

УДК 537.311.1

Lukashevich D., Levitskaya M.

## **Protection of Birds from Electric Shock on Overhead Power Lines**

Belarusian Nation Technical University  
Minsk, Belarus

The Daursky State Nature Biosphere Reserve carried out surveys concerning the problem of bird electrocution in 2010. The author identifies the species and approximate date of death of found electrocuted birds, took photographs, recorded the coordinates and number of the pole. When a bird simply sits on a live cable, it will not kill or even shake, provided that both paws are on the same wire. It can shock large birds, such as a stork, eagle or other large individuals. A bird can touch wings with different potentials during flight or landing on wires, as a result of which an electric shock will occur and the bird will die. If contact occurs between phase wires or a grounded support, then the death of the bird is inevitable, as a kind of short circuit occurs. With such a closure, the body of the bird is subjected to electric shock of several thousand amperes. Another bird can be killed by electric shock, if during landing on the wires it has in its beak some object that conducts electricity (wire, wet cord or wet branch). With a voltage of several thousand volts, even a weak passage of current can kill a bird. Also, the bird can be hit by electricity if the air is humid enough, and the voltage in the wires is very high. Ionized humid air is able to conduct electric current, that can adversely affect the health and life of the bird [1].

The average density of carcasses and remains of electrocuted birds near concrete poles was 0.14 birds a pole (491 poles were observed). The method of fixing the wires to

the complex pole is more complex - there are more grounded metal traverses and more wires there. It increases quite a hazard for birds. Electric shocks to large birds can damage power lines and interrupt electricity supplies, creating a problem for energy distribution companies. When a bird comes into contact with the phases or makes contact between phase and earth, the cable fibers can be damaged by short circuit, but most often short circuits damage equipment (for example, transformers, blown fuses, lightning conductors). The most dangerous for birds are the widespread reinforced concrete poles of an average power line (6-10 kV) with metal grounded traverses and pin insulators. “Distracting” crossbar additives and “scaring away” metal whiskers do not solve the problem and cannot be considered as effective bird protection devices. The dovetail traverse, that is not equipped with a ROM, is also not a safe design for large birds of prey, because the distance from the upper current-carrying wire to the horizontal crossbar of the grounded traverse is not large enough.

Over a sufficiently long observation period, it was found that most cases of death of birds from electric shock occur at the support of the power line and 0.6 m to each side of the support. Theoretically, the size of the isolated sections should be 1.25 m to each side of the support (the wingspan of one of the largest birds, the white-tailed eagle, is 2.5 m). Death occurs at the moment when the bird closes an electric circuit with its body or wing. On the support, the distance between the wire and the metal traverse is very small (15-25 cm), which is comparable to the size of most birds. Cases of death are also recorded when a bird, sitting on a metal traverse, tries to clean its beak on an insulator, the bandage fastener to which is also under tension.

There are different types of devices: the ones that eliminate the presence of sections under voltage in the place of

the support of the power line (Fig. 1), and those that prevent the landing of birds on the support of the power line (Fig. 2).

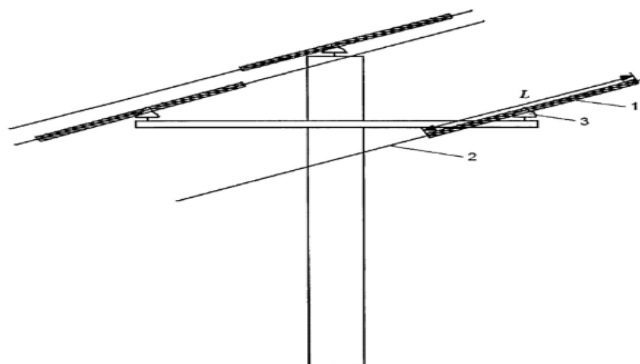


Figure 1: 1 - bird protection devices, 2 - wire, 3 - pin insulator, 4 - retaining fasteners [2].

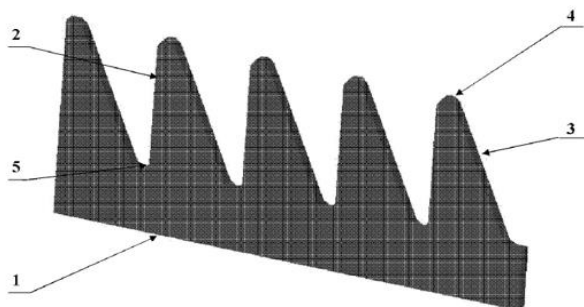


Figure 2: 1 - the long side of the plate; 2 - side perpendicular to the long side of the plate; 3 - side inclined to the long side of the plate; 4 - rounded parts of the outer corners; 5 - rounded internal angles between the teeth [3].

The device in Fig. 1 is installed as follows: the middle part of the device is attached to the pin insulator by winding the retaining fasteners on the glass-mica tape. Thus, a section of an insulated wire is created and the voltage at the insulator is eliminated, which helps protect birds from electric shock.

Currently, there are various well-established modern methods of protecting birds from electric shock during the operation of the power line:

1. refusing from land power lines in favor of the use of underground cables or local, including renewable sources of electricity.
2. the use of insulated air cable SIW (self-supporting insulated wire)
3. use of traverse with suspended insulators instead of pin insulators.
4. the use of modern bird protection devices of various types.
5. the use of wooden seamless supports.

Reference:

1. Goroshko O.A. Feathered predators and their protection/ O.A. Goroshko // Berdsk: Publishing House PC "Sibecocenter", 2011. – 84-99p.
2. Ostapenko A.A., Tsitser V.V. Device for protecting birds from electric shock on overhead power lines/ A.A. Ostapenko, V.V. Tsitser //Tolyatti: Publishing house PC"Avis", 2013. – 27p.
3. Savotin O.A., Frolov D.S. The device for protecting birds, preventing their landing/ O.A. Savotin, D.S. Frolov// Novosibirsk: Publishing house PC "Stroy Trans Snab", 2013. – 8p.