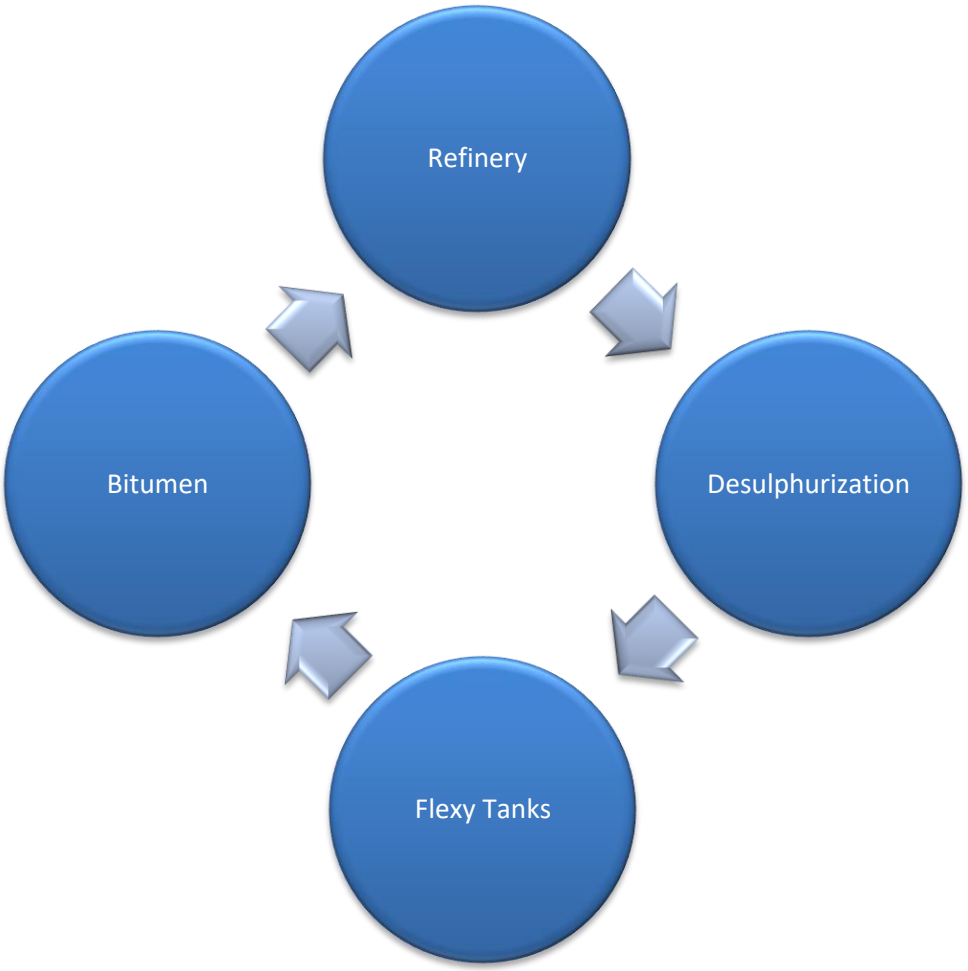
What we do



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OUR PRODUCTS

(Description)

About us

Oil & Fuels Engineering LLC is an Emirati Company that together with its Group has been designing, manufacturing, assembling, commissioning and starting "turnkey" modular refineries for over 20 years.

It also ensures and guarantees the training necessary for the management of the plant to its customers.

Oil & Fuels has built over 40 refineries operating in Eastern Europe and Asia on the basis of an innovative proprietary technology, covered by a patent.

Our 7 pillars

1. Refining of crude oil, using the "Vacuum" technology, which allows to obtain the fractionation of the various derivatives of crude oil with maximum temperatures of 100/120 °C using as fuel the gas produced by the same crude oil that must be refined.

Traditional "Fractionation Tower" or "Cracking" refining systems require temperatures ranging from 250/300/400/600 °C and use liquid fuels. Then they consume part of the fuels that are produced to power the process, reducing the percentage of outgoing carburant.

The plants, patented by us, are modular, with a distillation capacity ranging from 1/3/5/10,000 barrels/day up to 150,000 barrels/day (and more), to obtain the production of:

a. Gas (which we use to produce the energy necessary for the operation of the plant).
   In all plants in use today, the gas is released into the atmosphere and burned on torches, creating pollution. This is not the case with our plants, where the gas is recovered and used to produce the energy necessary for the process of refining.
b. Diesel type Euro 4, 5, 6 (D 1 / D 2)
c. Gasoline 98 octane and above, including the production of Gasoline-Aviation for piston aircraft engines

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d. Kerosene (or white gasoline) for helicopters and, after desulphurization, JP Jet Propellant / Jet Fuels (JP5 / 8/54)
e. Lubricating oils for engines
f. Solvents for Industry
g. Heavy Oil (Mazut) and, after desulphurization, fuels for ships, and fuel for generator sets for the production of electricity etc.
h. Bitumen to produce asphalt and for waterproofing use

2. Plant for the production of Bitumen, patented by us, suitable for the construction of road asphalt and waterproofing;

3. Desulphurization plant to eliminate Sulphur according to Community legislation, to obtain high-octane gasoline; JP Jet-Fuel, Jet-Propellant; Fuels for ships desulphurizing the Mazut;

4. Flexy tanks made with High Resistance Polymers, equipped with pumps for filling and rapid emptying, suitable for the containment of carburant, drinking water, liquid food etc.
They can be placed above ground, under the ground (buried); under sea water; in the depths of ports to provide water or fuel to ships without occupying large outdoor spaces; secret and strategic reserves in the territory to supply the armed forces with fuels, water and lubricating oils; also placed under the bed of rivers and streams. They resist temperatures ranging from - 60 °C to + 90 °C.
They are protected externally by reflective material - reflector to repel the sun's rays. They are guaranteed for 25 years.
The capacity is 250,000 liters for each tank (250 cubic meters). They can be placed in large numbers to hold up to many million liters. They are equipped with pump groups for quick filling or emptying.

5. Other products
The refinery is also able to produce the following products:
1 - Fuel additives, including anti-knock agents;
2 - Lubricating oils for engines;
3 - Solvents for industries (paints, perfumes, etc.);
4 - Calcium sulphate.

6. Ecological process
Our refineries have a totally ecological process because they do not emit any emissions into the environment. The gas normally released into the environment or burned in a torch, the so-called "gas flaring" typical of traditional technology, if improperly managed can emit methane, sulfur dioxide, other sulfur compounds and other volatile organic compounds even to aromatic hydrocarbons (benzene, toluene, xylenes) and benzopyrene, known to be carcinogenic.
In our process, however, gas is used in boilers to power the refining process. No sulphur dioxide or hydrogen sulfide, which is aggressive to the environment and dangerous to

human health, is therefore emitted.

7. Fire risk prevention

The risk of fire is a fairly frequent event that affects and has affected refineries in almost all countries of the world. The risk is inherent in the production process and is determined by explosions and fireballs that normally destroy the entire refinery or a large part of it.
With our refineries this does not happen thanks to the modularity of the plant. Each module has a production of 1,000 barrels/day and is spaced away from any other module. In the unfortunate event of a fire, this is contained to the module and does not propagate to all the others.

Our refineries have highly competitive prices and fast delivery time.
For example, a refinery of 10,000 barrels/day is delivered in just 5 months from the signing of the contract and payment of the deposit.

The modularity of the refineries allows for rapid installations, start-ups differentiated over time and a rapid rotation in the reuse of profits obtained from the activity to increase production capacity or build new refineries in other locations.
All African countries depend on fuel imports from abroad, even those that have large productions of crude oil, such as South Sudan, Congo, Tanzania or countries such as Kenya or Ethiopia importing refined fuels from 3 to 5 billion dollars a year.

Having its own refinery means a minimum saving of 30%, if the country does not have its own oil fields. In the case of refining its crude oil, the savings can be up to 60%.

OUR PROCESS IS INNOVATIVE AND IS PATENTED

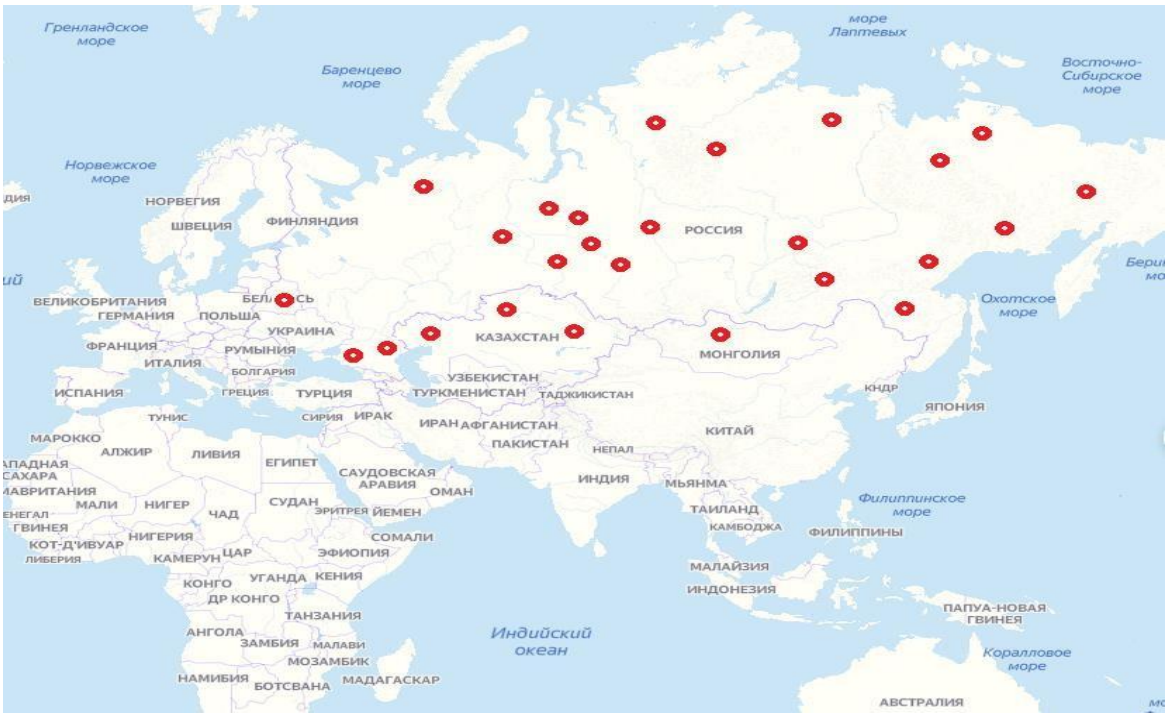
A distinctive feature of this technology is the ability to process hydrocarbon raw materials with an unlimited content of sulfur and sulfur compounds.

- The ideal raw material for processing and obtaining motor fuels are heavy gas condensates or light oils with a high content of light products. When using such raw materials, practically only high-quality motor fuels with high liquidity are obtained.

- At the same time, due to the same one-stage technology the composition of the refinery equipment and the capital costs for its commissioning is significantly reduced, this leads to the achievement of the most favorable economic indicators.

OUR FLEET

Oil refining plant for the production of finished products. Our modular fuel preparation unit s (MFPU) work in any climatic zone 80 MFPU per 20 years!



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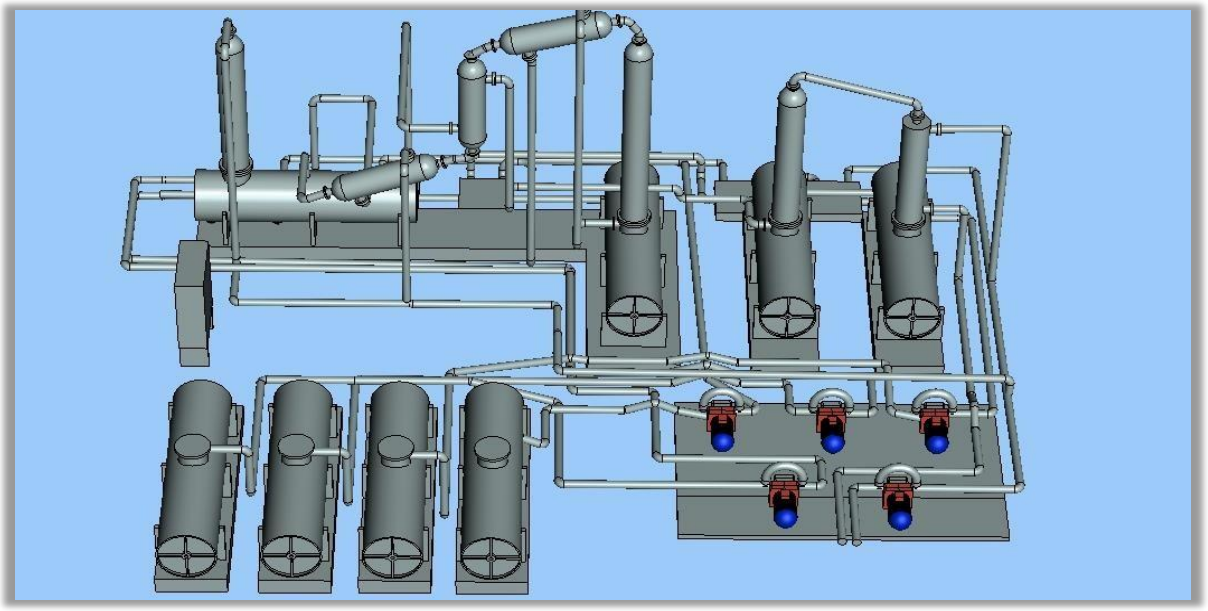
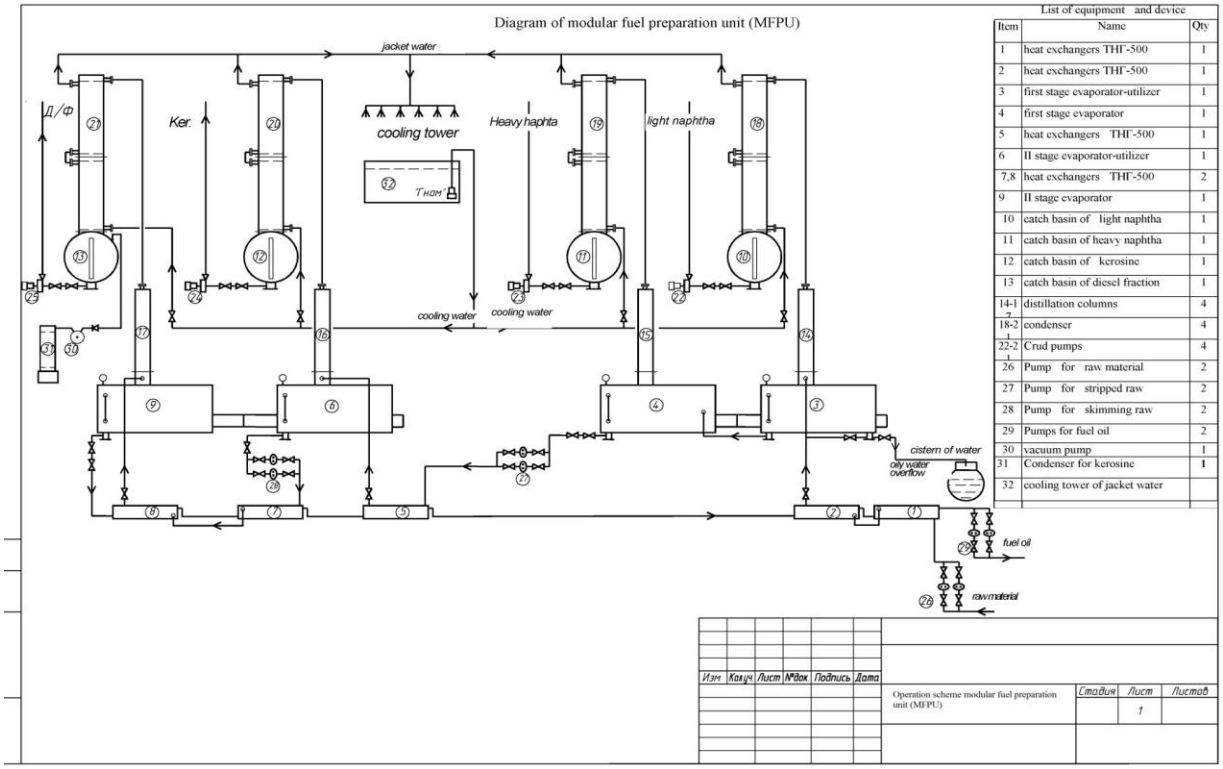
Fractionation unit



Process flow diagram of modular fuel preparation unit (MFPU)



List of equipment and device

Item	Name	Qty
1	heat exchangers ТНГ-500	1
2	heat exchangers ТНГ-500	1
3	first stage evaporator-utilizer	1
4	first stage evaporator	1
5	heat exchangers ТНГ-500	1
6	II stage evaporator-utilizer	1
7,8	heat exchangers ТНГ-500	2
9	II stage evaporator	1
10	catch basin of light naphtha	1
11	catch basin of heavy naphtha	1
12	catch basin of kerosine	1
13	catch basin of diesel fraction	1
14-17	distillation columns	4
18-21	condenser	4
22-25	Crud pumps	4
26	Pump for raw material	2
27	Pump for stripped raw	2
28	Pump for skimming raw	2
29	Pumps for fuel oil	2
30	vacuum pump	1
31	Condenser for kerosine	1
32	cooling tower of jacket water	

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Description of the working system

- The feedstock - oil or gas condensate - is pumped from the feedstock tank under a pressure of 0.1 - 0.3 MPa into the tube space of a four-way heat exchanger, where it is heated to 60-80 ° C with heating oil with a temperature of 150 -160 ° C supplied from the tote tank. Further, the raw material heated to t 60-80 ° C is fed into a distillation column with bubble cap trays. The distillation column is mounted on a horizontal tote tank, in which a heat exchange element is mounted for the final heating of raw materials in the bottom of the column. Heating is carried out by a moduled liquid-fuel burner capacity of 0.5 MW.

- The distillation column consists of cap-type trays. A reflux exchanger is built into the upper part of the distillation column. Cooling and condensation of gasoline vapors in the reflux condenser is carried out by the process water supplied to the reflux condenser. The column top temperature is controlled by changing the amount of water supplied to the fractional distillation tube of the distillation column, through a vapor line, connected to a heat exchanger by a condenser installed vertically on a gasoline collector. Gasoline vapors are cooled in a heat exchanger-condenser, condense and drain into the collection of gasoline, from where the gasoline fraction is subsequently pumped out into the gasoline tank. The remaining heavy fraction - the stabilized bottoms residue - is pumped out of the bottom tote tank by a pump, through a two-section heat exchanger in which it is cooled with water to a temperature of 60-70 C, into the furnace oil tank.

- Discharge of Bottom settlement water from a gasoline tank, as well as discharge of rainwater from the site of technological tanks is carried out into an underground tank, with subsequent removal by tank trucks. The installation meets all the requirements of sanitary standards for this equipment. The main source of harmful emissions into the atmosphere is a moduled liquid-fuel burner.

The advantages of the proposed system

- Absence of mother water..
- Reducing the content of oxygen in the air in oxidation gases.
- Increase in productivity on raw materials by 2-2.5 times.
- Reducing oxygen of air for oxidation by 25-30%.
- Reducing the output of black off-spec summer diesel.
- Reduced oxidation time
- Decrease in the temperature of the oxidation reaction 20-30 ^{0}C

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Storage, transportation of fuel in hot climate and sandy, rocky terrain

Problems

- Extreme temperature operation, ultra-high and low temperatures.
- Intense solar radiation. Maximum additional protection required for equipment and materials.
- Excessive irrigation leads to accumulation of salt in the soil.
- Complex logistics: deserted, waterless and off-road areas.
- Increased construction costs during the construction of stationary objects due to bulk sand or rocky soil.
- Increased wear and tear of equipment and materials
- Due to sand drills, additional protection of machines, equipment and mechanisms is required, as well as insulation coating
- Increased requirements for construction speed and organization

Solutions

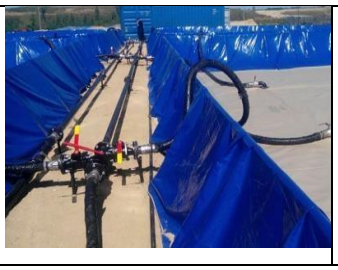
Storage

Polymer Elastic Tanks (PET)
Acceptance, dispensing, storage of fuel and other liquids in the field based on polymer elastic PER tanks designed for high-temperature and extreme operating conditions.

Transportation

Flat hose main pipelines

Pipeline pumping of petroleum products, fuel and lubricants, water and technical liquids over long distances in the field in rough terrain using flat hose pipelines



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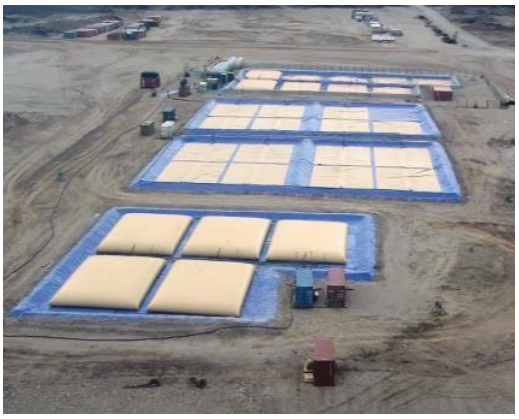
Benefits of these solutions

- 70% cost cap savings vs. traditional approaches
- Successful experience in hot climates
- Mobility and compactness (delivery of equipment by any mode of transport!)
- Reduction of construction cost and time
- Quick installation on unprepared surfaces
- 100% fuel polyurethane
- Extreme operation mode: from -50 to + 80,
- Corrosion and environmental protection. Abrasion resistant material, MIL-T compliant protection level (USA)
- Seismic stability
- Quality control ISO 9000
- Compliance with tactical and technical characteristics of NATO and US Military standards
- Re-use is provided
- Wide range of applications for all types of liquids, including drinking water



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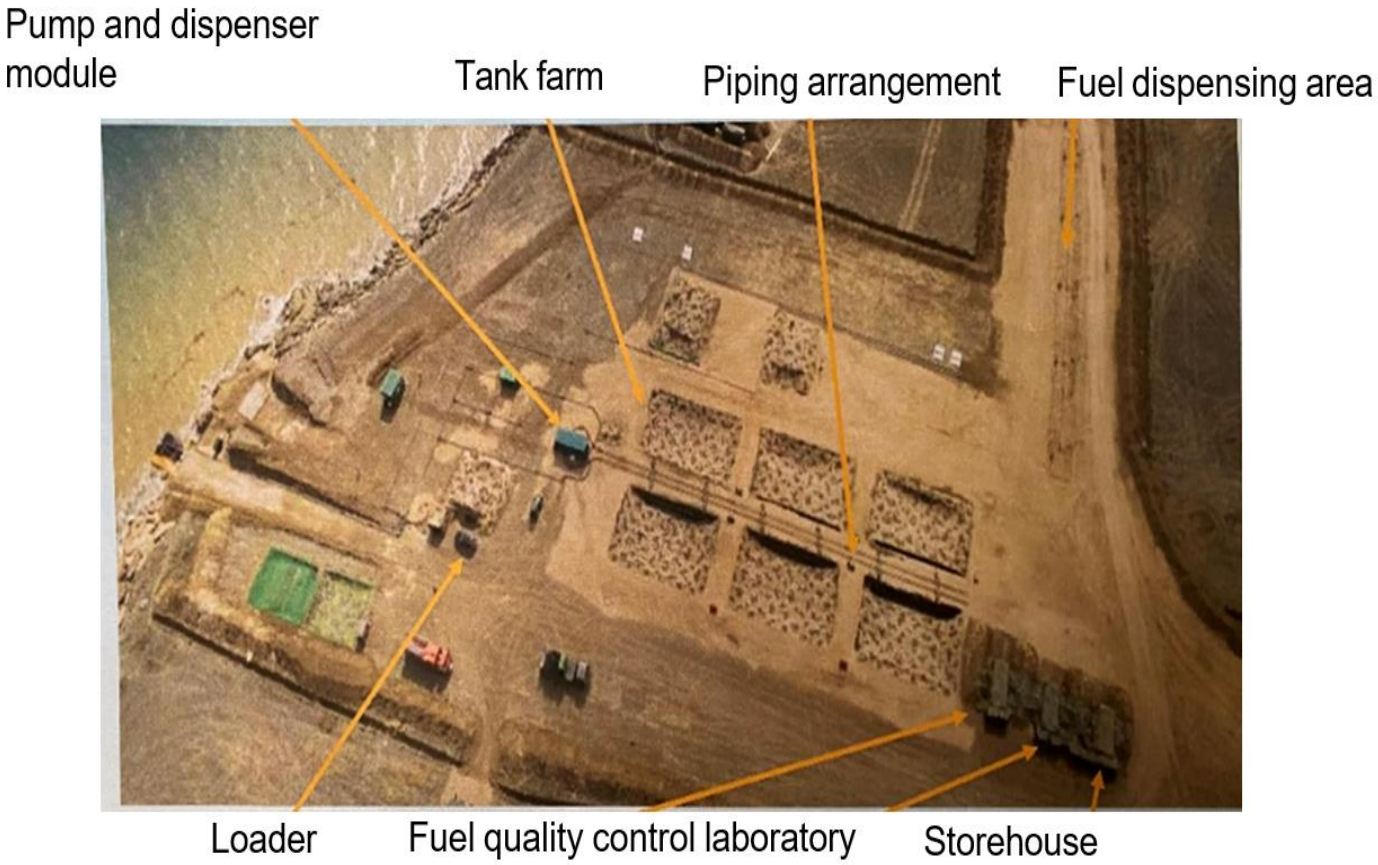
Fuels Depot

Creation of operational fuel reserves, as well as their reception and shipment by all modes of transport (road, railway, water and pipeline).



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Fuels Depot

(more pictures)









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ATTACHMENT 1

Refinery description & technical documents

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Oil refining plant for the production of finished products

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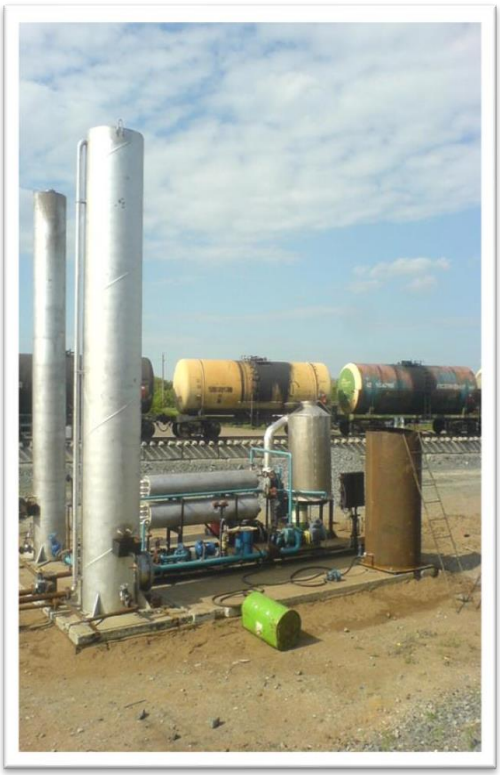
Oil treatment plant OTP

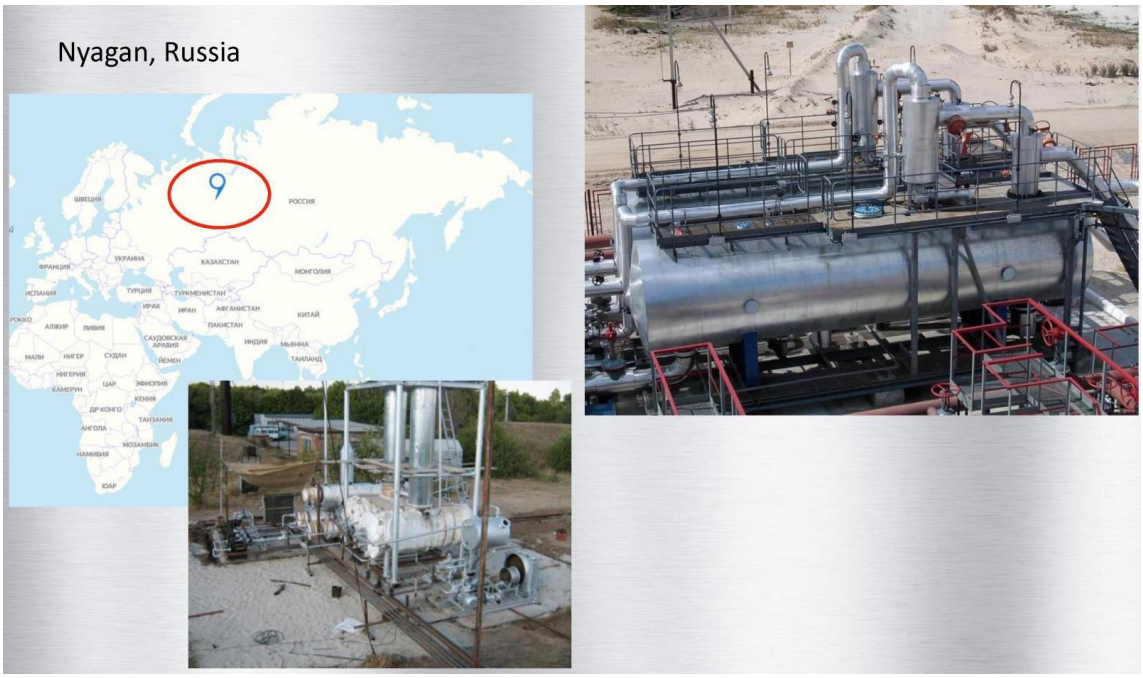
Oil treatment plant OTP
capacity - 10-30 m3 / hour.

Oil treatment plant OTP is designed for complex oil treatment for the purpose of desalting, dehydration, removal of mechanical impurities, and viscosity reduction.

The main OTP processes are:

- liberation of the incoming watered oil from coarse emulsion water.
- weakening the stability of the emulsion by reagent.
- maximum increase in the rate of oil treatment . The parameters of the treated oil:
  - mass fraction of water, %, no more than 0.5;
  - concentration of chloride salts, mg / dm3, no more than 100;
  - mass fraction of mechanical impurities,%, no more than 0.05





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OTP complete set

1. Oil treatment column with a diameter of 1.6 m. and a height of 9m. - 5 pcs. (for 2 MFPU 1 column)

2. Pump unit :

   - water pump for water supply - 5 pcs. (each - 50 m3/h)
   - water pump for salt water discharge - 5 pcs.
   - oil supply pump - 10 pcs. (Per 1 MFPU 1 pump)
   - chemical reagent supply pump (proportioning unit) - 5 pcs.
   - mixing pump, original design - 5 pcs.
   - pump homogenizer - 5 pcs.
   - pumps for pumping commercial oil - 5 pcs.
   - heat exchangers - 5 pcs.
   - magnetic activators - 5 pcs.
   - vibrators - 5 pcs

3. Technological piping from:

   - pipes Ø 50 ÷ 100 mm.
   - shut-off valves
   - coarse and fine filters

4. Electrical equipment, instrumentation.

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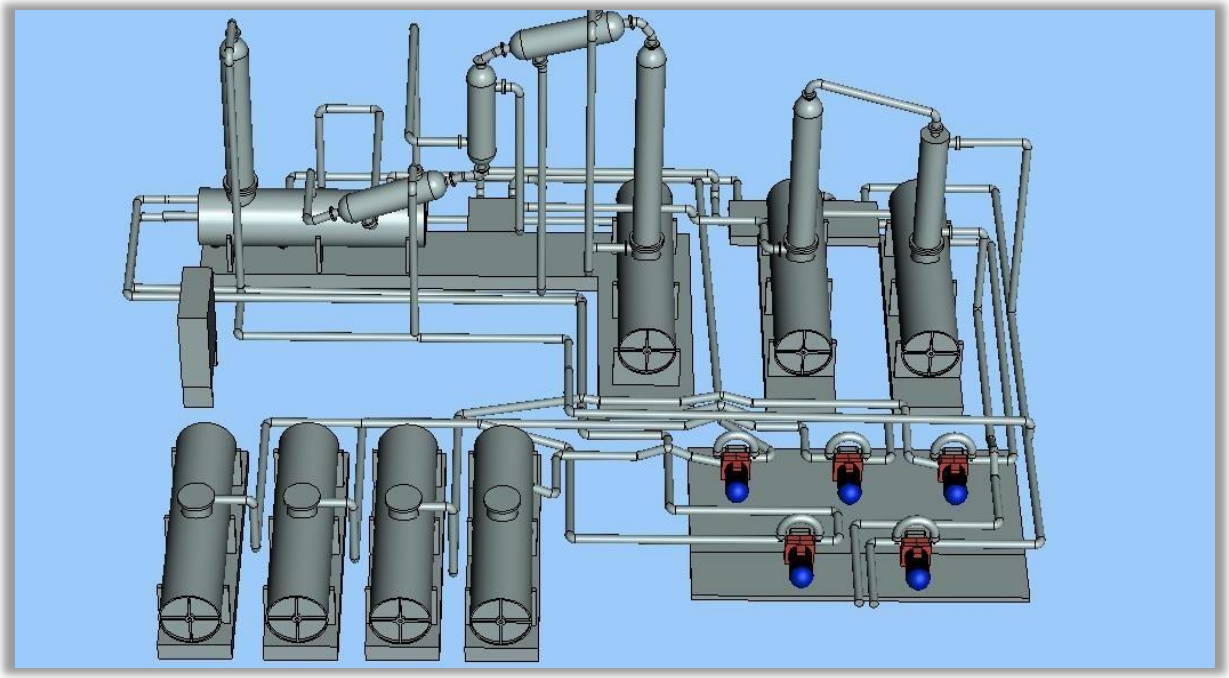
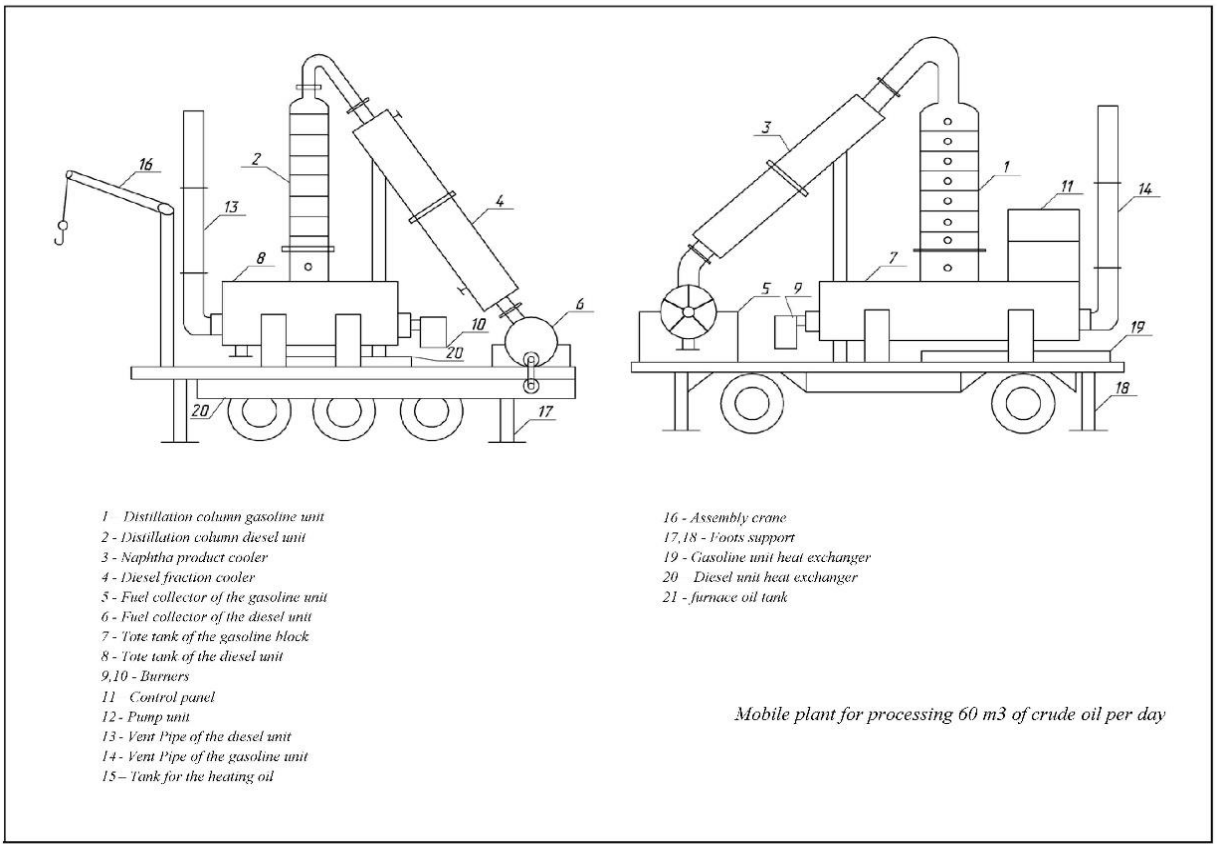
Fractional Unit





1 Distillation column gasoline unit
2 - Distillation column diesel unit
3 - Naphtha product cooler
4 - Diesel fraction cooler
5 - Fuel collector of the gasoline unit
6 - Fuel collector of the diesel unit
7 - Tote tank of the gasoline block
8 - Tote tank of the diesel unit
9,10 - Burners
11 Control panel
12 - Pump unit
13 - Vent Pipe of the diesel unit
14 - Vent Pipe of the gasoline unit
15 – Tank for the heating oil

16 - Assembly crane
17,18 - Foots support
19 - Gasoline unit heat exchanger
20 Diesel unit heat exchanger
21 - furnace oil tank

Mobile plant for processing 60 m3 of crude oil per day

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- The distillation column consists of cap-type trays. A reflux exchanger is built into the upper part of the distillation column. Cooling and condensation of gasoline vapors in the reflux condenser is carried out by the process water supplied to the reflux condenser. The column top temperature is controlled by changing the amount of water supplied to the fractional distillation tube of the distillation column, through a vapor line, connected to a heat exchanger by a condenser installed vertically on a gasoline collector. Gasoline vapors are cooled in a heat exchanger-condenser, condense and drain into the collection of gasoline, from where the gasoline fraction is subsequently pumped out into the gasoline tank. The remaining heavy fraction - the stabilized bottoms residue - is pumped out of the botom tote tank by a pump, through a two-section heat exchanger in which it is cooled with water to a temperature of 60-70 C, into the furnace oil tank.

- Discharge of Bottom settlement water from a gasoline tank, as well as discharge of rainwater from the site of technological tanks is carried out into an underground tank, with subsequent removal by tank trucks. The installation meets all the requirements of sanitary standards for this equipment. The main source of harmful emissions into the atmosphere is a moduled liquid-fuel burner.

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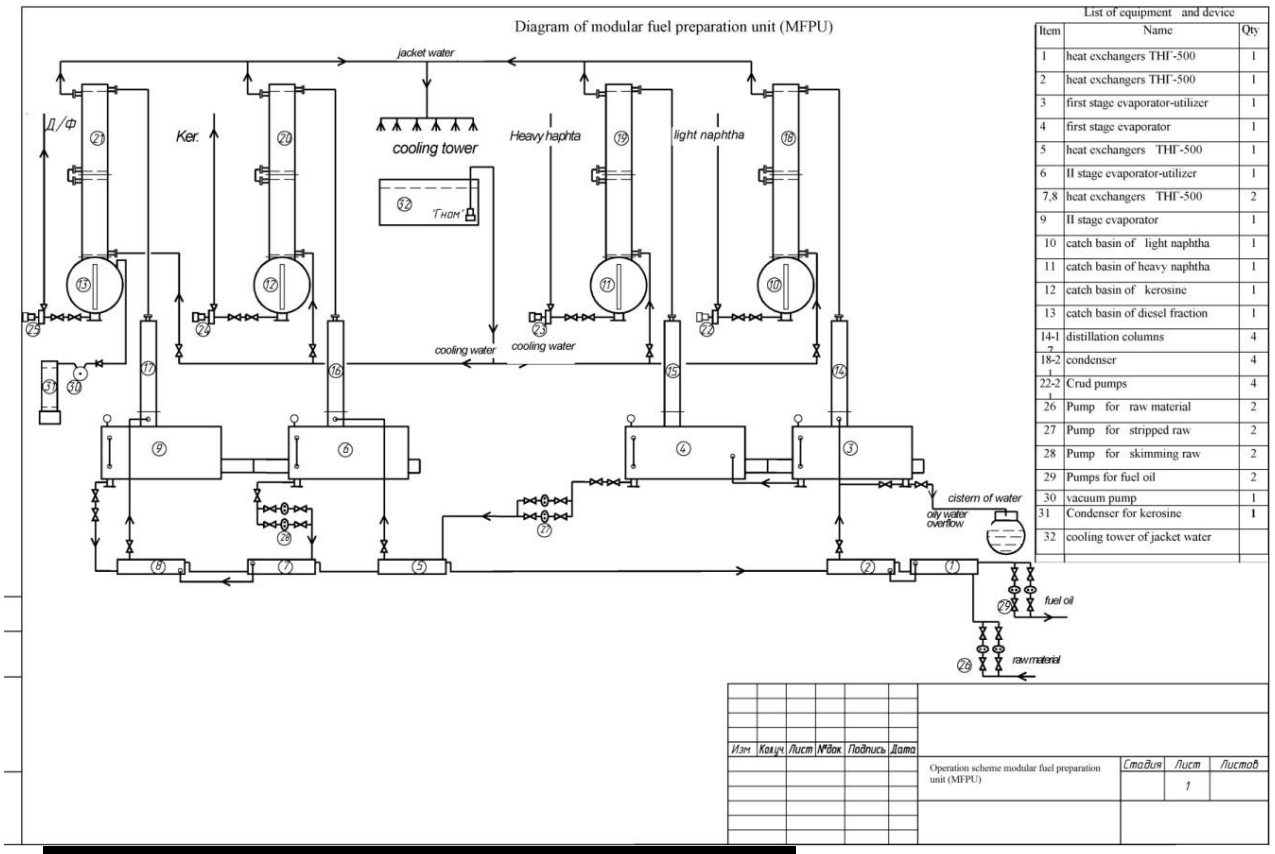
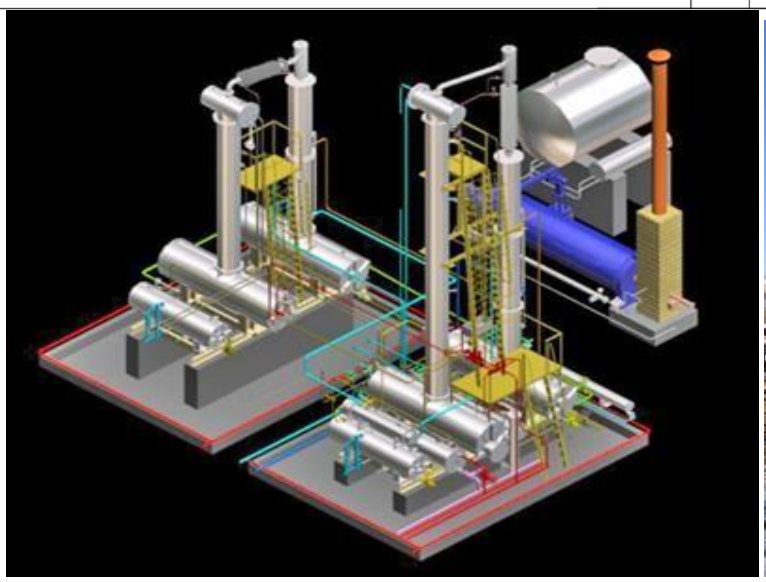
Process flow diagram of modular fuel preparation unit (MFPU)





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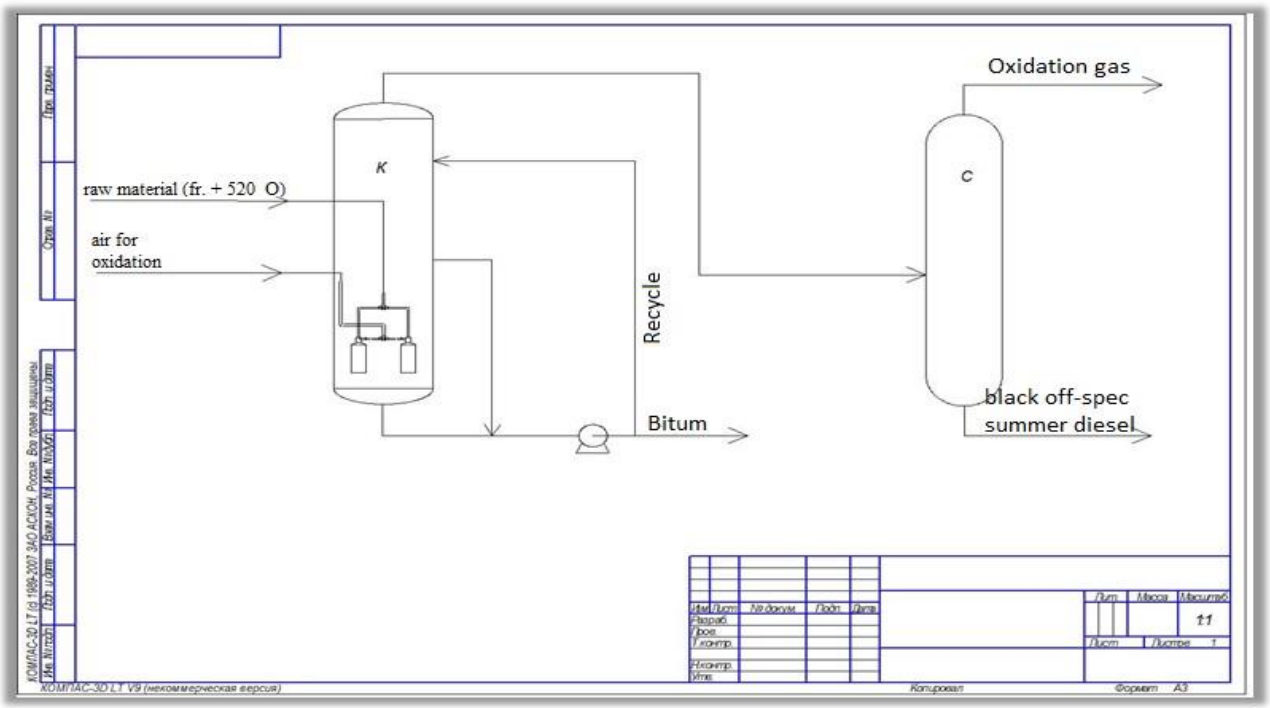
Oxidating unit



Oxidating unit

- Raw materials are pumped in two streams to columns K-1 and K-2, where they are heated to 60 ° C. Light fractions are fed through a heat exchanger to the commodity park for mixing with gasoline leaving the column K-3 (we get AI-92).
- The heavy residue of the gasoline fraction from the bottom of the columns K-1 and K-2 enters the vertical furnace P-1, where it is heated to 350 ° C and then the vapor-gas mixture enters the reactor R-1, where the catalyst is located.
- From the reactor, the mixture cooled in the heat exchanger enters the C-1 separator to separate light gases (C1 and C2), which are burned in the nozzles of the furnace.
- After that, the mixture enters the column K-3, where gasoline is stabilized. Light hydrocarbons, propane-butane mixture is removed from the C-2 separator, and the heavy part from the bottom of the column goes for mixing to the warehouse.

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The technology of preparation of the oxidized road bitumen with gas liquid cavitation vortex apparatus (GLCVA)

Aimed at the production of oxidized bitumen, which allows to increase the productivity of the Plant and achieve a stable quality of the obtained bitumen up to the requirements of GOST.

The advantages of the proposed system

- Absence of mother water.
- Reducing the content of oxygen in the air in oxidation gases.
- Increase in productivity on raw materials by 2-2.5 times.
- Reducing oxygen of air for oxidation by 25-30%.
- Reducing the output of black off-spec summer diesel.
- Reduced oxidation time
- Decrease in the temperature of the oxidation reaction 20-30 ^{0}C

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Storage, transportation of fuel in hot climate and sandy, rocky terrain

Problems

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- Intense solar radiation. Maximum additional protection required for equipment and materials.
- Excessive irrigation leads to accumulation of salt in the soil.
- Complex logistics: deserted, waterless and off-road areas.
- Increased construction costs during the construction of stationary objects due to bulk sand or rocky soil.
- Increased wear and tear of equipment and materials
- Due to sand drills, additional protection of machines, equipment and mechanisms is required, as well as insulation coating
- Increased requirements for construction speed and organization

Solutions

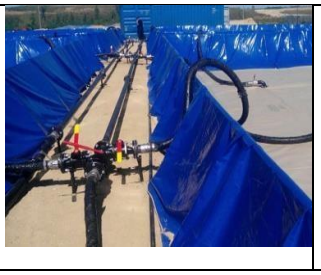
Storage

Polymer Elastic Tanks (PET)
Acceptance, dispensing, storage of fuel and other liquids in the field based on polymer elastic PER tanks designed for high-temperature and extreme operating conditions.

Transportation

Flat hose main pipelines

Pipeline pumping of petroleum products, fuel and lubricants, water and technical liquids over long distances in the field in rough terrain using flat hose pipelines



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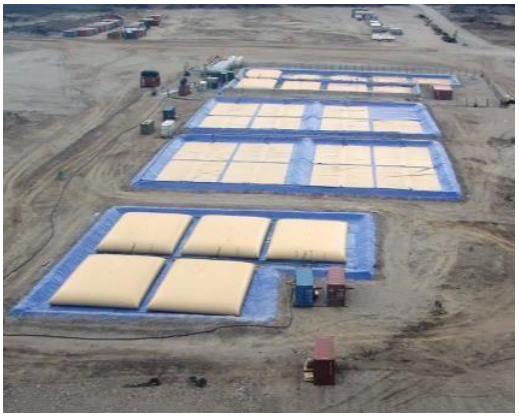
Benefits of these solutions

- 70% cost cap savings vs. traditional approaches
- Successful experience in hot climates
- Mobility and compactness (delivery of equipment by any mode of transport!)
- Reduction of construction cost and time
- Quick installation on unprepared surfaces
- 100% fuel polyurethane
- Extreme operation mode: from -50 to + 80,
- Corrosion and environmental protection. Abrasion resistant material, MIL-T compliant protection level (USA)
- Seismic stability
- Quality control ISO 9000
- Compliance with tactical and technical characteristics of NATO and US Military standards
- Re-use is provided
- Wide range of applications for all types of liquids, including drinking water



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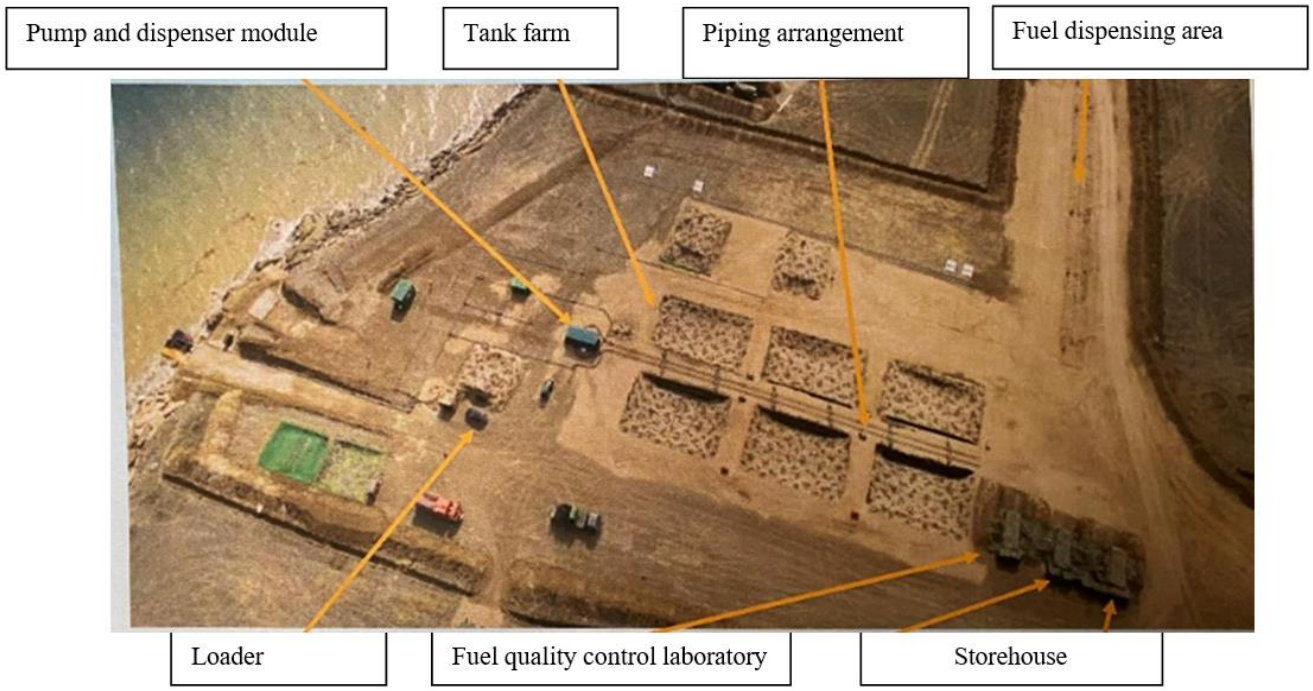
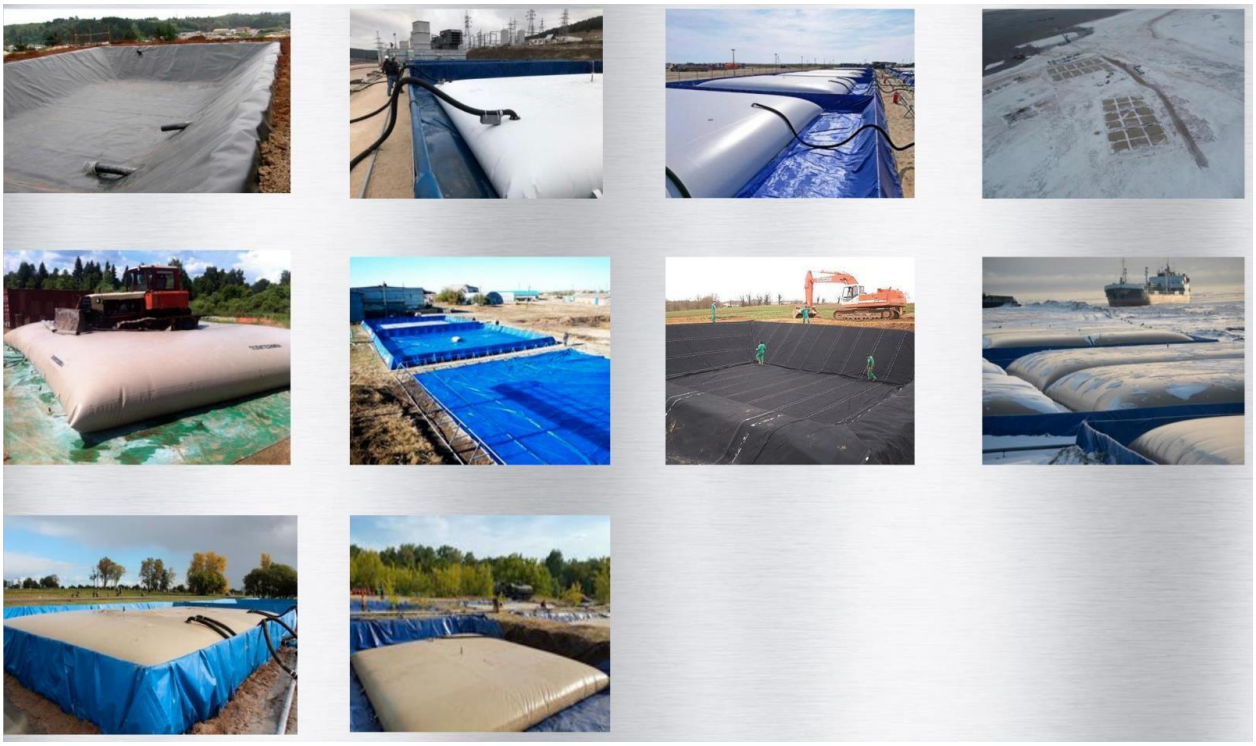
Fuel depot

Creation of operational fuel reserves, as well as their reception and shipment by all modes of transport (road, railway, water and pipeline).





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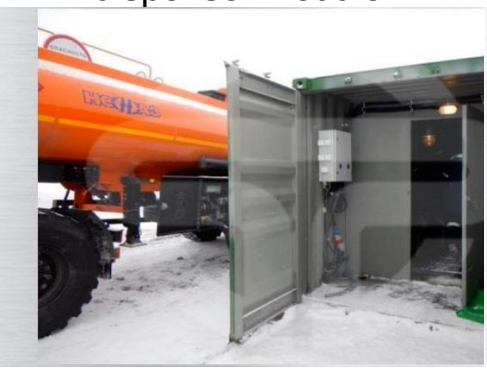
Main elements of fuel depot

Tank farm

Pump and dispenser module



Piping arrangement

Fuel dispensing area

Fuel quality control laboratory

Loader

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ATTACHMENT 2

Desulphurization Plant for Petroleum Products

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Desulphurization Plant for Petroleum Products

The problem of reducing the Sulphur content (desulphurisation) in petroleum products attracts a great deal of attention from domestic and foreign researchers.

According to numerous foreign and Russian researchers, one of the most promising methods for desulphurization of petroleum products is the oxidation of products with a mixture of ozone and air.

"The use of the proposed desulphurization technology is promising, in the first place, for mini-oil refineries that, with poor financial capacity, are unable to install expensive and energy-intensive oil refinery group. However, the possibility of scaling back the proposed technology will allow it to be used in large oil refineries, thereby improving the quality of oil and reducing the financial burden on the enterprise.

Existing Technologies

The three main methods of removing sulfur are:

1. Hydrotherapy. The method is based on the treatment of lubricating oils and liquid paraffins with hydrogen (or gas containing hydrogen), at a temperature of 200-3250 ° C, at a pressure of 4-5 MPa, in the presence of a catalyst. The gas/supply ratio is 300:1. Gas consumption - 0.2-03% of the total mass. As a result, H2S, NH3, H2O and N2 are released.

2. Hydrocracking. When using this method, the raw material is also treated with hydrogen (or gas containing hydrogen), but at a high temperature and pressure of 300-450°C and 5-30 MPa respectively, in the presence of a catalyst. Fractions of high-boiling oil are processed, mainly vacuum distilled with a boiling point of 300- 540 ° C.

3. Hydrodesulphurization. They are used to remove sulfur from the high-boiling fractions (boiling point 540-580°C) of tar, fuel oil, deasphalted oil. The process is carried out at 360 - 430°C and a pressure of 10-20 MPa, the gas-feedstock ratio (600-1000):1.

The technological schemes of the processes are very similar: heating of the components, mixing and processing in the reactor, cooling of the hydrogenated product, separation of gases containing hydrogen and hydrocarbons from it respectively in high and low pressure separators, with subsequent distillation into target products, gas purification from H2S, NH3 and H2O.
Attention is drawn to the large excess of gas and its very low use in hydrogenation reactions, typical of heterogeneous processes.

The activation of processes in all cases is signaled by heating and is enhanced by catalytic reactions. Note that the presence of sulfur, metals, aromatic hydrocarbons leads to rapid passivation of catalysts.
In these processes, hydrogenolysis reactions occur, that is, the bonds of carbon with sulfur, metals, oxygen and nitrogen are broken. Under conditions of excess hydrogen, H2S, NH3 and H2O are formed, etc.
Purification of petroleum products from sulfur is also carried out by treatment with acids, alkalis and other reagents.

Processes have many disadvantages

The disadvantages of these methods include high energy consumption, complexity of instrumentation, irrecoverable losses of expensive catalysts, system complexity and selectivity of methods in relation to the sulfur compounds removed, increased explosiveness, environmental toxicity, environmental risk, etc.
In the modern oil refining industry, under conditions of strict requirements for the quality of petroleum products and the depletion of liquid hydrocarbon reserves of "light" quality, promising and energy-efficient new systems are required, which make it possible to provide: processing of petroleum products without the use of expensive catalysts, increased processing depth of liquid petroleum products, reduction of the content of harmful impurities, improvement of the quality of the output product.
Therefore, a method for the oxidation of sulfur-containing compounds in the reaction zone with a mixture of ozone and oxygen of air is proposed.
The method is based on an important property of sulfur-containing saturated organic compounds: they oxidize much faster than hydrocarbons, which is explained by their lower thermodynamic strength. For example, for thiophene, ^H°t is 19.6 kcal/mol, while for SO2 it is 70.96 kcal/mol.

Irreversible oxidation potential

Links	Potential
nonilmercaptano	0,216
thiophene	0,342
thioxane	0,346
dibutyl sulfide	0,352
Dihexyl-sulfide	0,358
Dicycloec-sulfide	0,48
diphenyl sulfide	0,361
thiophanes	0,416
Methylteophene	0,409

Thermodynamic performance of compounds

Links	N kkal
thiophene	19г6
tetrahydrothiophene	23,5
butylmercaptan	38,48
Toluene	38,49
heptanol	48,17
Nonane	54,74
SO2	70,96
H2O	57,8
FeS	22,72

Therefore, the treatment of sulfur-containing petroleum products with a dosed dose of an ozone-air mixture ensures the complete removal of sulfur itself, without affecting, in practice, other hydrocarbons. This circumstance allows its application in technologies for the processing of petroleum products.

The main advantage that attracts the attention of both domestic and foreign scientists is the possibility, with a fairly simple design, to carry out the processes of mixing, dispersion and activation of liquid substances, creating a significant energy density per working volume group.

The use of our method allows the complete removal of sulfur and sulfur compounds in petroleum products.

The quality of the crude oil desulphurization process in an electromechanical converter with a discrete secondary part was determined by sampling the oil that had been processed in the device every 10 seconds. To find the optimal processing parameters (time) during the desulphurization process, dependencies on the amount of sulfur removed from the processing time were obtained.

The quantitative Sulphur content of petroleum products was determined by energy- dispersive X-ray fluorescence spectrometry.

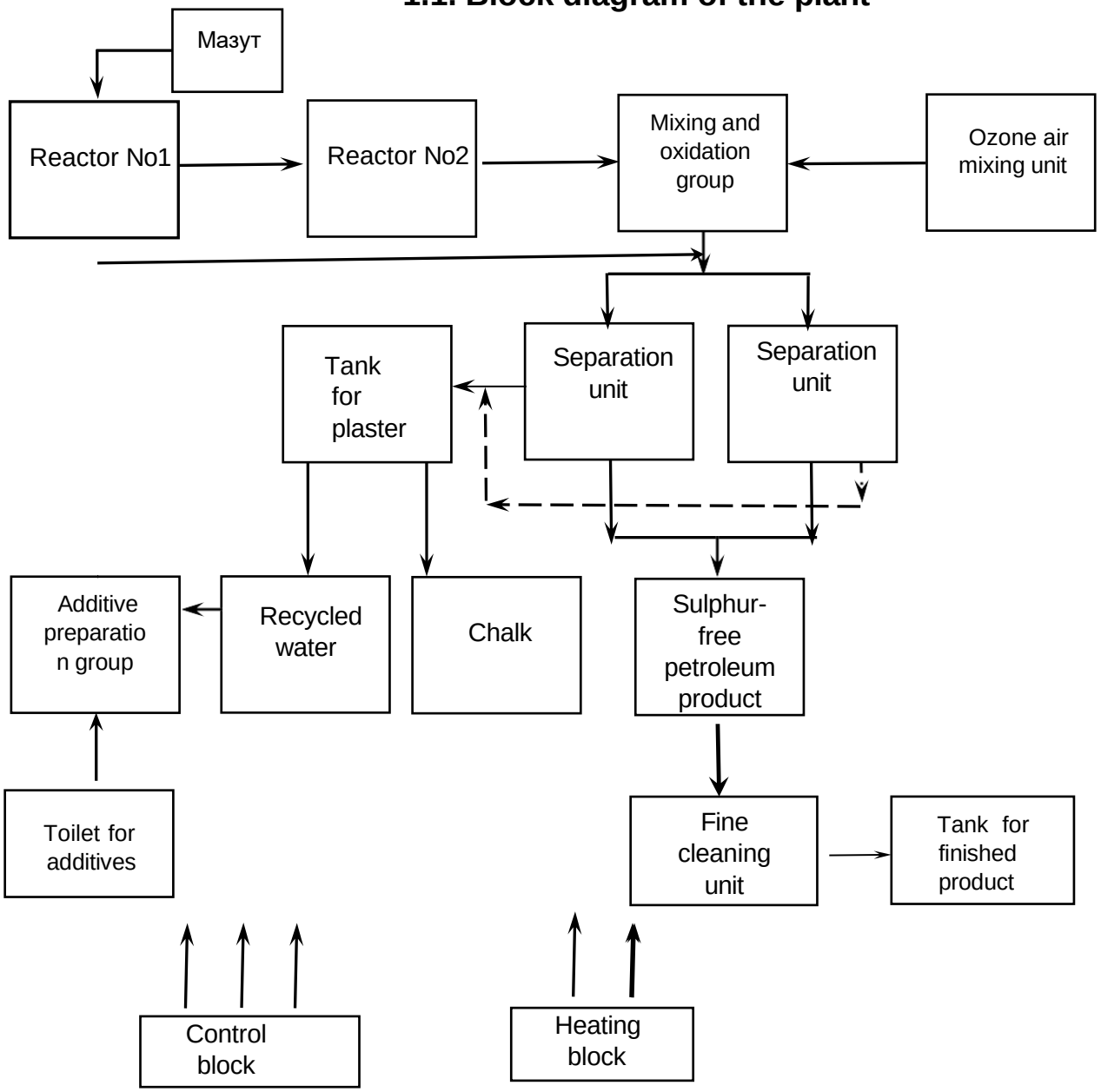
The range of variation in desulphurization efficiency in the experiments was up to 97 %, depending on the processing time.

Based on the effectiveness of the presented technological process, we proposed options for the implementation of technology in production facilities. The PSAF-4 installation was developed and tested.

GENERAL INFORMATION ABOUT THE INSTALLATION "PASF-4/5" AND ITS PURPOSE

The PASF-4/5 Group is designed to remove sulfur, mechanical impurities and water from petroleum products

1.1. Block diagram of the plant



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Installation is a set of blocks, each of which performs a specific function.

- - Raw material preparation team, (Reactor No. 1, Reactor No. 2)
- - Oxidation group of the raw material
- - Separation group,
- - Additive preparation group,
- - blocking of separation and removal of sulfur
- - Fine purification group from impurities, sulfur residues
- - blocking automation and control

Technical characteristics of the plant "PASF-4/5"

Technical data and characteristics of the system

The working pressure of the installation is not more than - 0.6 MPa.
The continuous operating time of the filter is 24 hours.
A feature of the design of PASF-4/5 filters is the presence of an automatic regeneration system. The inner blocks are made of stainless steel.

Main technical characteristics

The main technical characteristics of the filter are presented in Table No. 1 below;

Table 1

No	Technical Specifications	Value
	Parameters of the filtered liquid	
1	Type of liquid to be purified	petroleum product
2	Viscosity of the liquid (at 1000°C), cSt	50
3	Productivity m3/hour no more	
4	Sulphur residue in dark oil products, not more than %	0.5
5	Fluid operating temperature range, °C	50 - 60
6	Diameter of the connecting pipes at the filter inlet and outlet, mm	57
7	Sediment drain pipe diameter, mm	57
8	The area for installation does not exceed sq. M.	150
9	Mounting weight, not exceeding, kg exceeding, kg	10000
10	Dispenser for special additives, not exceeding kg/hour	120
11	Climate version according to GOST 15150-69	Yes
12	Technological emissions	According to PDK

Composition of the installation and delivery set.

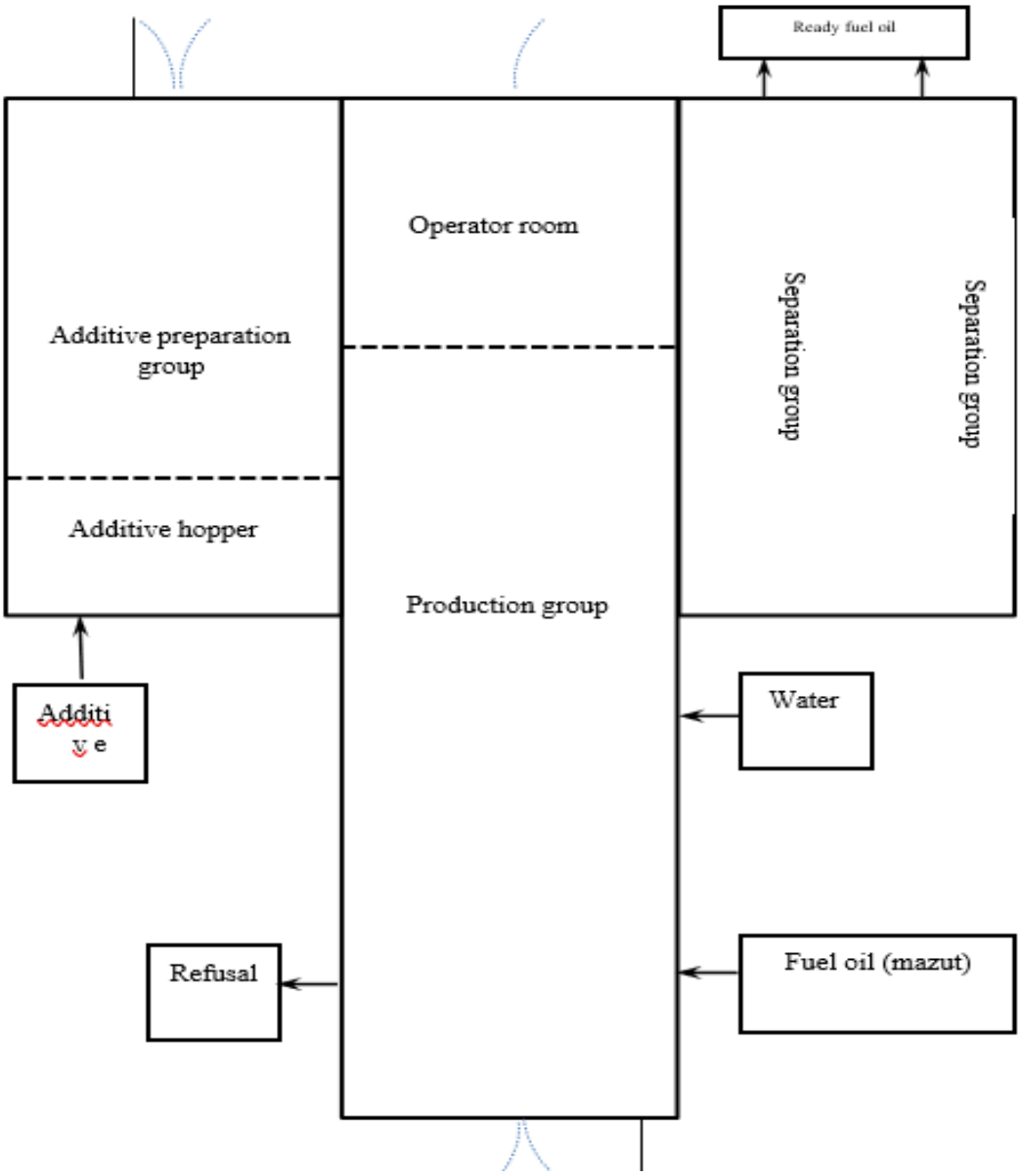
The composition of the installation is given in Table 2 below:

Table 2.

No	Parameter	Quantity
1	PASF-4/5	1 pcs.
2	Automation Kits	1 pcs.
3	Spare parts kit	1 pcs.
4	Passport and operating manual	1 pcs.
5	Installation Certificate	1 pcs.

PASF Installation Block Placement Scheme-4 /5

Block for the automatic preparation of additives with a hopper, a auger for automated powder feeding for additive production. Additive preparation tank, metered water supply tank for additive manufacturing, finished additive receiving tank and related supply to the system.



The dimensions of the "Fluff Preparation Block" and the "Separation Block" are 6000x2450x2450mm

The dimensions of the "Production Block" including the "Operator" are 12000x2450x2450mm

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Scheme of operation of the plant for the removal of sulfur PASF-4/5. Brief description

The PASF-4/5 installation can accept fuel oil from both stationary tanks and tankers. The temperature of the incoming product (fuel oil) must be at least 50 degrees. The temperature is automatically measured in the suction pipe when the oily product enters the Group with the help of a pump.

If the temperature is below 50 degrees, the Group does not turn on and the fuel oil supply stops. The pump will work in a reverse cycle.

If the temperature corresponds to the technological one, the Group comes into operation. At the entrance, the petroleum product, together with the air of the compressor, enters Reactor 1, Reactor 2 and then the Mixing and Oxidation Group with an ozone-air mixture. In addition, the petroleum product is separated from the air and sulfur in the "Separation Group". The petroleum product enters the "Separator 1" and "Separator 2", where sulfur compounds interact with the additive. The resulting gypsum sinks to the bottom, and the petroleum product rises upwards due to the different densities.

The gypsum from "Separator 1" and "Separator 2" is discharged via a pump into the gypsum collection hopper. The processed petroleum product enters the Fine Purification Group and from there to the Finished Product Group.

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ATTACHMENT 3

Bitumen Plant

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Bitumen Production Plant

The bitumen production unit is designed to produce bitumen of specific quality by direct oxidation of the tar from the fuel oil vacuum distillation unit.
The capacity of the bitumen production unit of the fuel oil vacuum distillation unit is defined in the specifications and is equal to **100.000 tons of bitumen per year**. With a certain number of working hours per year – (24 h * 365 days = 8. 760 hours) the estimated nominal bitumen capacity of the plant will be 10,416 tons of bitumen per hour.
The bitumen production module works in two ways:

- production of road bitumen BND 90/130 (100/130);

The capacity range of the plant for raw materials should be between 50 and 110% of the nominal.
The mode of operation of the fuel oil vacuum distillation unit is continuous. The revision period of the unit is 24 months.

Material balance

The synthetic material balance of the bitumen production module is shown in Table 10.1

Table 1 - Consolidated material balance of the vacuum distillation unit for fuel oil

Name of raw materials, petroleum products	Surrender % mass. from raw materials	Consumpti on, T/hour	Quantity t/day
Input			
tar	89,41	11,581	277,9
Aria technical	10,59	1,371	32,9
Total:	100,00	12,952	310,8
Output			
Bitumen	88,14	11,416	274,0
Oxidation gas	11,30	1,463	35,1
Black solar oil (when burning)	0,56	0,073	1,7
Total:	100,00	12,952	310,8

Coefficients of consumption of raw and auxiliary materials

The raw material of the oxidation unit of the vacuum distillation unit for fuel oil - tar in the oxidation process is almost completely processed to obtain the specified target products.
Consumption coefficients are taken on the basis of the productivity of the bitumen block of the vacuum distillation unit of fuel oil - 11,416 t / h (100.000 tons per year) of oxidized bitumen.

Table 2 - Consumption coefficients of raw and auxiliary materials

Name of raw materials and materials	Consumption coefficient	Note
tar	1,014 t/t	Raw material for the bitumen production module
Air technical	100 nm3/t	Air for bitumen oxidation
Air according to measuring and control instrument	0.876* nm3/t	For the operation of DCS and ESD actuators
inert gas	1.051* nm3/t	For nitrogen suppression and purging of devices before repair
combustible gas	3.503* nm3/t	For burners of an afterburner of a vacuum distillation unit fo mazut
transformer oil	0.876* t/t	For heating devices and piping

* - The coefficients of consumption of auxiliary materials and energy resources are determined during the design process when choosing the main and auxiliary equipment

ATTACHMENT 4

Elastic tanks

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BENEFITS OF ELASTIC TANKS OF PER-N

- Radical Investment Savings
  The total capital savings on construction of the fuel storage facility (shipping costs, installation and maintenance) is up to 70%, compared with the installation of traditional-type metal and plastic tanks. Cost of elastic polymer tanks is several times lower

- High Mobility
  Elastic tanks can be delivered to the place of operation by any type of transport (land, air and water) in the most remote regions of the country. The compactness of elastic tanks allows to place a complete fuel warehouse with a nominal capacity of up to 1.000 cubic meters in the one standard 20 foot container

- Versatility.
  Elastic tanks as part of mobile fuel storage facilities are designed to work in a wide variety of climatic zones, their shell material has a wide range of operating temperatures - from -60°C up to + 80°C.

- Operation Without Hassles
  Tanks are not subject to corrosion.

- Military-Grade Reliability
  The lifetime of mobile fuel storage facilities is 12 years. Elastic tanks are designed for multiple application cycles.

- Quick And Easy Installation
  Average installation time is 6 days. During the unfolding and folding in case of the temperature not less than -50°C, the tanks do not require additional heating. Soft tanks using in the PSGs, in contrast to the standard RGS and RVS tank types, don't require the preparing of the foundation. Elastic tanks can be placed on unprepared surfaces: soil, snow, swamps, ravines, trenches, etc.

- Ecological Safety
  PSGs are not subject to corrosion and adverse environmental effects. After completion of the work, there are no semi-full tanks and barrels in the site, which are a dangerous source of man-made pollution. Land reclamation after operation of PSG is not required.

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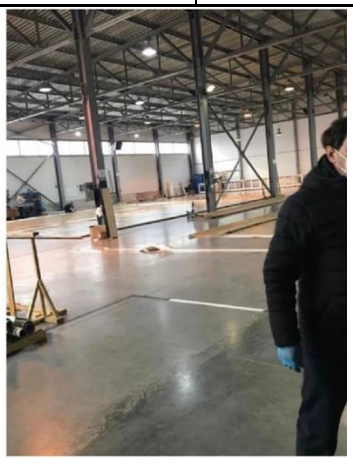
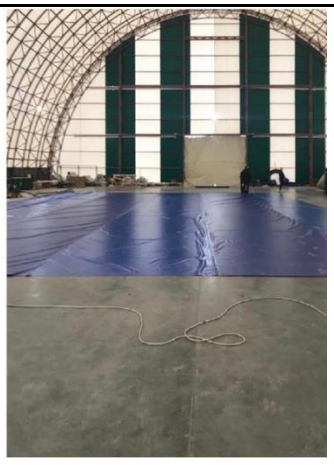
Polymer elastic tanks are intended for storage and transportation of jet fuel, aviation kerosene, diesel fuel, gasoline, engine oils and crude oil in field conditions, at ambient temperatures from minus 60 ° C to plus 80 ° C. Height of Polymer elastic tanks is 1,70

Closed shells of elastic tanks are made of heavy-duty polyester fabric of ballistic weaving with double-sided polyurethane (TPU) or special polyvinyl chloride (PVC+TPU). The strength of the shell is close to the breaking loads of cargo slings and tapes.





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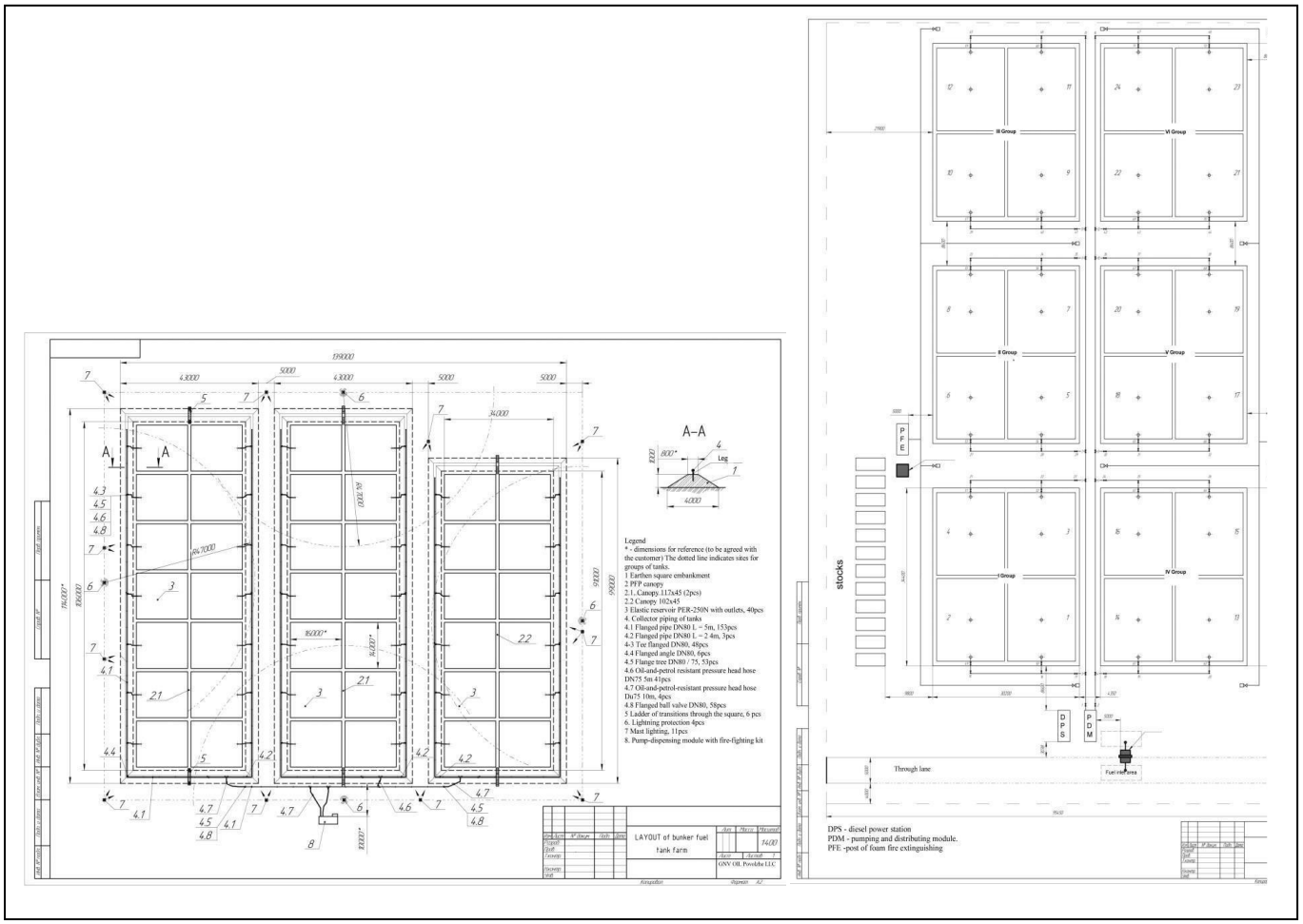
Elastic tanks Layout



Anti-filtration canopy (PFP) for a warehouse with a total volume of 35.000 m3 for the ground bundle:

- PVC material, density 630 g / m2.
- Operating temperature: from -60 ° C to + 70 ° C.

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Durability guarantee

Preparation of the site

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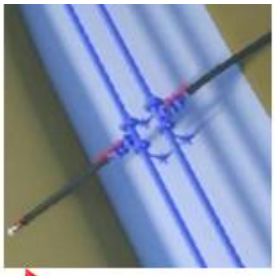
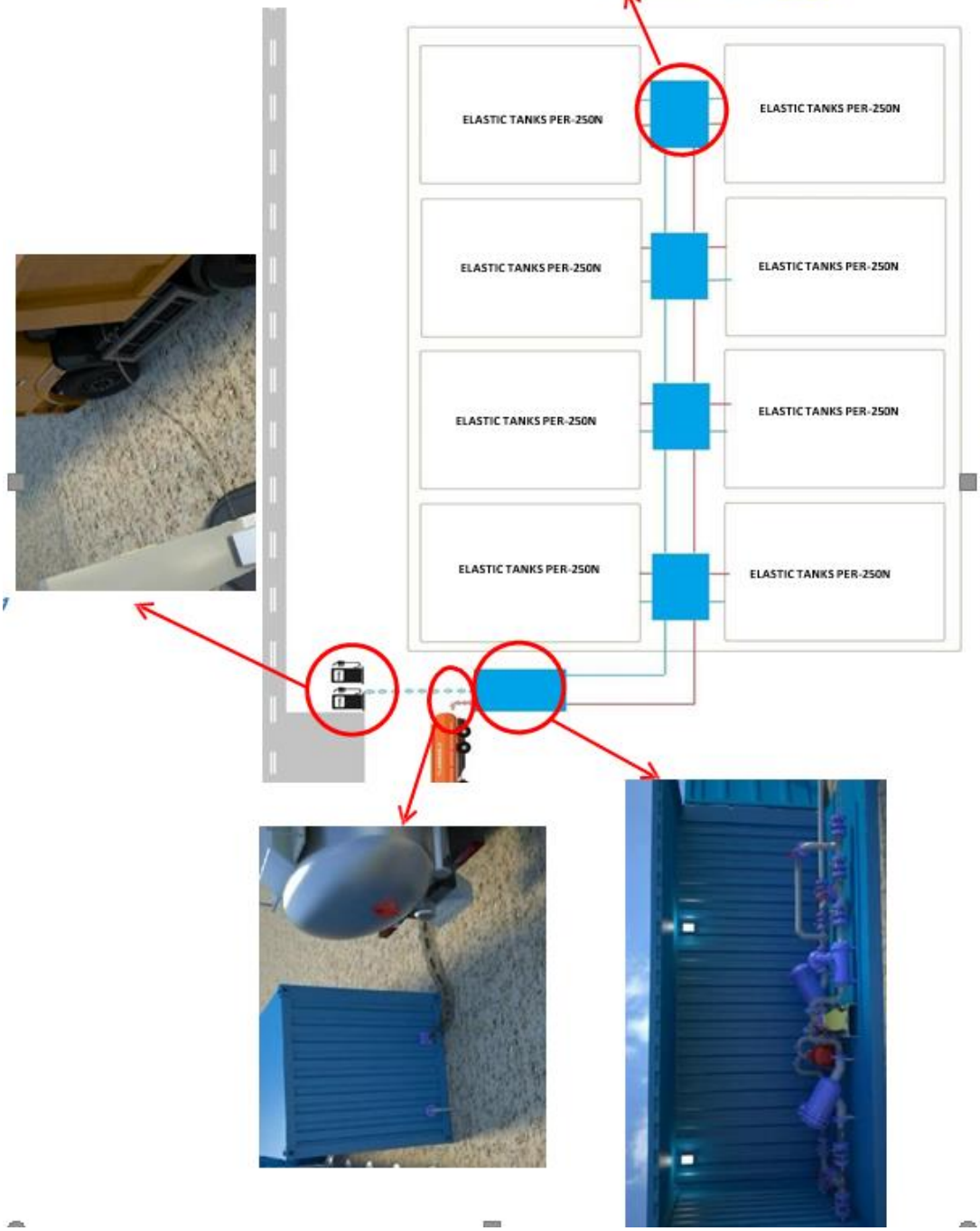
Fuel storage farms





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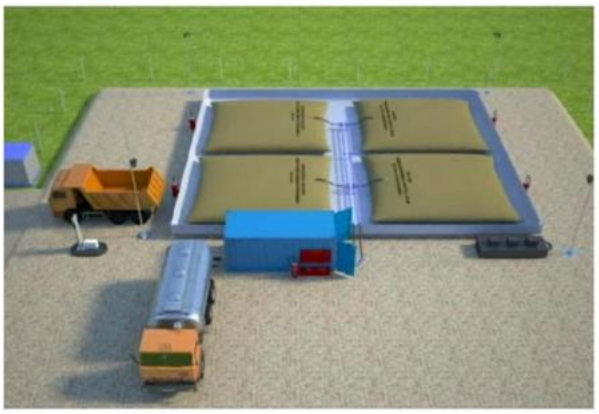
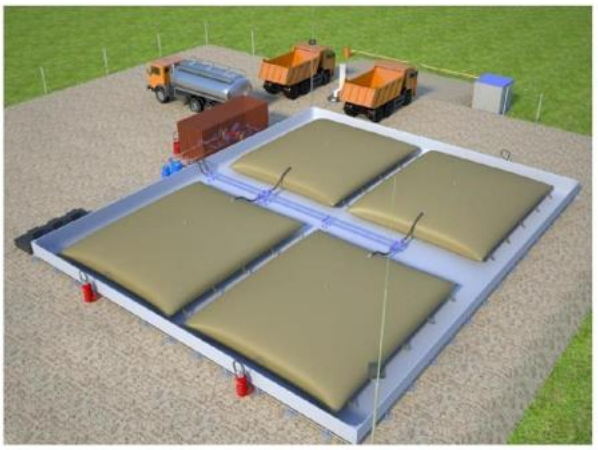
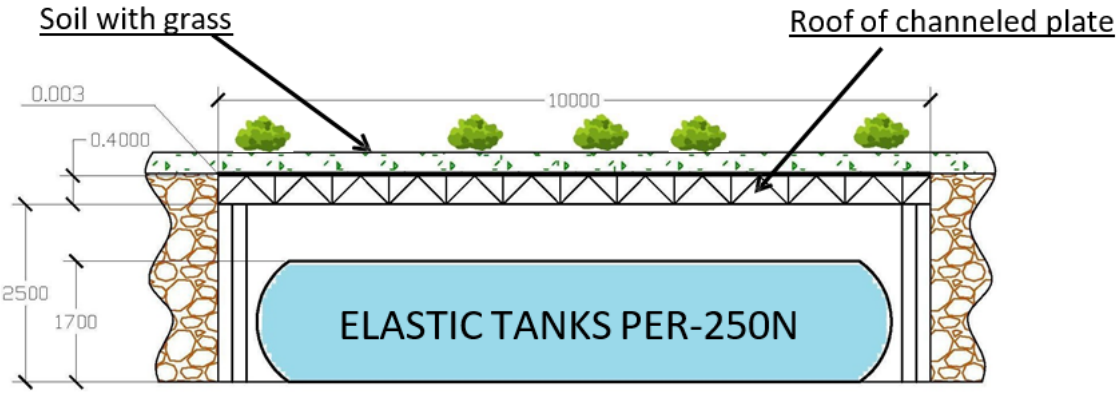


Many options for elastic tanks placement





Fuel storage farms are located underground

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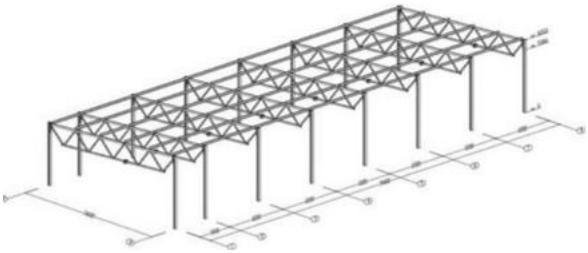
Fuel storage underground



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