203: Electrical installations technology  
**Handout 14: PVC cables**

**Learning outcome**

The learner will:

1. know wiring systems of electrical installations.

**Assessment criteria**

The learner can:

3.2 identify **wiring systems** for different **environments.**

**Range**

**Wiring systems**: Cable tray, cable trunking, cable conduit, ladder racking, thermoplastic multi-core, flat profile, SWA, MICC, FP200, thermoplastic single-core, support methods and requirements, component parts.

**Environments**: Domestic, commercial, hazardous, industrial installation, agricultural.

**PVC cables**

The vast majority of cables encountered by electricians will have conductors made of copper. Some larger cables (16mm2 and above) may have aluminium conductors.

Unless they are placed out of reach, eg overhead, these cables will need to be insulated to prevent short circuits and people and livestock coming into contact with the live conductors.

The most commonly utilised insulator currently used is **polyvinyl chloride**, referred to as **PVC**. This material is one of the many plastics that are generally used is industry for a wide range of purposes but is the most suitable for cable insulation.

Although it is very versatile, PVC cable is susceptible to damage when exposed to high temperatures and also becomes brittle at temperatures approaching freezing point. It also requires mechanical protection in many situations to prevent damage to the cable.

PVC comes in two main forms:

* thermoplastic
* thermosetting.

**Thermoplastic**

This is the standard type of PVC insulation used on most electrical cables. It has a maximum continuous operating temperature of 70°C and will soften above this temperature, resulting in possible ‘conductor migration’.

**Thermosetting**

This type of cable is designated as XLPE (cross-linked polyethylene). It has a higher continuous operating temperature of 90°C. It is often used for mains distribution because it can operate at higher temperatures, which can bring about a reduction in conductor size with larger cables.

**Low smoke and fume (LSF) cable**

One major drawback of PVC is that when it is burnt, it can produce hydrogen chloride fumes that are toxic; these fumes can also produce hydrochloric acid on surfaces.

Many specifications for public buildings, such as schools and offices, will require the installation of LSF cable to reduce this risk in the event of a fire.

**PVC cable types**

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| **PVC single core (6491X)**   * This cable comes in sizes from 1.5mm2 upwards and usually has stranded conductors, although single strand ‘solid’ conductor cable is still available. * This type of cable requires additional mechanical protection and is generally installed in conduit and trunking. * It is generally found in commercial, industrial and agricultural installations. * A range of insulation colours are available to facilitate cable identification. | 01 PVC single 6491X.png |
| **PVC insulated PVC sheathed flat twin and cpc (6242Y)**   * This cable comes in sizes from 1.0mm2 upwards; 1.0mm2 and 2.5mm2 have solid conductors, and larger sizes have stranded conductors. * The sheathing provides some mechanical protection for the cable and it can be clipped directly to a surface without any other protection in less onerous conditions. * It has PVC insulated conductors and an uninsulated cpc conductor. * Flat three core and cpc (6243Y) is also available, as is single core and cpc. * It is generally, but not exclusively, used for wiring domestic installations. | 02 PVC flat twin and earth 6242Y.png |
| **PVC insulated PVC sheathed flexible cable (3092Y and 3093Y)**   * This cable comes in sizes from 0.5mm2 upwards. * Each conductor is made up of many fine strands which make the cable much more flexible. * The sheathing provides some mechanical protection for the cable. * Whilst two- and three‑core cables are the most common, this type of cable is available with many cores. * It is generally used for connecting portable appliances to the socket outlet and for connecting lighting points, eg pendant ceiling rose. * In order to ensure that all the strands are clamped by the terminal, they should be twisted together before termination to avoid ‘whiskers’, ie odd strands that miss the termination. | 03 pvc flexible 2 core 3092Y.png |
| 04 pvc flexible 3 core 3093Y.png |