CABLES

Cabling

Cables play a very important role in all our lives in allowing the transmission and distribution of electrical energy from power stations to industry, commerce and our homes. They provide power, lighting, control and communication.

What you are about to see:

'What is meant by the term cable'
How they work
Types of cables used
Their applications

Introduction

What is a cable?

Essentially a cable comprises ***conductive parts*** called the ***conductors*** which are metallic and carries the current flow through it.

Types of conductors: Most common is ***copper*** which is used over a large range of conductor sizes.

Aluminium conductors are normally restricted to distribution power cables only.

Conductors

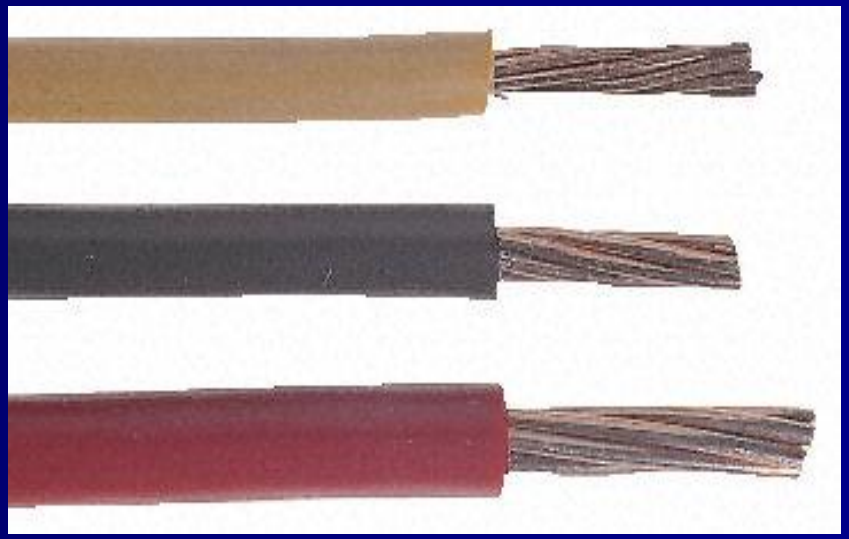
Conductors can be either:

Solid: One single conductor.

Stranded: A number of individual conductor strands twisted together producing a single conductor.

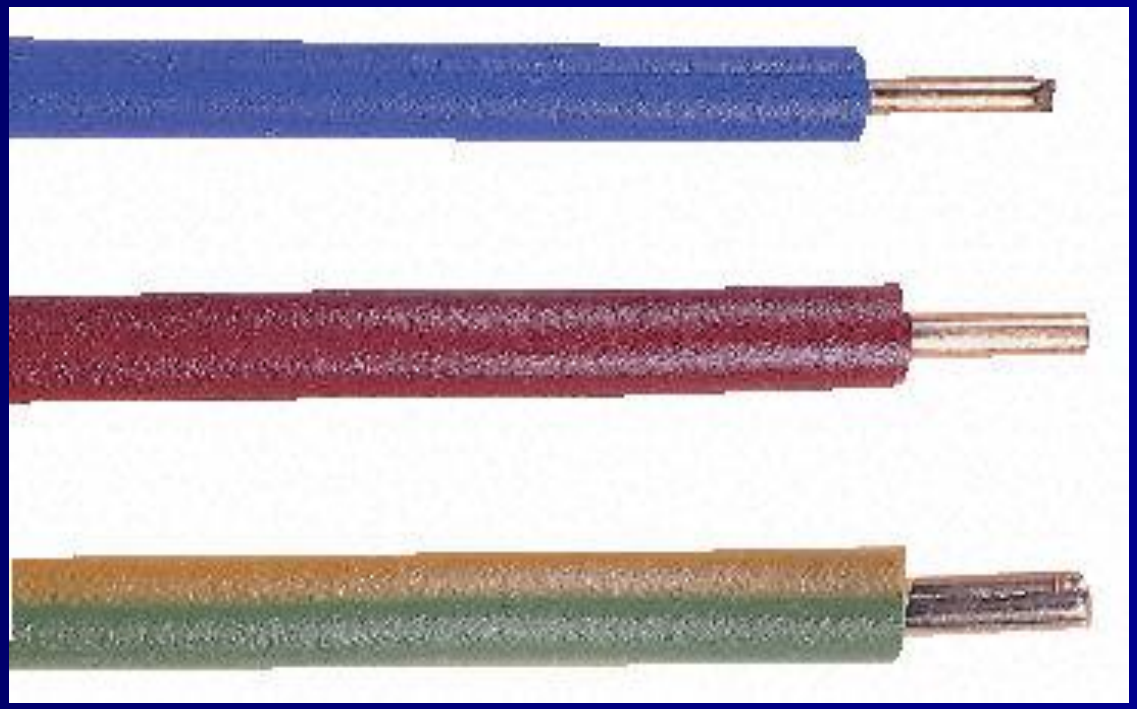
Types of cores

Single core: Stranded



Types of cores

Single core: Solid conductor



Insulation

Conductors need to be insulated to prevent them from coming into contact with each other or into contact with earth.

There are many types of insulation used in cable manufacturing for insulating conductors, following is a sample of those used.

Core

Is the name given to a conductor that is surrounded by Insulation.

Types of insulation used

Polyvinyl Chloride (PVC) is most commonly used:

High Density Polyethylene (HDPE)

Cross linked polyethylene (XLPE)

Ethylene Propylene Rubber (EPR)

Mineral insulated Metal Sheath, Magnesium Oxide powder (MIMS)

Sheath

Cables contain more than one core (multi-core) these are enclosed inside an insulated outer cover that is called the cable sheath.

The cable sheath gives mechanical protection against abrasions that can occur during the installation of the cable whilst rubbing against rough/sharp surfaces.

Current carrying capacity of conductors

The amount of current a conductor is able to carry without it deteriorating depends directly upon its ***Cross - Sectional - Area (CSA)***

Conductors are sized in ***mm^2***

When current flows through a conductor this will create heat and a magnetic field and will also have to be taken into consideration.

Current carrying capacity of conductors

Current carrying capacities are selected using the tables: 4D1A to 4J4A of BS7671 18th Edition IET Regulations

This is the maximum current carrying capacity for cable conductor sizes; subject to length, installation method, ambient temperature, grouping, thermal insulation, type of protection and thermal effects of overload.

The resistivity of a conductor is measured in Ohm meters

Terminating Conductors

Ensure sufficient insulation is removed to allow the conductor to be suitably clamped.

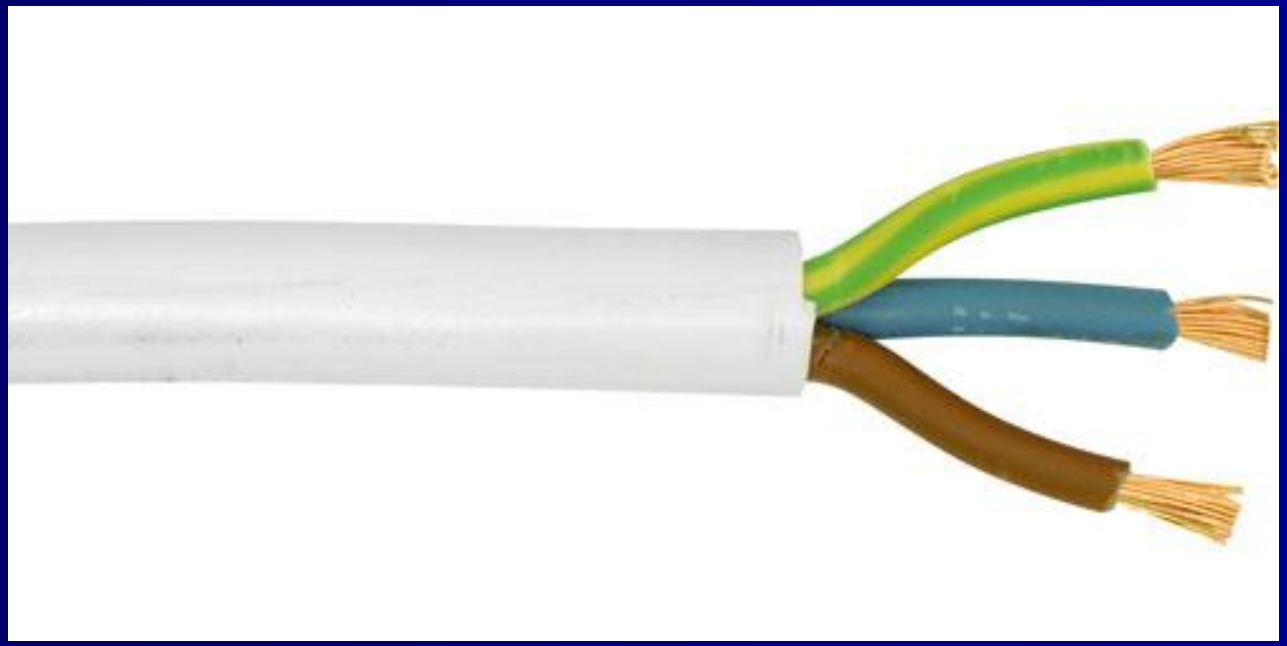
Make sure no conductor is exposed beyond the terminal insulation.

Do not over-tighten the terminal screw.

Ensure all the terminal strands are present and inside the terminal

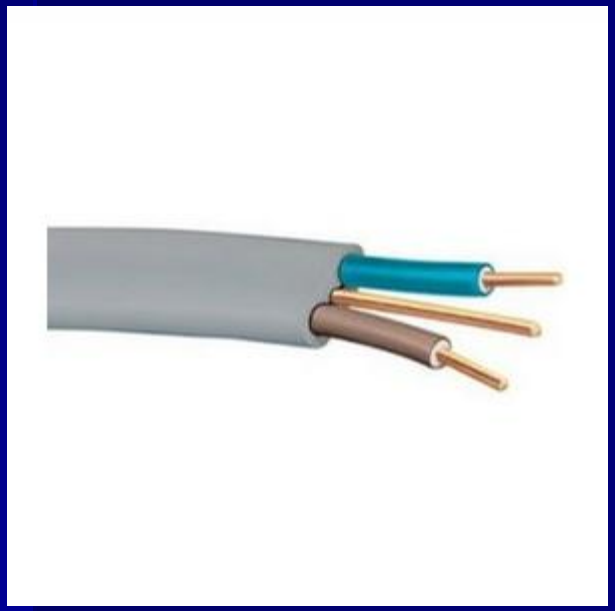
Types of cables

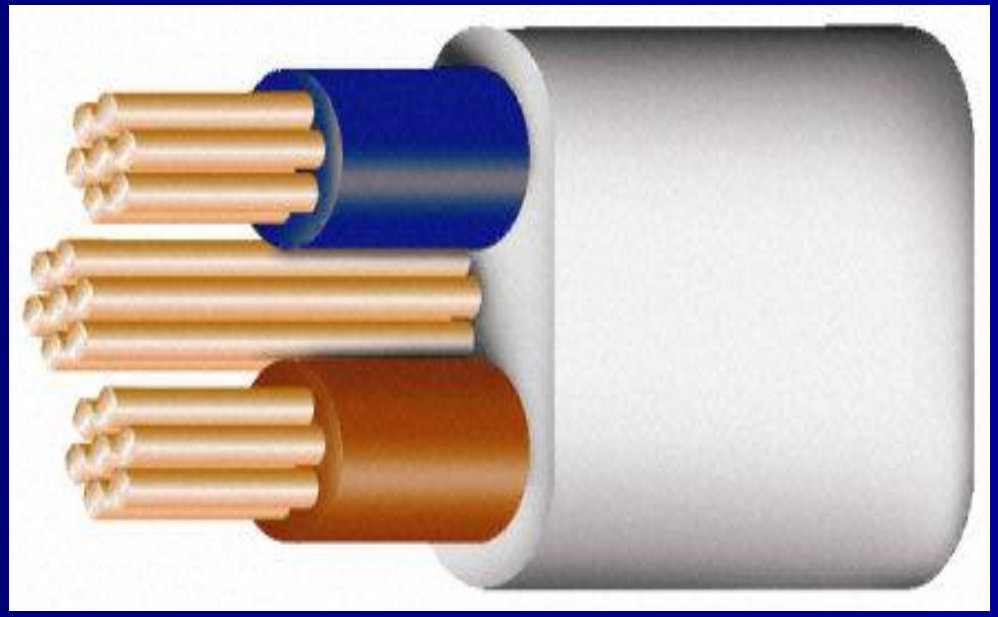
Three core cord/flex
(Portable appliances)



Types of cables

Surface Mounted Flat Twin & Earth (Power & Lighting)





Types of cables

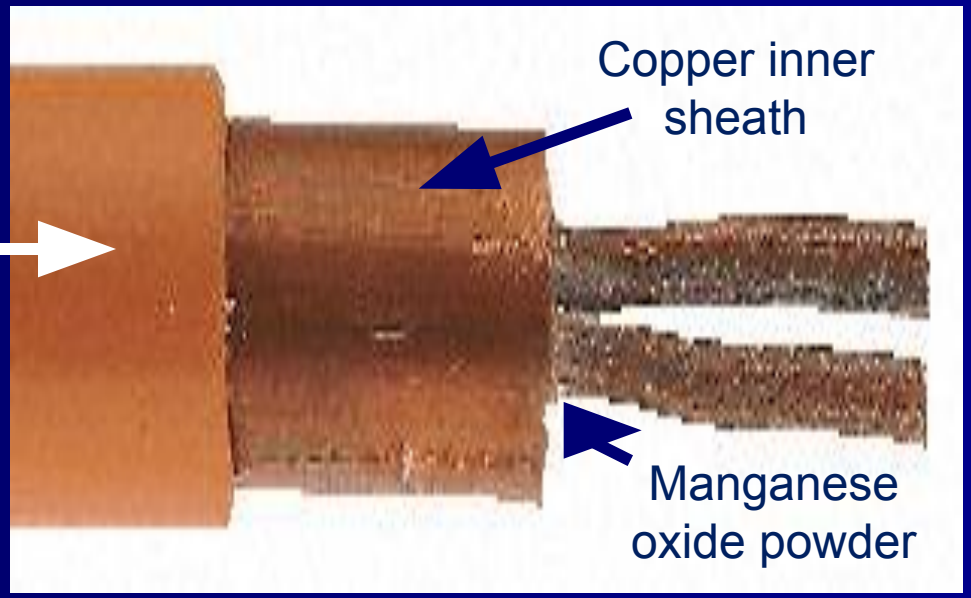
Steel wire armoured cable

(Power & Sub main)

Types of cables

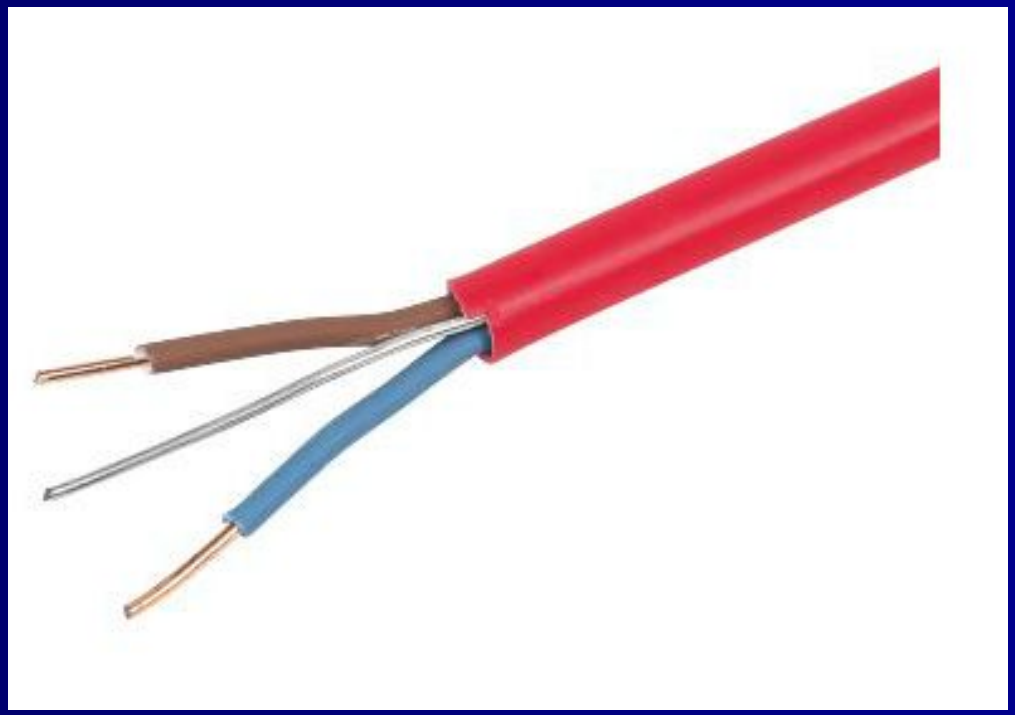
Mineral insulated (MIMS)

(High risk fire installations)



PF 200

FP Plus fire resistant cables



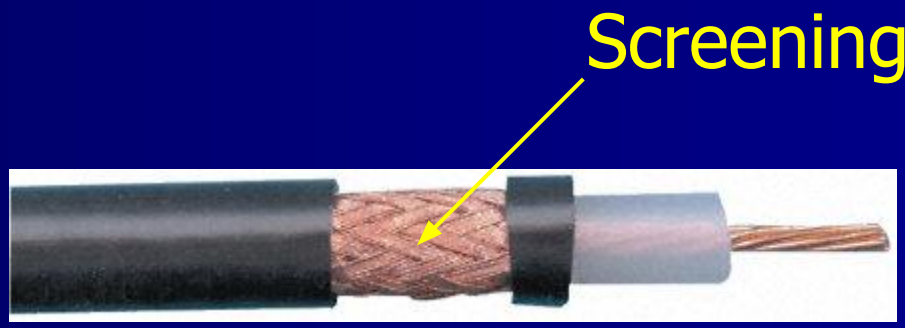
Types of cables

Multi-core cables
(Signalling)

Other types of cables

Screened cable (Co-axial)

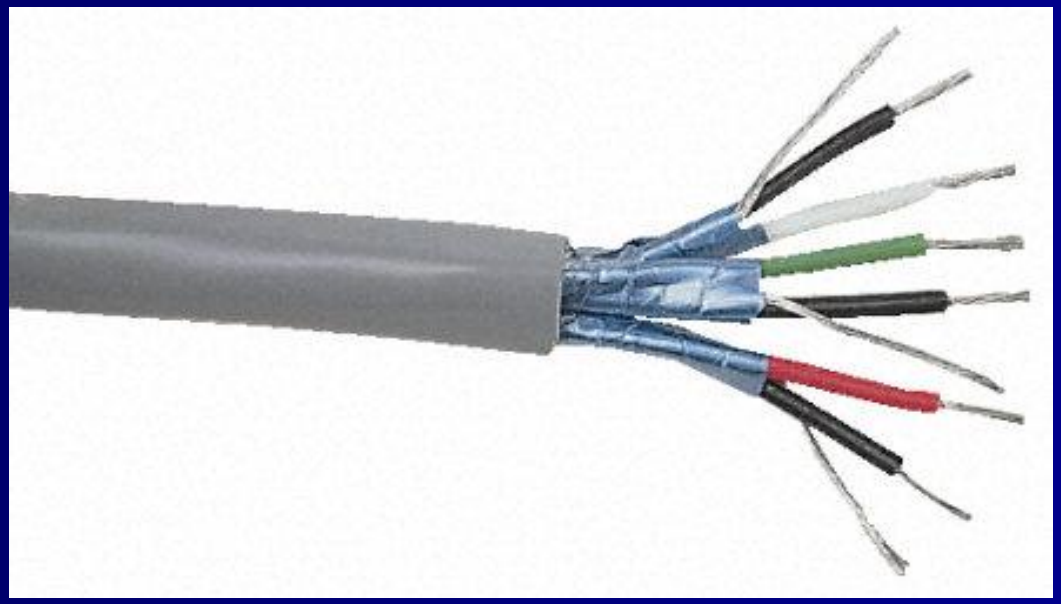
(Television signals data and sound)



Types of cables

Data/communication cable

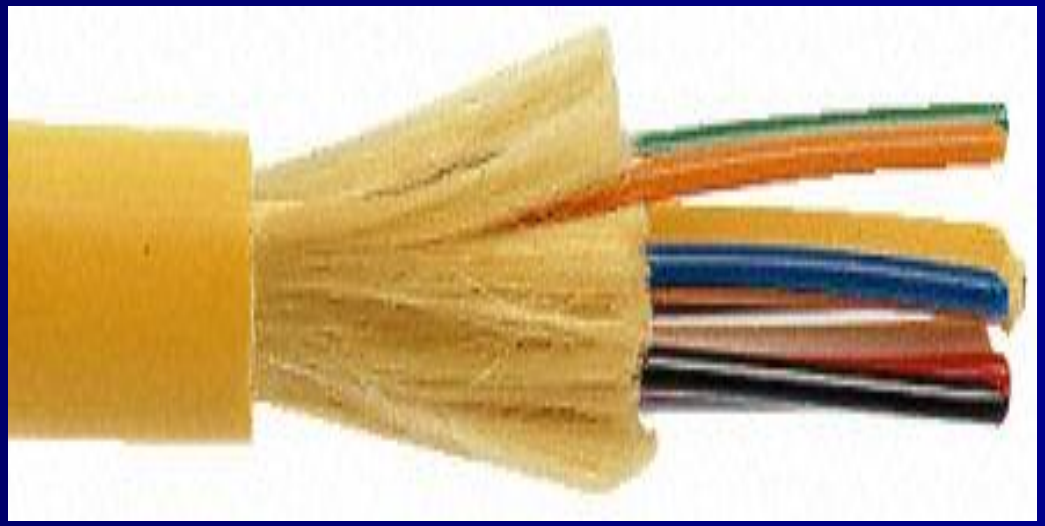
(Digital analogue signals)



Types of cables

Fibre optic cable

(Data, sound and vision)



Applications

Single core: Solid & Stranded

The solid conductor cable is used where flexibility is not a requirement, e.g. surface mounted power and lighting. Whereas stranded conductor cables are used in conduit or Trunking where flexibility is required.

Applications

Multi-core stranded

These cables are used in control systems (instrumentation) and telecommunications.

Applications

Surface mounted/concealed cables

2 core + earth flat sheathed cables are used in lighting and small power circuits for both domestic and commercial installations for such applications as, 13A radial and ring socket outlet circuits installed along the surface of walls or concealed behind stud walls. Sometimes routed along tray work above a suspended ceiling in commercial premises.

Applications

Armoured cables

Used for mains or sub-mains power supply purposes in and around or between buildings. Installed in different ways;

On the surface as a vertical rising main or installed within cable ducts, or buried underground between buildings from the main switchboard to a sub-main board or motors. The steel wire armour wires give the cable protection from mechanical impact that is not severe in nature, but not the likes of the impact of a JCB bucket for example.

Applications

M.I.M.S. cable

Used mainly in fire systems, although it is being replaced by FP-200 and FP Plus fire resistant cables

Applications

Screened cable

Co-axial, signal & data communication cables

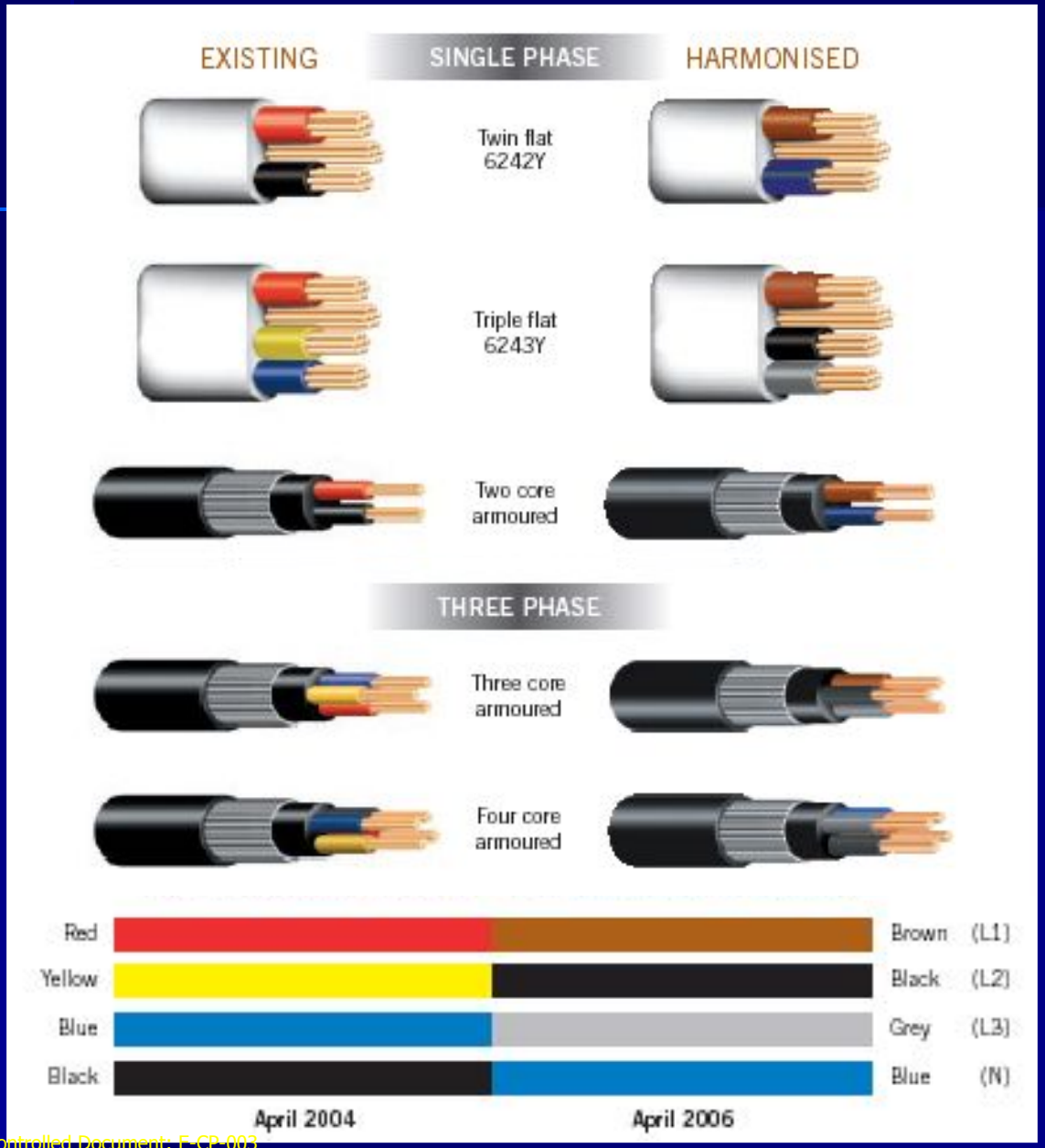
Screened cables are mainly used in data transmission applications, such as in telecommunications, T.V. or industrial/process industries to prevent the pick up of unwanted signals/interference.

Applications

Fibre optic cables

Fibre optic cables have overtaken copper conductors for transmitting telecommunication, video, broadcasting and computer signals to a greater extent around the U.K. and around the world.

Harmonisation



Battery wire colours

+ Red

- Black

COLOURED PLUG OR SOCKET

16a or 32a | 3 pin, 4 pin or 5 pin | IP44 rated

PLUGS

3 PIN	3 PIN	4 PIN	5 PIN
110V	240V	415V	415V

SOCKETS

perfect for site lighting, caravan hook up, 3 phase tools

Colour Code For Plugs And Sockets

Voltage	Frequency	Colour code
25	50-60 Hz	Purple
50	50-60 Hz	White
100–130	50-60 Hz	Yellow
200–250	50-60 Hz	Blue
346-460	50-60 Hz	Red
500-750	50-60 Hz	Black
>50volts	100-500hz	Green