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INDIA

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INSIGHTS

**THE TIME
HAS COME**

INDIA'S
EXIGENT NEED
FOR A PV
RECYCLING
POLICY

PERSPECTIVE

LINKING SOLAR POWER TO INDIA'S
**AGRICULTURE
SECTOR**

FIND OUT: UPCOMING
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LATEST TRENDS IN
SOLAR ENERGY
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TEETHING PROBLEMS & EMERGED SOLUTIONS IN PV WIRES

While the Solar power developer world is wrestling with the continuous challenge of increasing the power generation efficiency of Module by points to go up above the 22.1%, the copper cables that carry this generated electricity are indeed burdened with the immense task of carrying this energy without any loss.

Similar to the technology advancement in the areas of Modules, Structures, Inverters etc. The wires also did undergo the metamorphosis from being the UL 4703 Spec to the TUVs 2pfg 1169 and then the current EN 50618 & IEC FDIS 62930. There are few critical challenges the wires need to survive besides ensuring no transmission loss. The challenges are :

- 1) Rugged construction - Life expectancy beyond 25 years
- 2) Fire retardant
- 3) RoHS compliant
- 4) UV resistant
- 5) Anti Rodent & anti termite

Rugged construction - Manufacturing the wires using specially formulated high end Polyolefin polymer alloy insulation with electron beam irradiation cross linking process ensures Life expectancy and Fire retardant features. Unlike the other conventional technologies of cross linking , the ebeam irradiation crosslinking polymer is with the impingement of electrons at a very high acceleration where in the electrons penetrate between the weak covalent bonds of the polymer and crosslink the adjoining carbon links with each other. Such crosslinked polymer compounds exuberate highly increased characteristics of electrical, mechanical , physical and environmental resistance parameters.

RoHS compliance is ensured by way of using eco friendly hazard free polymers. The UV resistance is ensured by way of adding few special non degrading UV stabilisers during polymer compounding and the black colour secondary insulation.

The teething problem in PV wires is to make them auto protect from the attack of rodents and termites. The rodents are continuously in search of food and are habitual of biting each and every thing that they come in contact with. " RODENT " is the gnawing mammal of an order that includes rats and their relatives, distinguished by strong constantly growing incisors and no canine teeth. It shall be interesting to know that an average adult Rat's incisors grow by an average of 0.3mm each day. These incisors have no root unlike other teeth and they keep growing till the rat is alive. There is an inner irritation from the incisor to the Rat from



the continuous growth as well the necessity to scrape off as much of the incisor as possible. This is the primary reason why the rats keep biting each and everything they contact besides grinding the incisors against each other. Except for hard surfaces like rocks or metals, there is hardly any normal surface that can escape the sharp bites of the RODENTS.

Many methods and practices have been tried, tested for making the cable auto-protect from the sharp incisors of the gnaws:

1) ANTI RODENT -

Rodenticides – Barium carbonate, Bromadiolone, Phosphorous paste or sulfates of Zinc, Arsenic etc.. were widely used mixing them in a low dosage during the formulation of the polymers used for insulation. But later, these being poisonous substances, were banned by most of the countries and the practice was declared illegal and stopped.

2) RODENT REPELLENT -

A wide spectrum of highly specialized materials similar to Naphthalene, peppermint etc. are used as fine coating or mixing with the polymers. This method is effective in repelling but can not be guaranteed as a long term solution. These chemicals are no doubt eco friendly but it is difficult to define the longevity of the repelling substance in the cable.

3) RODENT RESISTANT / Mechanical protection:

The wire can be protected in many forms-

- A) By way of laying them in a metallic conduit,
- B) By way of providing a metallic layer /armoring below the outer insulation - but both these methods needed compromise on very high increase costs as well as flexibility.

Last option was to add a layer of RODENT RESISTANT polymer so that the cable stays AUTO PROTECTED.

After extensive research and many trials, NYLON was adjudged as the most suitable RODENT RESISTANT polymer considering both technical & commercial parameters. The base element of NYLON being Ammonia it has a natural characteristic of repelling smell for rats. While Nylon retains the flexibility of cable, it is considerably hard to resist the Rat Bite(subject to thickness) In addition, NYLON is not very expensive and can easily be extruded.

The final tried, tested & proven model evolved is providing an intermediate insulation layer of Nylon. Though this design is a little costlier than the normal cable, it has proven to be the most ideal – It is globally accepted as the most successful solution. It saves huge costs on maintenance, frequent replacements and repair problems of electricals. Over a period of time, this design proved to be the most economic though it seems costly at the time of buy. Starting from the US, a major part of the world has already adopted this design.



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