203: Electrical installations technology  
**Handout 16: Fire resistant 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.

**Fire resistant cables**

There are industrial and commercial installations that need to continue working even when subjected to high temperatures and fire. Examples of these are fire alarm installations, centrally fed emergency lighting installations and petro-chemical installations. Two types of cable are available for this purpose:

* mineral insulated copper clad (MICC)
* FP200.

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| **Mineral insulated copper clad (MICC) cable**  This cable is made from copper conductors inside a copper sheath, insulated by inorganic **magnesium oxide** powder. The name is often abbreviated to **MICC** or **MI** cable, and it’s known in the trade as **pyro**(because the original UK manufacturer is a company called Pyrotenax). A similar product sheathed with metals other than copper is called mineral insulated metal sheathed (**MIMS**) cable.  MI cables may be covered with a PVC sheath that is coloured for identification purposes: red for fire alarms, white for emergency lighting and orange for general purpose. The plastic sheath provides additional corrosion protection for the copper sheath, as well as reducing shock risk under fault conditions. | | 01 MICC.png |
| **Advantages**   * fireproof * great mechanical strength * waterproof * non-ageing * small overall diameter * high current carrying capacity * earth continuity * high corrosion resistance * high operating temperature. | **Disadvantages**   * moisture absorption * complicated termination process * cost. | |

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| **FP200**  Key applications:   * fire detection and fire alarm systems for buildings * voice alarm systems * emergency lighting * other essential service circuits.   The conductors are made from plain annealed copper solid (1.0–2.5mm2) or stranded (4.0mm2) circular.  The conductor insulation is high-performance damage resistant Insudite\*. Insudite is a tough composite insulation that is resistant to impact, nicking and abrasion, ie all things that normally result in failure of silicone insulated cables. Consequently, protective ferrules are not required. | 02a FP200 gold.png |

The screen is made from laminated aluminium tape screen bonded to sheath and in contact with full size tinned annealed copper circuit protective conductor, which provides automatic screen earthing.

The sheath is made from robust thermoplastic LSOH sheath (the colours are white or red; other colours to special order). For external exposure, the use of a white sheath is recommended.

The cable passes a set of tests specified in BS 6387:1994 (Specification for performance requirements for cables required to maintain circuit integrity under fire conditions), referred to as the CWZ tests, which comprise of three separate fire, water and shock tests. In order to meet CWZ and comply with the standard, the cable must pass the following three separate tests:

* C: resistance to fire at 950ºC for three hours
* W: resistance to fire and water at 650ºC for 30 minutes
* Z: resistance to fire and mechanical shock at 950°C for 15 minutes.

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| **Advantages**   * Fire resistant * Good mechanical strength * waterproof * easy to terminate * relatively cheap compared to MICC. | **Disadvantage**   * Types with silicon insulation require ferrules to be fitted because this insulation is brittle and easily damaged. |