

Remote diagnostic monitoring useful for inaccessible pipeline sections

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Evaluating and inspecting pipelines has become more difficult as systems grow larger and enter more inaccessible areas. The challenging climate in Russia's northern regions also makes performing inspections more difficult and often requires upgrading instruments and equipment, which also increases inspection costs. Peak values in pipeline parameters are common in cold weather, when diagnostic inspection is extremely difficult. In such situations, automated systems should be used to monitor pipeline conditions.

The *system for monitoring pipeline crossings under auto and railroads (SKP21)* developed by Energodiagnostika LLC was designed as an automated system for monitoring the technical condition of inaccessible facilities with a high risk of corrosion. SKP21 was designed to provide long-term equipment operation in the absence of external power sources, in sensitive areas, in a wide range of ambient temperatures and high humidity. SKP21 was required to be tamper-proof and secure in deployment (Fig. 5).

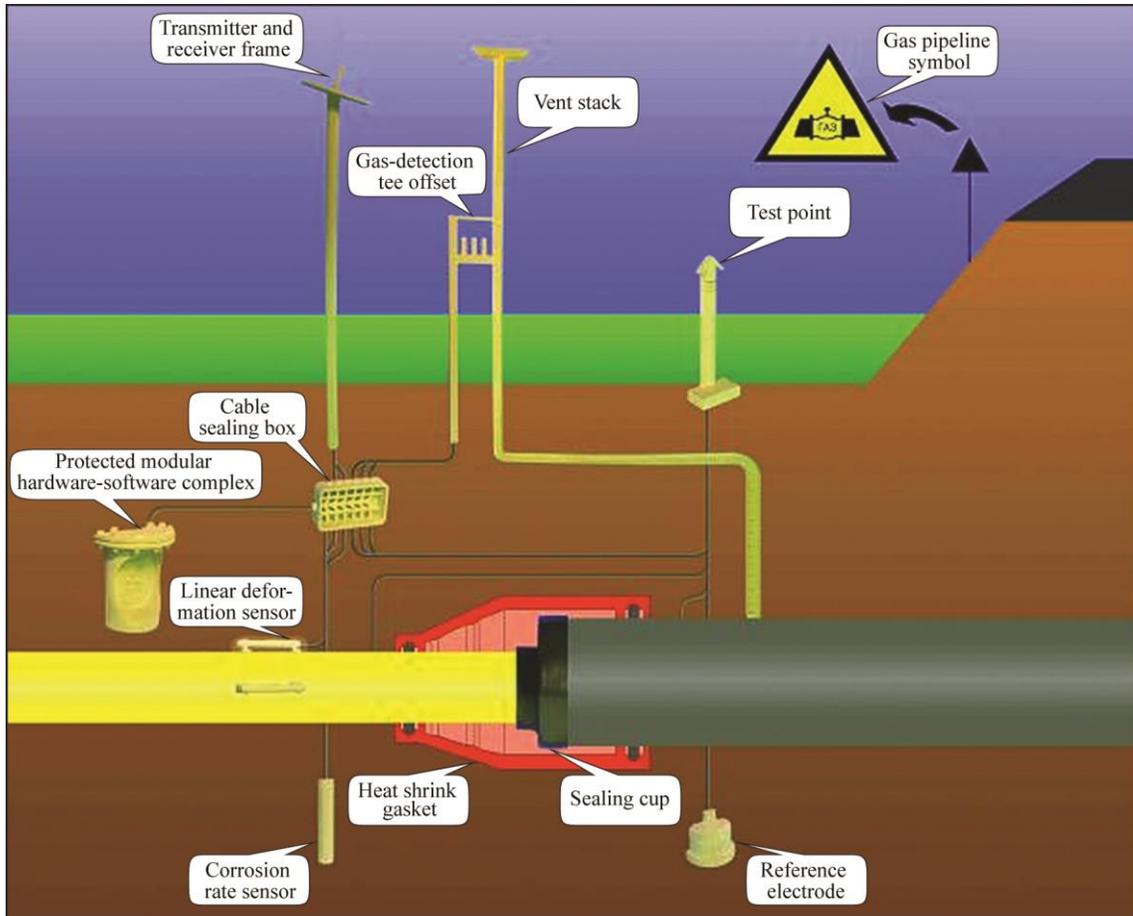


Fig. 5 System for monitoring pipeline crossings under auto-and rail-roads (SKP21).

SKP21 trial operation started in 2005 at PJSC “Gazprom” facilities. In 2009, SKP21 was included in the list of ECP (pipeline electrochemical protection) equipment authorized for use at PJSC “Gazprom”. In 2010, SKP21 was recommended for installation where oil and gas pipelines crossed under public railroads to monitor for leaks and as a safety tool for railway operations.

In 2015, in accordance with PJSC “Gazprom” requirements, SKP21 technical specifications were assessed for conformity with STO Gazprom 9.4-023-2013 and were recognized to have met the standards. SKP21 has all the required permits, licenses and approvals to be used at sensitive pipeline facilities.

To date, SKP21 systems have been installed at hundreds of various pipeline facilities – from main pipelines, to plants and gas-supply systems near populated areas, and in all climatic zones of the Russian Federation, from the Kaliningrad region to Sakhalin, and from Krasnodar Territory to Salekhard.

Reliability is one of the key requirements for systems like the SKP21, which are used in such geographically diverse settings. For example, the validated error-free running period of SKP21 standard equipment is 25,000 hours and the demonstrated life of individual SKP21 systems is over 60,000 hours both in the harsh conditions of the far north and drought-prone southern regions of the country.

The SKP21 system is designed on a modular basis and contains a wide range of instrumentation for remote monitoring and control. Due to standard communication protocols, SKP21 equipment can be easily integrated into linear telemechanics systems and automated processing control systems.

There are two types of SKP21 field hardware and software complexes: underground (Fig. 6) and above ground, located in a container unit (Fig. 7).



Fig. 6. System for monitoring pipeline crossings under auto and railroads (SKP21) – underground version.



Fig. 7. System for monitoring pipeline crossings under auto and railroads (SKP21) – above ground container unit.

When installing SKP21 at potentially hazardous pipeline sections, Energodiagnostika specialists carry out all the related work: preliminary diagnostic inspection, development of design and detailed documentation, manufacturing and modernization of customized equipment, installation and start-up, warranty service and post-warranty maintenance. All work is properly certified.

The system's modular concept allows for a wide range of monitoring possibilities and equipment can be quickly adapted to customer requirements. The modular design allows diagnostic instruments and sensors that meet safety and power consumption requirements to be integrated.

Certain SKP21 configurations are designed to acquire data and monitor pipeline electrochemical protection parameters in zones subject to the influence of stray current, which allows ECP equipment to be maintained less frequently and the operating mode adjusted during trial operation.

Diagnostic monitoring of pipeline sections keeps track of any changes in the pipeline's condition to help determine if/when it should be removed from operation.

The available SKP21 technology and experience gained by Energodiagnostika LLC can be applied to a wide range of issues related to the automated remote control, monitoring and diagnostics of sensitive pipeline facilities.