NEW INFORMATION ON «OLD» ELECTRODES

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The article gives information on upgrading of electrodes ANO-4 and ANO-21 to expand the range of electrodes and provide the maximum possible utilisation of raw materials from Ukrainian manufacturers. Also, it contains data on updating of regulatory documents for electrodes ANO-4 and UONI-13/45 to certify them to conformity with specifications RD 03-613–03 «Rules for Utilisation of Welding Consumables in Manufacture, Erection, Repair and Reconstruction of Technical Units for Hazardous Industrial Facilities».

Keywords: *welding electrodes, upgrading of electrodes, regulatory documents, construction and erection of industrial facilities*

The current market conditions are characterised by rapid changes in business environment and growth of competition. In this connection, it is necessary to promptly and adequately react to the associated risk. Following the concept of «continuous change to achieve stability», in the last years the E.O. Paton Electric Welding Institute has been active not only in developing new grades of electrodes, but also in improving developments of the last years to meet the constantly changing requirements imposed by their manufacturers and customers.

This study describes the point of upgrading of three grades of electrodes — ANO-21 and ANO-4 (the development of the E.O. Paton Electric Welding Institute), as well as UONI-13/55 (the development of the Central Research Institute for Materials (TsNIIM), Russia).

Versatile electrodes of the ANO-21 grade with rutile covering were developed for fillet, butt and overlap welding of 1–5 mm thick metal in all spatial positions, including for vertical downhill welding. The electrodes were produced with a 2–3.25 mm diameter rod. As proved by the experience of applying electrodes ANO-21 of the above diameters, they have high welding-operational properties: the arc is easy to ignite and remains stable in welding at both alternating and direct current of any polarity, the slag spontaneously detaches, the forming weld metal is fine-scaly, and the resulting weld is flat, dense and uniform. The use of these electrodes provides the required density of the welds even if the electrode covering is moistened, as well as in welding of metal having rust traces and various contaminations. The high arc stability at low amperage allows using household transformers with low open-circuit voltage. The above electrodes are easy to handle even for low-skilled welders.

Upgrading of electrodes of the ANO-21 grade was aimed at expanding their range and at the maximum possible utilisation of raw materials from Ukrainian manufacturers.

New modifications of the 2–5 mm diameter electrodes ANO-21 were designated as follows:

E46–ANO-21–∅2–3.25–UD E432(3)–R11	GOST 9466–75 TUU 05416923.001–95
E46–ANO-21–∅4–UD E432(3)–R21	GOST 9466–75 TUU 05416923.001–95
E46–ANO-21–∅5–UD E432(3)–R31	GOST 9466–75 TUU 05416923.001–95

It follows from the above designations that increase in diameter of electrodes ANO-21 leads to limitation of spatial positions, in which welding can be performed, other welding-operational indicators of the electrodes remaining practically unchanged.

The regulatory documents for electrodes ANO-21, including specifications and instructions, were updated allowing for the results of the investigations conducted. The statement of the sanitary and hygienic examination was issued, and the technology for production of the electrodes was mastered at Closed Joint Stock Company «Artyomovsk Machine-Building Factory «Vistek» by using the equipment available at the Factory electrode workshop.

Upgrading of electrodes ANO-4 and UONI-13/55 was caused by the need to meet requirements imposed by the National Agency for Control and Welding (NAKS) of the Russian Federation to the products supplied to this country by foreign manufacturers. Upgrading was preceded by efforts on adaptation of production of electrodes of the said grades to raw materials from the Ukrainian manufacturers, as well as on certification of manufacturers of electrodes ANO-4 and UONI-13/55 to conformity with specifications RD 03-613–03 «Rules for Utilisation of Welding Consumables in Manufacture, Erection, Repair and Reconstruction of Technical Units for Hazardous Industrial Facilities». Results of the above efforts are presented in the documents for the said grades of electrodes, including amendments in specifications of Ukraine for electrodes ANO-4 and UONI-13/55, which are supplied to the Russian Federation.

In particular, the section describing requirements to the electrodes indicates that they are used in manufacture, erection, repair and reconstruction of technical units applied at hazardous industrial facilities. The section dedicated to properties of the electrodes gives limitations (at a level of 0.75 of the requirements of GOST 9466–75) to values of the maximum permissible variations in thickness of the electrode covering and curvature. Also, it includes additional requirements for marking of each electrode and for deposition of an ionisation layer on an igniting tip of each electrode, as well as requirements to impact toughness of the deposited metal at a temperature of –40 °C.

The label attached to the packing, as well as the quality certificate should contain «NAKS Certificate # _____ of_____ », along with the other data.

The above efforts were made on the initiative of CJSC «Artyomovsk Machine-Building Factory «Vistek».