

Greening of PVC Cables

PVC comes in two main grades, plasticised and un-plasticised PVC. Un-plasticised PVC (UPVC) can be found in double glazing window frames where a rigid material is required. The PVC used for manufacture of cables is plasticised PVC, conforming to the relevant British Standard for the cable type in question.

For twin flat and earth house wiring cable, the insulation is a T11 grade and the sheath is a type 6 grade. Both of these grades of PVC have a minimum elongation to break of 150% when manufactured.

As a cable ages (at temperatures above normal ambient) the elongation to break decreases (also the IR's of cable increase). The life expectancy of a cable is reckoned to be when the elongation to break of the PVC is 50%. However this figure is arbitrary and a lower value could be considered suitable especially for a fixed wiring cable. Therefore providing the cable is not subject to movement or when moved due to inspection of socket outlet or the like the PVC does not crack, a much lower a value of elongation to break is considered by some as suitable.

The wet green substance is the product of a reaction between decomposing plasticiser (a plasticiser is an oily liquid used in the manufacture of PVC compounds) and the copper conductors of PVC cables.

The decomposition of the plasticiser is caused by overheating the PVC compound. It is usually a slow process but can be accelerated when high temperatures are involved. High temperatures in cables can be caused by many reasons but overloading and loose connections are two examples.

Although all cable grades of PVC may look the same, the cheaper grades can be more prone to 'greening'. In the 1970's some manufacturers used a cheap grade of plasticiser in their PVC that is prone even if not overheated to what is now called greening. The plasticiser of the better grades, such as those used by ourselves contains an antioxidant which inhibits the decomposition rate of the plasticiser when heated. Even these plasticisers can be broken down eventually under adverse conditions of heat, but are much better protected than those which do not contain an antioxidant.

Although fumes may be given off when PVC is decomposing (this statement is applied to house wiring), it would not be considered to be a health hazard, but there is a danger that the breakdown of a cable could cause an electrical fire.

The plasticiser itself is a clear oily liquid that is non-conductive. The green substance is a combination of copper oxide and plasticiser which is conductive. Therefore whenever this green substance is found at socket outlets etc. it should be removed and the terminations cleaned (gloves should be used) otherwise it is possible that tracking/overheating may occur. It is normally considered that if greening is found that rewiring should strongly be considered.

If however it is considered that rewiring is not required and the effect on decoration and equipment is acceptable then the following should be strongly considered,

1. That periodic inspection and testing is carried out.
2. That visual inspection of cable ends and equipment and cleaning/replacement is carried out as required.
3. That the resistance of conductors are monitored to ascertain that conductors are not being over oxidised (in parts of the cable that cannot be seen) and their resistance thereby increasing.

The question of how frequent inspection and testing should be carried out is a good one, but no established guidance exists. Therefore only by experience of the particular installation concerned can the frequency of periodic inspection and testing be ascertained.