

Universal highly conductive greases (HCG) – reduction of energy losses in the electrical contacts, increase of reliability of work of the contact systems and reduction of accidents in electric networks



Text: Michael SOKOLOVSKY,
Director general "BERS", LLC
doctor of technical Sciences

»» In the Russian Federation electricity losses for transmission from generating companies to the final consumer are estimated at the level of 10 to 12%. Losses of the electric power at enterprises are several times higher. One of the main factors of high losses is wear and oxidation of contact systems, leading to increased contact resistance, overheating of contacts and to reduce of the reliability of their work that may cause accidents.

According to GOST 8024-90 (1) recommended temperature of contacts that made of copper and its alloys shouldn't be above 75 °C, and on contact systems that made of copper and aluminum – not above 90 °C. In practice these temperatures are much higher and very often exceed 250–300 °C (2). Traditional means of stabilization of electric resistance, such as disc springs, hardware from the nonferrous metal, copper-aluminium plates, protective metal coverings, etc. are expensive and ineffective.

GOST 10434-82 (with change № 3 of 01.01.1991) prescribes the application of conductive greases or other conductive materials (3), but does not specify which ones. So, this article is about universal highly conductive greases.

Due to the lack of uniform requirements for technical characteristics of greases and qual-

ity control methods, appears the arbitrary interpretation of their usability. As a result the Russian market is flooded with a variety of greases of unknown origin, and sometimes even obvious counterfeit is met. In our article (4) we analyzed contact greases that were represented at the Russian market during that period. You may see the results in table № 1 and at pictures 2, 3 and 4. Tests were carried out at the facility (picture 1) (4), which allows to do express-research of transient resistance of contact system with different types of greases.

There are two groups of conductive greases that are divided by the nature of the impact on the contact system:

1. passive (neutral) - protecting the contact system from further oxidation with oxygen of air and moisture. Representatives of this group are ciatim 221, ECL 98 and ECL 98T

(only the most common types of greases are mentioned);

2. active – that influence the oxide membranes of the surface of contact system. Representatives of this group are UVS Supercont, UVS Extracont, UVS Primacont.

With the increase of working temperature up to 100°C organic components start to dissolve oxides of metals of the contact system, transforming it into liquid form and deleting it from the working area of the contact system. With further increase over 350 °C starts pyrolysis of the organic components through the formation of carbon monoxide, which, as a strong chemical restorer of metal oxides, creates corrosion protection at high temperatures.

The first and the third grease correspond the requirements of GOST 10434-82 (including reliability), retaining the original electrical characteristics of the contact system in case of emergency heating up to 400–450 °C for contact systems of copper–copper, copper–iron, and to 350 °C for aluminium–aluminium and aluminium–copper.

Information about greases with working temperature up to 1000°C can be found, but its initial electrical resistance is dozens of times greater than that of contacts without lubrication, which makes its usage with the contact systems impossible. The second grease is meant for sliding contact systems.

We have made a series of comparative tests of different greases for contact systems with cyclic heating, and have wrote about the results in our articles (5, 6, 7, 8).

On the basis of this research, as well as the opinions and tests made by our consumers (about 1000 enterprises), we believe it was proved that active greases UVS Supercont and UVS Primacont allow to:

▶ significantly reduce the contact resistance of the contact system (significant energy sav-

ings in the constitutional court – as a consequence);

▶ protect from corrosion (there is a three-stage chemical defense against invasion of oxygen, moisture and other corrosive environments, dust, and gases into the contact system);

▶ provide constant work of the contact system in case of overheating up to 250 °C (UVS Extracont), up to 350 °C (UVS Supercont) and up to 450 °C (UVS Primacont);

▶ cut labor and maintenance costs of equipment;

▶ help to keep contact system and power busbars in the working conditions without the use of expensive materials.

It is important to understand that in real conditions in electric networks of power distribution most of the aluminium contacts through the year increase the transient resistance up to 3–5 times. Our greases will reduce the temperature of the contact system, and will keep transient electrical resistance for a long time. By the way, if you put the grease on the contact system which is in good condition, close to ideal, you can still get a reduction of the transition resistance.

As the grease consistency is a semisolid clay and has excellent adhesion, it fills all the scratches and surface roughness of the contact system and after pulling will be squeezed out to the periphery.

As a result, a conductive gasket is formed within the contact system filling all its irregularities. At the same time the effective area of contact is increased in several times.

Significant energy savings and reduction in maintenance and repair costs of the contact system with the use of Universal highly conductive greases (HCG) was proved already many times.

According to the results of 2011, the Chairman of state Duma Committee on energy Ivan

GRACHEV in an official letter noted our project as a viable and practically useful both for the regional and federal projects (9). Innovation product of “BERS” LLC is recommended by many professionals working in the field of energy saving and energy efficiency. ♦

Bibliography:

1. GOST 8024-90 Apparatuses and electric devices of alternating current by voltage over 1000 V. the Norms of heating in prolonged working mode and test methods.

2. MOZGALIN A.V. Conductive lubricants – reliable measure to reduce accidents in the network and reduce losses in the electrical contacts. – Industrial energy, 2010, № 1.

3. GOST 10434-82 Contact electrical connections. Classification. General technical requirements.

4. NOVIKOV V.K., SOKOLOVSKY M.Y. All the matter... in lubrication! – Energonadzor-Ural, 2009, № 1.

5. SOKOLOVSKY M.Y. UVS – Innovations, energy saving, reliability. – Business Russia, 2011, № 9–10.

6. SOKOLOVSKY M.Y. UVS – innovations in action. National experience. – Business Russia, 2012, № 1–2.

7. SOKOLOVSKY M.Y. UVS Supercont – conductive grease. – Business Russia, 2012, № 7.

8. SOKOLOVSKY M.Y. Uniqueness for many years. – Business Russia, 2012, № 9–10.

9. Official letter by CRACHEV I.D. Chairman of the Committee on energy of the state Duma Letter № IG-D-5/86-2 from 31.08.2011. – www.supercontact.ru



“BERS”, LLC

Of. 47, Frolova st., 29, Ekaterinburg, 620028, Russia

Telephone: +7 (912) 22-90-111

E-mail: region66@gmail.com

www.supercontact.ru