

LCC RESEARCH AND DEVELOPMENT ENTERPRISE

**«FACTORY OF MODULAR DEGASSING UNITS»** 



LLC "RDE "Factory of MDU" was founded in 2009 according to initiative of leader Kuzbass mining coal enterprises as manufacturer factory of modular degassing units, included in LLC "TH KuzbassElektromash-Service". The basic direction of LLC "RDE "Factory of MDU" is preliminary degassing of developed coal layers, degassing of

The basic direction of LLC "RDE "Factory of MDU" is preliminary degassing of developed coal layers, degassing of adjacent coal layers and pumping of concentrated methane-air mixtures from worked-out areas. The units of the type MDU with an automated control system, meet all requirements of "Instructions for the degassing of coal mines", "Instructions for use schemes of airing of excavation areas of mines with isolated removal of methane from out space using gas-suction units".

For the last four years the units of type MDU have been entered in such coal enterprises as ""Belon", "Sibuglemet", "SUEK-Kuzbass", "Yuzhkuzbassugol", "Northern Kuzbass" and many others. There are innovative technologies using the highest quality components in the units, produced by LLC "RDE "Factory

There are innovative technologies using the highest quality components in the units, produced by LLC "RDE "Factory of MDU" which are based on rotation and liquid ring pumps of Italian factory production ROBUSCHI (GardnerDenverS.r.I.–Divisione ROBUSCHI).

The plant is located on the territory of Kemerovo region. The total area of the enterprise is over 15000 m2, the number of highly qualified specialists is more than 180 people.

- The factory produces modular degassing units of two types:
- on the basis of rotary pumps;

on the basis of liquid- ring pumps.

- The factory produces installation and the equipment commissioning.
- The factory carries out a full instruction and training of the personnel of the companies-customers (departure of experts on the factory of the company ROBUSCHI, Parma, Italy)
- The factory produces cogeneration units (energy and heat generation from the extracted coal mine methane) together with company TEDOM a.s., (Czechia).
- The factory carries out a full instruction and training of the personnel of the companies-customers (departure of experts on the factory of the company TEDOM a.s, Czechia)
- The factory produces high-temperature flare units of closed type with the possibility of subsequent using of heat.

The factory manufactures thin-walled degassing pipes in diameter from 300 to 1500 mm.

The factory produces a full range of works in drilling of degasification wells, including:

- The drilling of degasification wells;
- The sealing of degasification wells;
- The installation of degasification pipeline and connecting it to the modular degassing units.

The subdivision of LLC "TH KuzbassElektromash-Service", producing the drilling of wells and installation of degasification pipeline, is LLC "TMK".

The factory provides continuous monitoring of gas environment parameters (the concentration of methane, carbon oxide, oxygen, the negative pressure in the pipeline, flow rate and temperature of methane-air mixture in all the way of its passage from a borehole (underground degassing network) to vacuum-pump station.

The factory provides service maintenance, warranty and post-warranty repair of the supplied equipment.

The factory produces metal constructions and containers for technological equipment.

The structural unit of LLC "TH KuzbassElektromash-Service" is LLC "Yuzhstroy-Group", which develops project documentation and carries out construction and installation works on industrial platforms for the MDU units. (Certificate of SRO № 0752.01-2014-0411167670-C-223 and № SRO-P-142-27022010-0411167670-274).



### **Reliability and safety**









Units of the type MDU are developed with the participation of the Institute of problems of complex development of bowels of the Russian Academy of Sciences (SCIENTIFIC STATION, RAS), and with the involvement of technical experts from the leading coal companies of Russia.

Modular degassing units meet all the requirements of "Instructions for the degassing of coal mines" (The order of the Federal service for ecological, technological and nuclear supervision on December 1, 2011 № 679) and "Instructions for use schemes of airing of excavation sites of mines with isolated removal of methane from out space with gas-suction units" (Order of the Federal service for ecological, technological and nuclear supervision on December 1, 2011 № 680).

Thus the units of the type MDU are adapted for the using in the coal mining industry of the Russian Federation. They are used in mines, where by means of ventilation it is impossible to ensure the content of methane in the air within safety standards.

#### Constructive reliability and safety

High-quality materials and certified equipment are used in the production of units. Electrical equipment in explosion-proof version is installed in the technological modules. In addition, all the sensors installing in the modules of degassing and cleaning, have explosion-proof and included in the State register of measuring instruments of Russia.

The construction of the unit envisages location of pumps in different modules. In case of emergency situation it allows to stop the pumps located in one module, while they will continue to work in another one. Thus, the degassing process will not stop.

In all branches of technology there is control of atmospheric composition and in the case of emergence of methane in dangerous concentrations, all electrical equipment turns off.

The units of the type MDU have the certificate of the technical regulations of the Customs Union " About security of the equipment for work in explosive environments" (TR TC 012/2011), and permission for using by the Federal service for ecological, technological and nuclear supervision.

#### Automated control system

MDU are equipped with an automated control system (ACS), which provides control of parameters of degassing unit work, displaying the current status of the units and technological processes on the screen of the operator panel, operation via operator panel, and archiving of information about the MDU units and the values of the controlled parameters of technological processes, and its output to the screen of the operator panel in the form of graphs.

ACS allows to control the degassing unit by manual (local) and automatic modes. In the first case, management by mechanisms is implemented by the operator screen of operator station or by local control panels.





LLC "RDE "Factory of MDU" developed a new model of vacuum module for gas control on the excavation area specially, which is fully consistent with both the current instructions for the degassing of coal mines, and the current instructions for use of schemes of airing hollow sites of mines with isolated removal of methane from out space with gas suction units (GSU).

The advantage of the new module is that it combined pump group (based on vacuum pump RBS 155 capacity up to 185 m3/min of the production of Italian factory ROBUSCHI), cleaning system (production ROBUSCHI also), stop valve and safety valve, gas-analyzing equipment. Gas-analytic equipment allows to keep control of the concentration of methane, oxygen and carbon oxide in exhaust gas mixture in the automatic mode, and it gives the opportunity to prevent the emergence of endogenous heating coal at an early stage. In accordance with the current instructions for ventilation schemes using, GSU consists of the production and backup units equal to the filing.

Another advantage of the new module is the absence of a large number of bends and tees, which creates additional resistance. The new module is connected to the trunk pipeline directly. The number of modules is only limited by the throughput capacity of the trunk pipeline.











Modular degassing units based on rotary pumps MDU-RBS are equipped with pumps of the type RBS of the production of Italian factory ROBUSCHI.

Rotary pumps of the type RBS have a high bandwidth – one pump to 25000 m3/h with a working pressure up to 500mbar. They are used for a preliminary degassing and for degassing of worked out space, and as gas suction units. These units are exploited together with a degassing pipeline, which has total losses up to 300 mm Hg in the degassing network.

The absence of moving parts in the working area of the pump RBS, and applying corrosionresistant, antistatic and abrasive-resistant coverage provides an increased operating life of the unit.









To ensure a high level of security and increased resource of the pump groups and elements of the unit, each MDU-RBS is equipped with clearing system of methane-air mixture from mechanical impurities and moisture placed in a separate module, installed in front of modules of vacuumization MDU.

The clearing system of a methane-air mixture includes separators and filters of thin clearing of stainless steel. Draining of water from the separators is automatically.

- Standard delivery set of degassing unit MDU-RBS includes 3 modules:
  - The cleaning module of methane-air mixture;
  - The vacuum module (pump module);
     The control module (module of constant)
  - The control module (module of operator)
- Additionally, according to the technical task of a Customer, degassing unit can be equipped with:
  - The cogeneration unit (the production of electricity and heat);
  - The high temperature flare unit of the closed type with the possibility of subsequent using of heat.







Modular degassing units based on rotary pumps of the type MDU-RB are equipped with pumps RB-DV produced by Italian factory ROBUSCHI.

Degassing units MDU-RB – are units based on rotary pumps having a special device of injection of cooling gas. Thanks for the cooling system, units of the type MDU-RB can make a vacuum degassing rod of mine two times higher in comparison with other manufacturers. In turn, working at an absolute pressure of suction to 100 mbar (differential pressure is 900 mbar), or 93% of the vacuum, the operating temperature of the pump does not exceed 85 degrees C.

When extended degassing pipe with the total losses in the degassing network is more than 300 mm Hg it is recommended to use degassing units with rotary pumps of the type RB-DV with possibility of creation of depression more than 300 mm Hg.

The absence of friction parts in the working area of the pump RB-DV, and applying corrosion-resistant, antistatic and abrasiveresistant coverage, provides increased working resource of the unit.

To ensure greater security and increased resource of the pump groups and elements of the unit, each MDU-RB is equipped with system of clearing of methane-air mixture from mechanical impurities and moisture, placed in a separate module, installed in front of modules of vacuum MDU.











ROBUSCH

The system of clearing of a methane-air mixture includes separators and filters of thin clearing of stainless steel. Draining of water from the separators is automatic.

Degassing unit of the type MDU-RB is fully adapted to the Russian market and has no analogues in its technical parameters in the modern industry.

# Standard delivery set of degassing unit MDU-RB includes4modules:

- Cleaning module of methane-air mixture;
- Two vacuumizing modules (pump modules), which are equipped with 1 (one) or 2 (two) pumps in each module depending on the capacity of the machine;
- The control module (operator module).
- Additionally, according to the technical task of the Customer, degassing unit can be equipped with:
- The cogeneration unit (electricity and heat);
- The high temperature flare unit of the closed type with the possibility of subsequent use of heat.

### Modular degassing units based



Modular degassing units based on liquid ring pumps MDU-RV are equipped with pumps of the type RVS of the production of Italian factory ROBUSCHI.

Degassing units of the series MDU-RV have a number of serious technical advantages in comparison with existing global manufacturers of vacuum liquid ring pump units.

All liquid ring pumps RVS are completed with automatic discharge valve. Thanks to it pumps of the series RVS, the only liquid ring, which are able to work in the whole range of vacuum.

The distinctive feature of MDU-RV is the latest device SIA (Integrated system of the anticavitation), which completely eliminates the problem of cavitation, quenching the vapour bubbles in the moment of their formation. The using of the new device phenomenon of cavitation is missing even when the mouth of the inlet is fully closed.

Degassing unit MDU-RV is equipped with a system with closed cycle of working fluid. Additionally, methane-air mixture passes through demister, in which there is separating of the residual moisture, and as the result - consumption of the working liquid is reduced to the minimum and natural evaporation.







### on liquid ring pumps







In addition, to ensure greater security and increased resource of the pump groups and elements of the unit, each MDU-RV is equipped with system of clearing of methane-air mixture from mechanical impurities and moisture, placed in a separate module, installed in front of modules vacuum MDU.

The system of clearing of a methane-air mixture includes separators and filters of thin clearing of stainless steel. Draining of water from the separators is automatically.

Degassing unit of the type MDU-RV is fully adapted to the Russian market and has no analogues in its technical parameters in the modern coal industry.

- Standard delivery set of degassing unit MDU-RV consists of 4 modules:
  - The module of cleaning methane-air mixture;
  - Two vacuumizing units (pump modules), the unit is equipped with 2 (two) pumps in each module;
  - The control module (operator module).
  - Additionally, according to the technical task of the Customer, degassing unit can be equipped with:
  - The cogeneration unit (production of electricity and heat);
  - The high temperature flare unit of a closed type with the possibility of subsequent use of heat.





To organize service, LLC "RDE "Factory of MDU" used the ideology of leading world producers, which is based on the postulate "any failure is the responsibility of the manufacturer, and the service is a connecting link between the manufacturer and operator.

Today LLC "RDE "Factory of MDU" uses the service as a powerful resource to increase customer value by which questions connected with possible malfunctions are solved.

Buying products LLC "RDE "Factory of MDU" the client can be sure of its long and continuous work with the company's warranty and service maintenance, modern diagnostic and repair equipment, highly qualified specialists and original spare parts.

Customer service has existed since the foundation of the Factory. The main objective is execution of works on installation, commissioning, warranty repair and service maintenance of equipment.

Today, service professionals capable to carry out tasks of any level of complexity. Service specialists regularly participate in seminars, trainings, certifications, improving their skills.

Service teams work all over Kemerovo region. In addition to the Central office, in Novokuznetsk city, in January 2013, office was open in Leninsk - Kuznetsky.

## Standard delivery set of degassing unit MDU-RV consists of 4 modules:

- the many years experience of servicing the full range of used domestic and import equipment;
- the certified specialists trained in the companies-manufacturers of the equipment;
- the installation and commissioning, including start the equipment into operation;
- the warranty and post-service of the equipment during the whole operation term;
- the availability of a full range of spare parts in the stock; the fast exit of technical experts to degassing units.

#### The performed service works:

- The installation and commissioning of all spectrum of the equipment;
- The warranty service;
- The service maintenance.











### Service









New offer on the market is thin-walled metal degassing pipes produced by LLC "RDE "Factory of MDU".

To provide a more complete package of services for degassing of mines at the beginning of 2012 the leadership of the enterprise made a decision to launch the production of pipes for degassing. To ensure the high quality of the new product it was decided to use the newest equipment of leading world manufacturers.

So, for example, thermal cutting machine Czech production with power production USA is used for the production of high-precision components for pipes and flanges of sheet metal.

Programmable rolling machine of Italian production is used for rolling of tubes with the length up to 4000 mm.

Auto console Italian production with welding unit of German production is used for welding. Welding of all joints of pipes is made in the atmosphere of protective gases Ar+CO2, increasing the quality of welds in several times.

Each pipe is exposed shot blasting treatment before its painting.

Painting of pipes is performed in a specially prepared spray booth with forced-air and exhaust air ventilation system.

Using this equipment, LLC "RDE "Factory of MDU" can produce pipes of different diameters: minimum - 325 mm, maximum - 1420 mm.

Flanges are manufactured according to GOST 12820-80. But for our partners, if it is necessary, LLC "RDE "Factory of MDU" can manufacture pipes and flanges according to client's specifications.

This line of the equipment is automated, that eliminates the human factor.

 $The production \, capacity \, is \, 10\,000 \, meters \, of \, degassing \, pipes \, in \, a \, month.$ 

This production line has no any analogues in the Kemerovo region.





To position itself on the international market successfully, many leading Russian industrial companies came to the conclusion that the key to increase the level of competitiveness and increase of efficiency of activity is the introduction of new forms of doing business, one of which is cooperation with external service providers while solving non-core tasks of the enterprise.

The main goal of using of this approach in many companies is the need to concentrate on more important fields and functions of its activities. Thus, the organization tends to pass secondary functions to other companies engaged in this activity with specialized equipment professionally and access to the latest technologies, however, the organization (client) receives new opportunities, optimizing its activities and releasing their own resources.

After analyzing of the changes in Russian large industrial companies, in 2014 the management of LLC «TH KuzbassElektromash-Service" was made the decision about creation of LLC "YuzhStroy-Group" based on the material-technical base of LLC "RDE "Factory of MDU".

LLC "Yuzhstroy-Group is an engineering and construction company, which was established as a unified structure which allows to implement an comprehensive approach in solving problems in the sphere of construction.

LLC "YuzhStroy-Group" deals with the construction of new buildings and constructions, and reconstruction, capital repair of existing buildings, carries out maintenance of the constructed or reconstructed objects of civil and industrial purposes, including:

preparation of the construction platform, excavation works, the device and installation of concrete and reinforced concrete structures, construction of bearing and enclosing structures of buildings and constructions, roofing, finishing, commissioning works, the device and installation of internal and external engineering systems and equipment, quality control work.

Among provided services there is also execution project and work documentation, development of engineering measures, support of project documentation (approval according to established procedures, the submission of examination for approval, and so on), supervision during construction and installation works.

LLC "YuzhStroy-Group" performs functions of the General contractor fully, carries out the control over quality and terms of execution of design and construction works, develops graphics construction, regulates the financing and movement of labor, supplies all necessary construction materials and equipment. Selection and using of materials and equipment in the optimum combination, as well as constant perfection of methods of work allow to meet the requirements of the Customer with maximum economy and more effectively.

In accordance with the main activity principle, LLC "Yugstroy-Group", work in a team based on trust and mutual respect, which contributes to the full realization of creative potential of each employee. The company has created a team with knowledge and experience of professionals who have worked many years in the construction industry, combined with energy and ambitions of young specialists, which gives alloy of innovatory creative ideas and guarantee stability of making the right decisions.

To introduce the project and construction activities LLC "Yuzhstroy-Group" has the necessary permissions that allow you to work with objects:



**OJSC Yuzhkuzbassugol**, the construction of «Mobile groundvacuum-pump station on the industrial area of the cargo of an inclined trunk» of the branch Mine «Jubileinaya» 2 area



CJSC «Sibuglemet», OJSC «Mine "Bolshevik», the device of water supply and drainage of surface degassing station.

### LLC «YuzhStroy-Group»





OJSC «JUzhkuzbassugol», LLC «Mine Uskovskaja», the installation of degassing unit MDU-110RB and surface degassing of pipe L=2000m



CJSC "Shahtoupravlenie "Taldinskoe-South", the construction of "Mobile ground-vacuum-pump station on the industrial area of CJSC



**CJSC "Shahtoupravlenie "Taldinskoe-South",** the construction of "Mobile ground-vacuum-pump station on the industrial area of CJSC "Shahtoupravlenie "Taldinskoe-South"



**CJSC "Shahtoupravlenie "Taldinskoe-South",** the construction of "Mobile ground-vacuum-pump station on the industrial area of CJSC "Shahtoupravlenie "Taldinskoe-South"



**CJSC "Sibuglemet", OJSC "Mine "Antonovskaja",** the construction of "Mobile ground-vacuum-pump station on area of OJSC "Mine "Antonovskaja"



Reconstruction of the Administrative-household complex, LLC "RDE "Factory of MDU"  $\,$ 

To introduce the project and construction activities LLC "Yuzhstroy-Group" have necessary permits to the types of works which influence safety of objects of capital construction, including dangerous and technically complex objects:

-certificate Nº 0752.01-2014-0411167670-C-223 issued by self-regulating organization non-commercial partnership "Building regional partnerships"; -certificate Nº SRO-P-142-27022010-0411167670-274 issued by self-regulating organization non-commercial partnership "Union of the projectors of Siberia".



During the existence of LLC "RDE "Factory of MDU" it has made more than 80 degasification units of the type MDU, consisting of 147 pumping modules, which are 272 pumps. For the period from September 2010 to June 2014 over 4975000000 m3 methane-air mixture is pumped out from coal seams with degassing units of the type MDU.

#### Cogeneration units

- Cogeneration is a highly efficient method of production of heat and electricity. The efficiency of electricity production in the classical power plants is in the range of 25 to 35%, while cogeneration units work with efficiency of 80 to 90% because of using of thermal energy.
- The payback period of cogeneration units is from 2.5 to 3 years.
- The unit consists of a modular design, i.e. the engine, the generator and the rest of equipment (heat exchangers, fittings, silencer, etc.) are located on the common frame in the module of container type. All the units are equipped with control and measuring instruments (CMI), electric control cabinet and synchronization, power switchboard.

#### The advantages of modular construction:

- The minimum level of noise produced by the unit allows you to place it in locations without special training.
- The low cost of construction and installation works at the installation area.
- The all piping, cabling and other equipment are installed in the module and exclude the possibility of outside intervention.
- It is possible to manufacture cogeneration units with various electrical and thermal power.



#### Torches of the closed type

• Additionally modular degassing units of the type MDU can be equipped with a module of incineration and recycling which represents a flare of the closed type with possibility of heat recovery. Methane-air mixture is combusted with a methane concentration of 25-100%.

#### The advantages of module of incineration and recycling are:

- The absence of thermal radiation and visible flame;
- The low level of noise;
- The simple control system with easy access to all elements of control;
- The access to all serviced junctions of the flare unit;
- The possibility of heat recovery;
- The flare units of the closed type can be positioned in the immediate vicinity of technological equipment;
- The two-layer fire protection is applied to sections, which consist of a layer
  of refractory fibre thickness of 20 mm, covered with a layer of 5 mm of
  composite on the basis of silicate, (NaAl2SiO3) which protects against the
  penetration of condensate and products of combustion.



#### The insulating properties of a double-layer fire protection



### **Product reviews**





OJSC "SUEK-Kuzbass "Management of degassing methane recovery and utilization" (MD&UM) Chief engineer Gavrilov Viktor Ivanovich

"First degassing unit on the basis of liquid ring Italian pumps was commissioned 08.08.2011 year, «Mine «Kotinskaya». Currently, similar units are purchased for the needs of the "Mine of the name of Kirov" and "Mine № 7".

Technical characteristics of the equipment and its safety are important for us. Module of cleaning of methane-air mixture ", which comes from a well, from moisture and debris is used in modular degassing units produced by LLC "RDE "Factory of MDU". It helps to ensure the safe operation of vacuum pumps and increase their service life.

Questions about work of the units did not arise. We hope for further cooperation".



#### CJSC "Sibuglemet" Mine "Bolshevik" Chief engineer Lebedev Sergey Nikolaevich.

"Degassing unit MDU-180RV was introduced in exploitation at the mine "Bolshevik" 18.01.2011 year. The unit is equipped with Italian pumps RVS60, the factory Robuschi. The performance of a single pump is 60 cubic meters of methane-air mixture in a minute. Currently the mode of the unit is three pumps in operation, and another one is in reserve. We were attracted by the technical parameters of the degassing unit MDU-180RV, the most important of which is the ability to pump methane-air mixture with the methane concentration from 0 to 100 percent.

We are glad for this installation, and at the moment the contract for the supply of another similar unit is already concluded".



#### OJSC "Juzhkuzbassugol", LLC "Mine "Esaulskaya" Chief mechanic Biryukov Alexey Evgenyevich.

"LLC "TH KuzbassElektromash-Service" put on the branch "Mine "Esaulskaya" the degassing unit MDU-110RB, produced by LLC "RDE "Factory of MDU".

Modular degassing unit was put into operation on February 21, 2011. Installation, commissioning, control and adjustment were made by the representatives of LLC "TH KuzbassElektromash-Service".

This unit is equipped with advanced sensors of monitoring of methane-air mixture (oxygen content, CO, CH4), sensors of monitoring of the temperature of the mixture at the inlet and outlet sensors vacuum degassing pipe. Information about the work of the unit goes to the operator in real time. MDU has three control modes: automatic, remote, local.

There is no any problem with work of the unit MDU during the operating period of it ".



#### OJSC "Juzhkuzbassugol", LLC "Mine "Uskovskaya" Deputy chief engineer for production Volkov Alexey Yurievich.

"TH KuzbassElektromash-Service" supplied two degassing units MDU-110RB, produced by LLC "RDE "Factory of MDU" to OJSC "Juzhkuzbassugol", LLC "Mine "Uskovskaya".

The first unit was put into operation 06.06.2011 year, the second one is in - 24.10.2011 year. The construction of platforms for degassing unit, installation of the pipeline, its insulation, installation degassing units, personnel training was carried out by LLC "TH KuzbassElektromash-Service".

Thanks to the commissioning of the second station, there was a separation of preliminary degassing and the process has become more efficient. Maintenance of the units is carried out according to schedule maintenance. I do not have any claims about completed work."



### **Certificates and awards**



### **Certificates and awards**





### LCC RESEARCH AND DEVELOPMENT ENTERPRISE "FACTORY OF MODULAR DEGASSING UNITS"

654031, Kemerovo region Novokuznetsk, shosse Severnoe, 8 tel.: +7(3843)991-991 e-mail: info@tdkes.ru www.zavodmdu.ru