

Rodent Resistance of Fibre Optic Cable

Optical fibre cables can be damaged seriously by gnawing rodents. Such damage can impact the long-term reliability of both outdoor and indoor installed cables, and depends upon the specific species of rodent (rats, gophers, squirrels) and geographic location.

Rodent protection for optical fibre cables is generally based on making it difficult for the animal to gnaw into the cable core. Rodents are usually able to eat away the cable outer sheath. The challenge is to prevent additional penetration. This can be done in several ways.

The primary cable design features for improving rodent resistance are increasing the overall cable outside diameter and incorporating metallic armoring.

Cable Diameter

A cable with an outer diameter big enough to prevent the rodent closing his jaws around the cable will discourage the animal to start gnawing.

Testing over many years has shown the most effective method of rodent resistance is use of corrugated steel tape or steel wires as a **metallic** armoring under the cable sheath. The hardness of these materials leads to their excellent performance in inhibiting rodents from damaging the cable.

Corrugated Steel Tape Armoring

The tape is corrosion protected and with a polymer coating. During the cable manufacturing process the tape is corrugated in order to give the cable better bending performance. The corrugated tape is folded around the cable core with an overlap.

This method gives a 100 % effective protection. The cable is of relatively lightweight, and has a good flexibility. The tape, with trade name Zetabon™, is 0.155 mm thick.

Steel Wire Armoring

This is a metallic armor made of galvanized soft steel wires, applied between inner and outer sheath. A steel wire armor is often used for heavy duty applications when high crush is required. The steel wire armor also provides 100% rodent protection like steel tape.

FRP Armoring

Also **dielectric** armor composed of rigid elements (FRP/GRP) have proven to be effective under severe conditions. Flat FRP elements are stranded around the cable core, typically in a construction with double sheathing and the armor between the sheaths.

This means of rodent protection provides the same 100 % protection as metallic armoring, and in addition the cable becomes dielectric (non-metallic), an advantage because the cables will be immune towards lightning and towards induced voltage e.g. along electric railways and lines.

Under more relaxed circumstances other means of rodent protection are sufficient, included just to keep the diameter of the cable above a certain figure :

Nylon (Polyamide 12) Outer Sheath

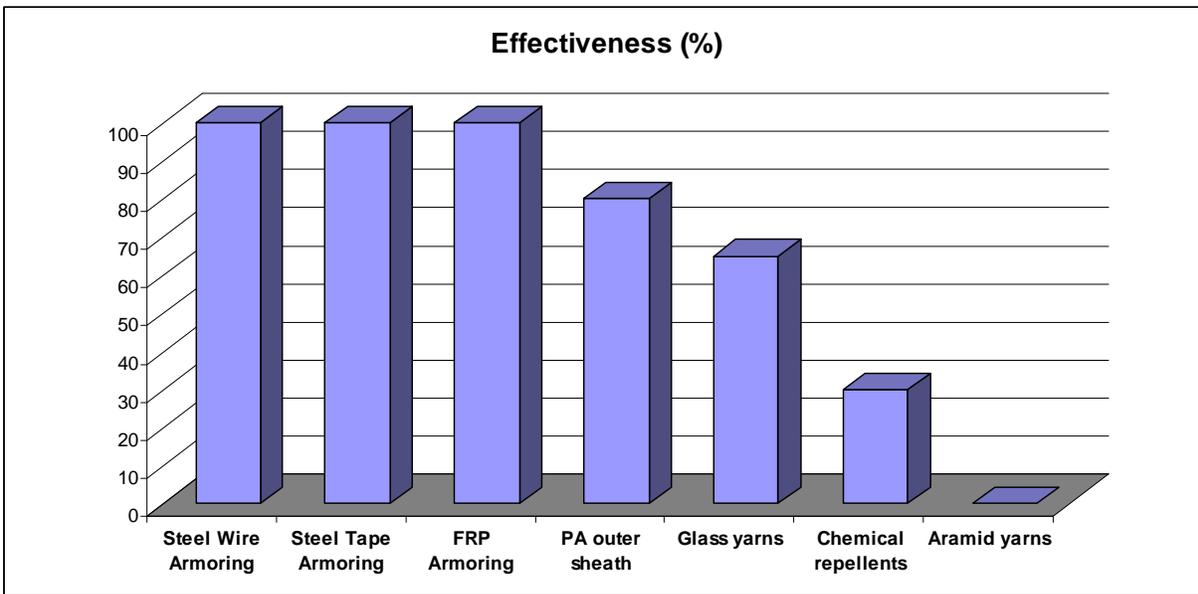
A thin (0.5 to 0.8 mm) additional outer sheath of nylon (PA 12) is widely used as an effective type of rodent protection under normal conditions. Moreover, the nylon outer sheath gives the cables also a termite protection and a hard smooth surface, which makes the cables more effective when blowing or drawing in ducts.

Glass yarns

In recent years the use of glass yarns for rodent protection has become more and more popular. These cables have been proven to be effective against attacks from small rodents. The function of glass yarns differs from the other rodent protection principles. The glass yarns protects because the rodents find it unpleasant to gnaw the glass yarns. Although they can easily penetrate the glass yarns it will irritate their jaws and makes them cease their gnawing activities. Although aramid yarn is also commonly used as a reinforcing element in optical fibre cables it has no contribution to rodent resistance of the cable

Chemical repellents

Recently a variety of chemical repellents compounded into sheathing materials have also been employed to deter rodent attacks. Rodent repellent methods based on chemicals with unappealing tastes or other toxins have been less effective due to the habits of gnawing rodents. The gnawing behavior is more for “dental maintenance” and rodents typically will chew anything without necessarily ingesting it.



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