

CERTAIN FEATURES OF ELECTRICAL SUPPLY OF ELECTROCHEMICAL PROTECTION DEVICES OF HIGH PRESSURE OIL AND GAS PIPES

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ANNOTATION

The article provides information on the process of corrosion of high-pressure oil and gas pipelines, methods of combating it and devices for the implementation of the process.

Keywords: pipe, pressure, cathode protection, electrostatic field, stray currents, corrosion, drainage, tread, power line.

INTRODUCTION

Delivery of oil and gas to refineries is carried out mainly under high pressure through metal pipes. An electrically conductive ionized environment is created due to the interaction of the electrostatic field created by the movement of the product inside the pipe and the aggressive interaction of the soil layer on which the pipe is laid. The potential difference in the resulting electrostatic field causes an electrical conductivity to form, resulting in the onset of a corrosion process in the metal pipe (Figure 1).

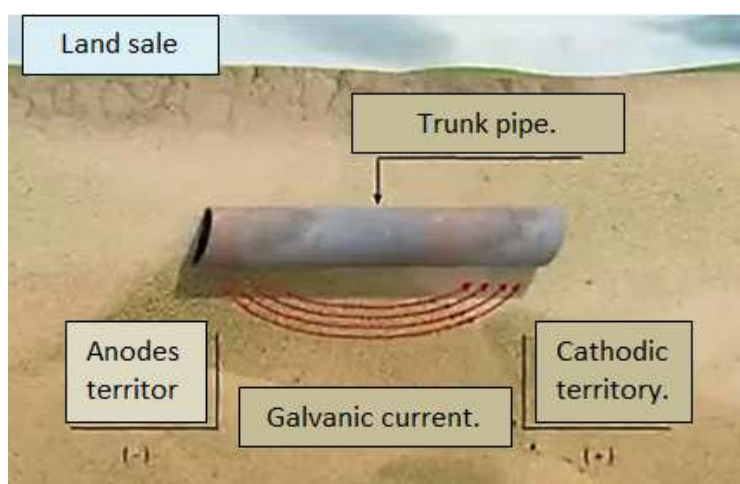


Figure 1. Occurrence of corrosion process in metal pipe.

The development of modern surface transport systems also leads to increased corrosion of product pipelines, ie corrosion of pipes also occurs under the influence of stray currents generated at the intersection of electrified transport routes (railways, subways, etc.) (Figure 2).

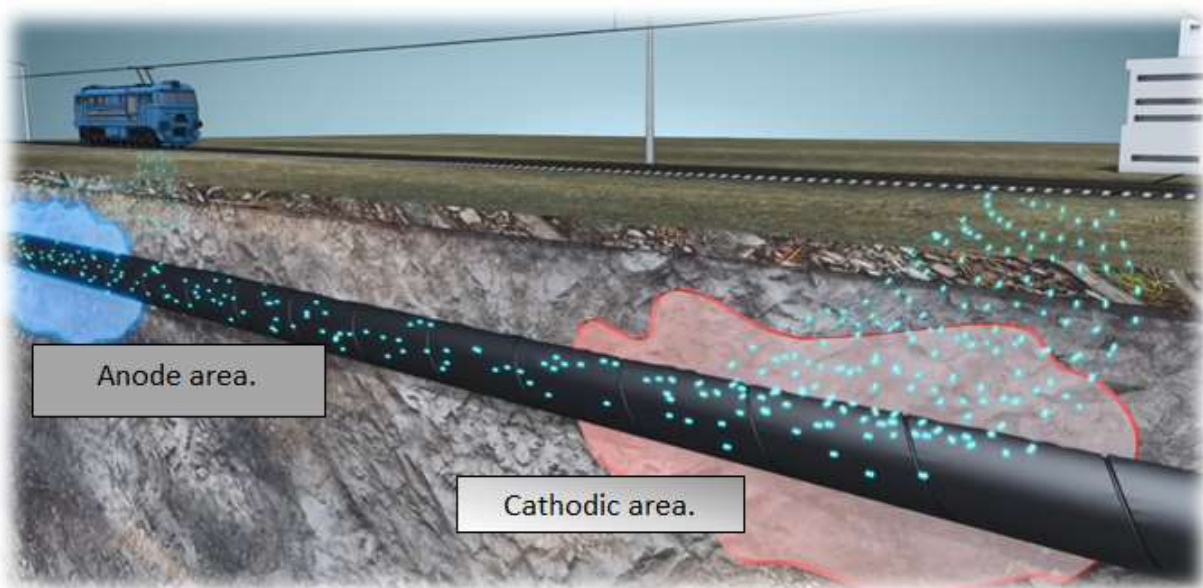


Figure 2. Impact of electrified railways on pipes.

There are several different methods and devices to combat corrosion that occur in pipes when delivering oil and gas products through pipes under high pressure, and these are mainly:

- Electric drainage device;
- Cathode protection stations;
- Protective protection.

The electric drainage device drains the currents generated in the pipes (ground) or return the lost current to the source (Figure 3).

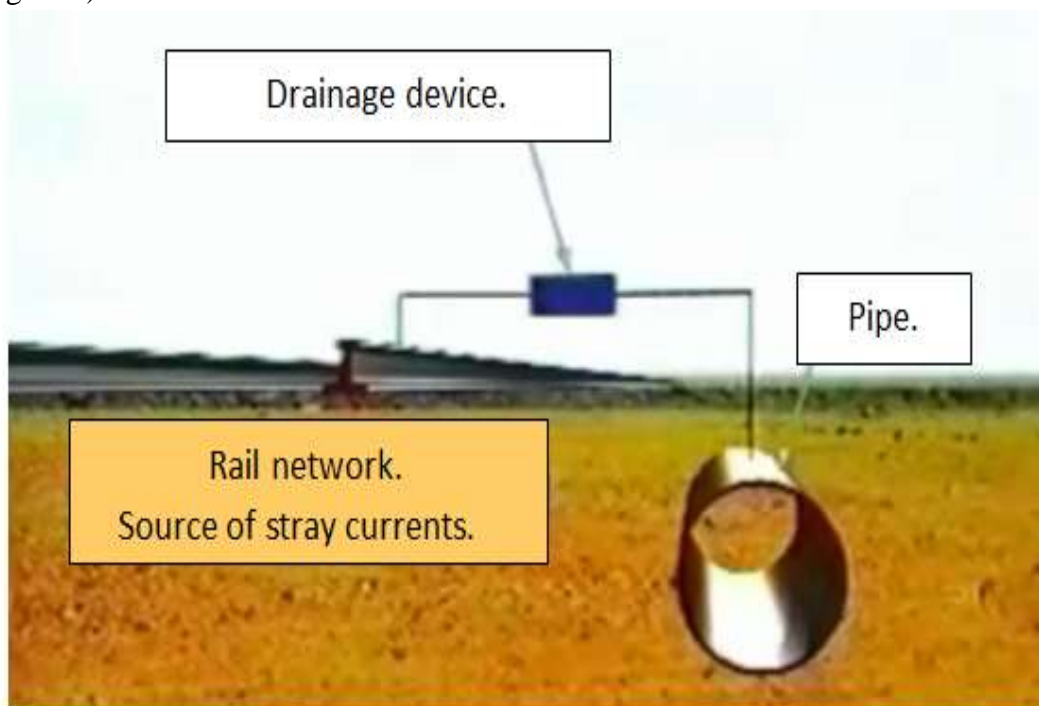


Figure 3 Electric drainage device.

Cathode protection stations ensure that the potentials generated in the pipes are shifted to the negative side (Figure 4).

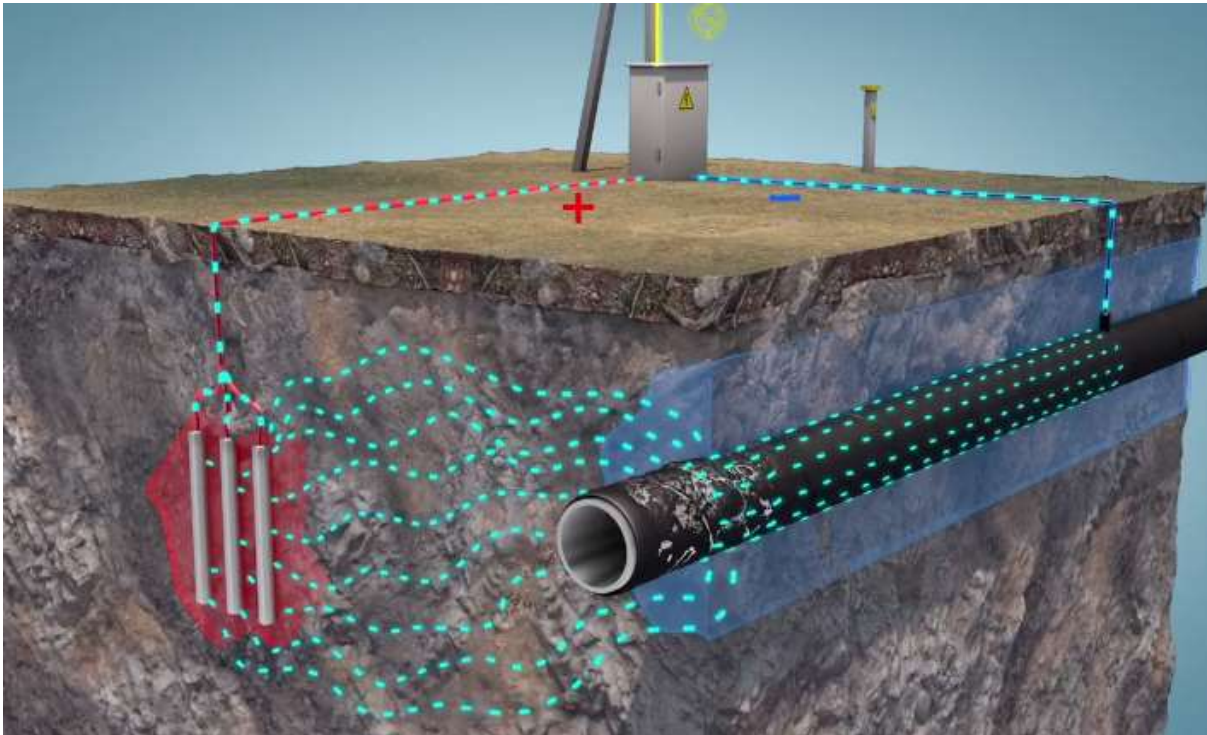


Figure 4. Cathodic protection stations.

The tread protection device consists of several treads and is connected to the pipes through a special measuring and control point (Figure 5).

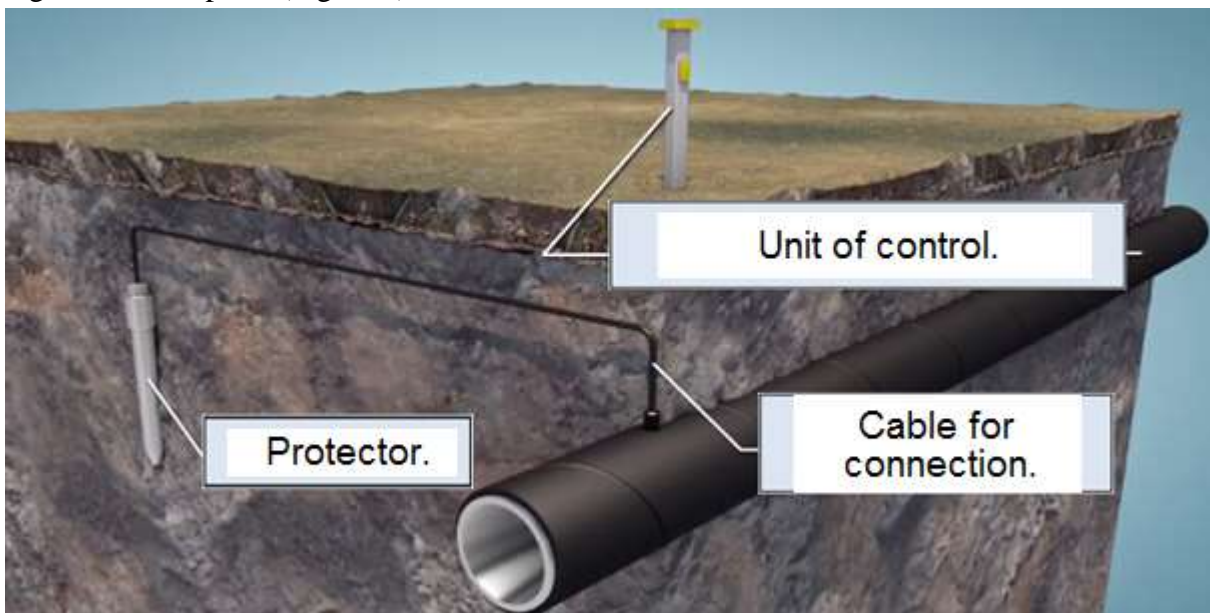


Figure-5. Protective protection device.

This device is connected to the pipe as a low-voltage AC source using special electrodes, which slows down and stops the corrosion process as a result of exposure to electron-ion currents.

The electrical drainage device and cathode protection stations are connected to a high-voltage (6-10 kV) power supply system running along the pipeline. In addition to the large expenditures on the construction of overhead transmission lines, which in turn are ground-based devices, there are regular power outages due to the fact that they are not protected from various external influences.

Conclusions based on theoretical and practical studies show that the distance between the individual cathode stations protecting the pipes should not exceed 20 km. This, in turn, requires the cathode stations to be connected to an existing part of the regional power grid. In cases where the reliability of the network to which the devices are connected is low, the presence of power outages can lead to a violation of the operating mode of the cathode stations, or a state of complete shutdown. The above facts show that there is a problem that needs to be addressed, the widespread use of electrotechnological processes in the corrosion protection of high-pressure oil and gas pipelines and the importance of scientific research in the use of modern energy-saving, advanced technical devices.

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