

Tutorial on Electrified Fence for Perimeter Security

Introduction:

An electric fence usually consists of several conductors of bare wire, supported on insulators and connected to a fence energizer which in turn is connected to a power source and earth rod(s). Electric fences were first used in World War I to contain prisoners of war. These fences carried alternating current (ac) and were designed to kill anyone coming into contact with them. It was not until the late 1930s that non-lethal fence energizers (also called controllers or fencer units) producing direct current (dc) were developed to manage stock or wildlife. Nevertheless, these early energizers were still dangerous, unreliable and easily short circuited. Then, in the late 1930s, better units were developed, making the technique more successful and acceptable.

Over the last 30 years, improvements in energizer technology have continued to be made so that now a large range of energizers can be purchased. They are powered either from a mains electricity supply or, where this is not available, by battery. In remote areas, wind and solar power can be used to charge batteries. Energizers of varying power output, ranging from less than 1 joule to over 20 joules, can be purchased. (A joule (J) is the unit of energy used by manufacturers to specify the energy level of pulses produced by their products).

Electricity flows as a result of electrical potential which is measured in volts (V). Energizers produce brief, high voltage pulses of electricity between the conducting wire and earth when the circuit is closed by an object in contact. A person touching a live fence wire when standing on the ground or a live and neutral will get an electric shock forcing him to disengage. If the intruder persists and tries to breach the fence by means of cutting or short circuiting, alarm will be generated to alert the guards on duty. The alarm system can also generate SMS text messages and trigger security lights/cameras optionally.

The basic electric fence which provides intrusion detection and deterrent capabilities can be divided into two main components;

- The electronic component
- The physical structure component

The electronic component:

The electronic component of the electric fence has patented and unique monitoring system on the energizers which enables to provide practically any number of zones, accurately pinpointing the area of intrusion. Smaller a zone, higher is the accuracy of the point of intrusion indicated by

the monitoring system. The highly efficient and dedicated software enables the guard on duty to respond effectively to this area of intrusion. The robust design of the energizer and communication devices provides a reliable system with little or no down-time. Added to this is a highly deterrent shock of no less than 5 Joules of energy and 9000V anywhere on the fence, ensuring a reputation of almost no intrusions through perimeter electric fences.

The physical structure component:

To be able to provide this high amount of energy and voltage on the fence and to ensure that there are no false alarms or nuisance alarms on the system, there are certain physical (or structural) factors which are taken into account.

To ensure such a high voltage, the wires used for the energizers need to have a high conductivity. This means that the wire should have a low resistance. For this purpose, professionals at Stinger use a specially made aluminum wire which has an extremely low resistance of 30 Ohm/km, compared to 260 Ohm/km on braided steel wire. The lower the resistance, the higher is the conductivity. This results in higher energy and voltage availability on the fence. This type of wire is also not affected by rust and the correct installation method prevents bi-metallic corrosion. Same standards have been adopted by Unisource to provide highest degree of reliability and long operational life to our installations.

Prevention of False Alarms:

The next important thing is to isolate this high voltage. After experimenting with all the available isolators on the market with no desired result, professionals at Stinger started developing a range of isolators which are able to withstand voltages of up to 18,000V even in wet conditions. This gives the desired result of having no false alarms.

Avoidance of lightning damage:

Electric fences developed by Stinger are able to provide up to 40 zones on a fence without having to install any electronics in the field, or without having to install any communication cables to the various zones. The greatest advantage that comes from avoiding communication cables is to evade lightning damage. The approach to this is simple; less electronic devices in the field result in a system less vulnerable to lightning. Properly earthed energizers are located at main entrance of the fenced compound only, and fiber optic cables are used to establish communication between the energizers and the human interface.

To ensure that all the systems are installed at the highest possible standard, Stinger has compiled its own set of specifications to which all Unisource installations adhere to.