Electrical Maintenance

Wiring and Terminating

There are many different ways in which we can wire and terminate electrical components and equipment -

Types of wires/cables used and their applications

Types of terminal used and their applications

Introduction

What is a wire?

The correct terminology for a wire is a conductor which is 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 power cables only

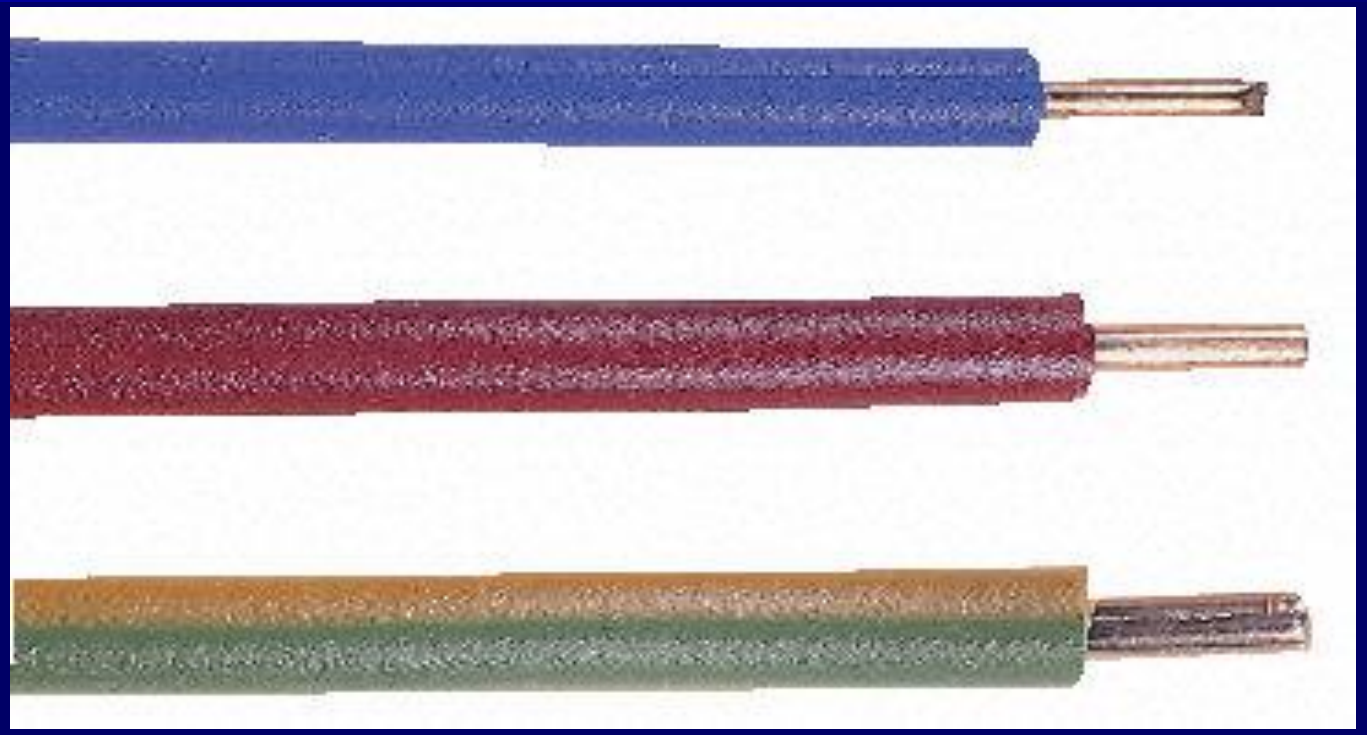
Conductors for Wiring

Conductors can be either:

Solid: One single conductor

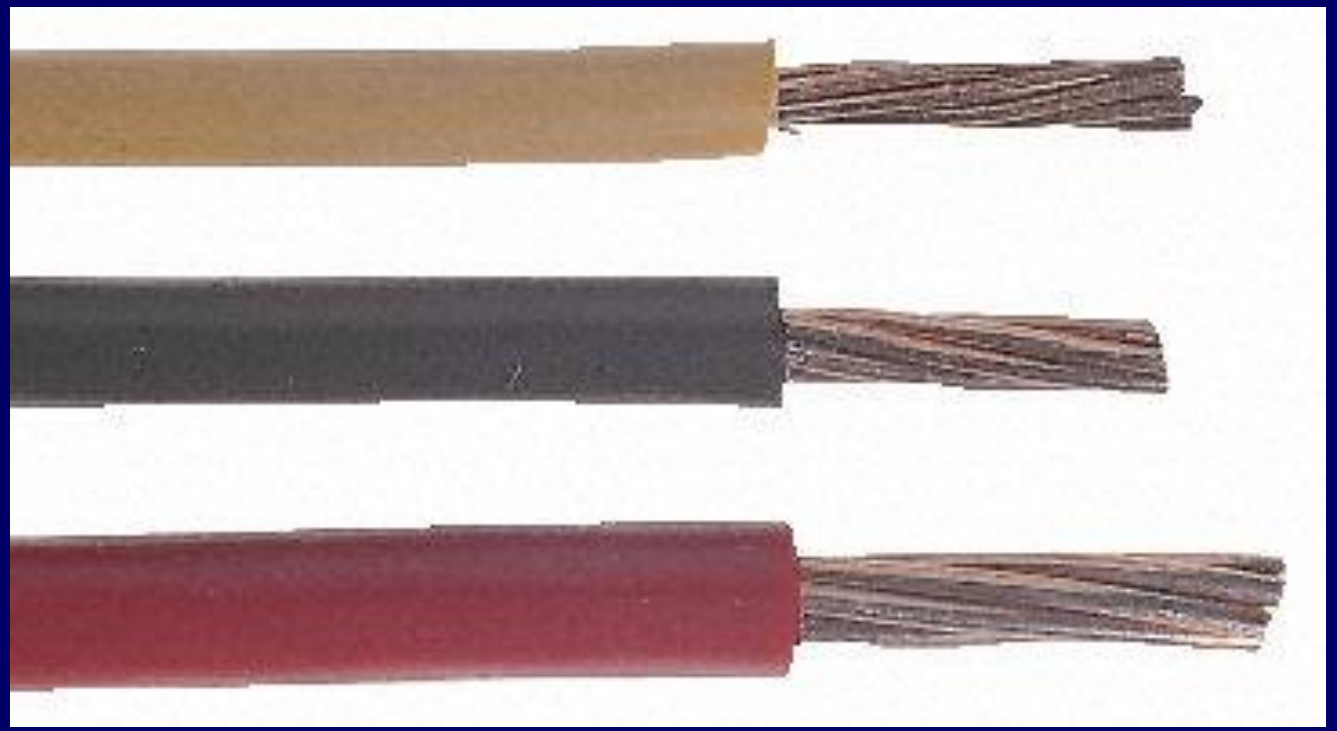
Stranded: Several individual conductor strands twisted together producing a single conductor

Types of Conductor



Single core: solid conductor

Types of Conductor



Single core: stranded conductor

Advantages/Disadvantages

Solid conductors

Can be used where the wiring system is visible and can be shaped to suit how the installation will look

Unfortunately, they can be very difficult to install within support systems such as trunking and conduit due to their rigidity

Advantages/Disadvantages

Stranded conductors

Very flexible making it easy to draw into support systems

Difficult to keep straight unless formed into cable looms

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:

Types of insulation used

Polyvinyl Chloride (PVC) is most commonly used:

High Density Polyethylene (HDPE)

Cross linked polyethylene (XLPE)

Ethylene Propylene Rubber (EPR)

What is a cable?

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

What is a cable?

Essentially a cable comprises of ***Cores***

(individual conductors surrounded by insulation).

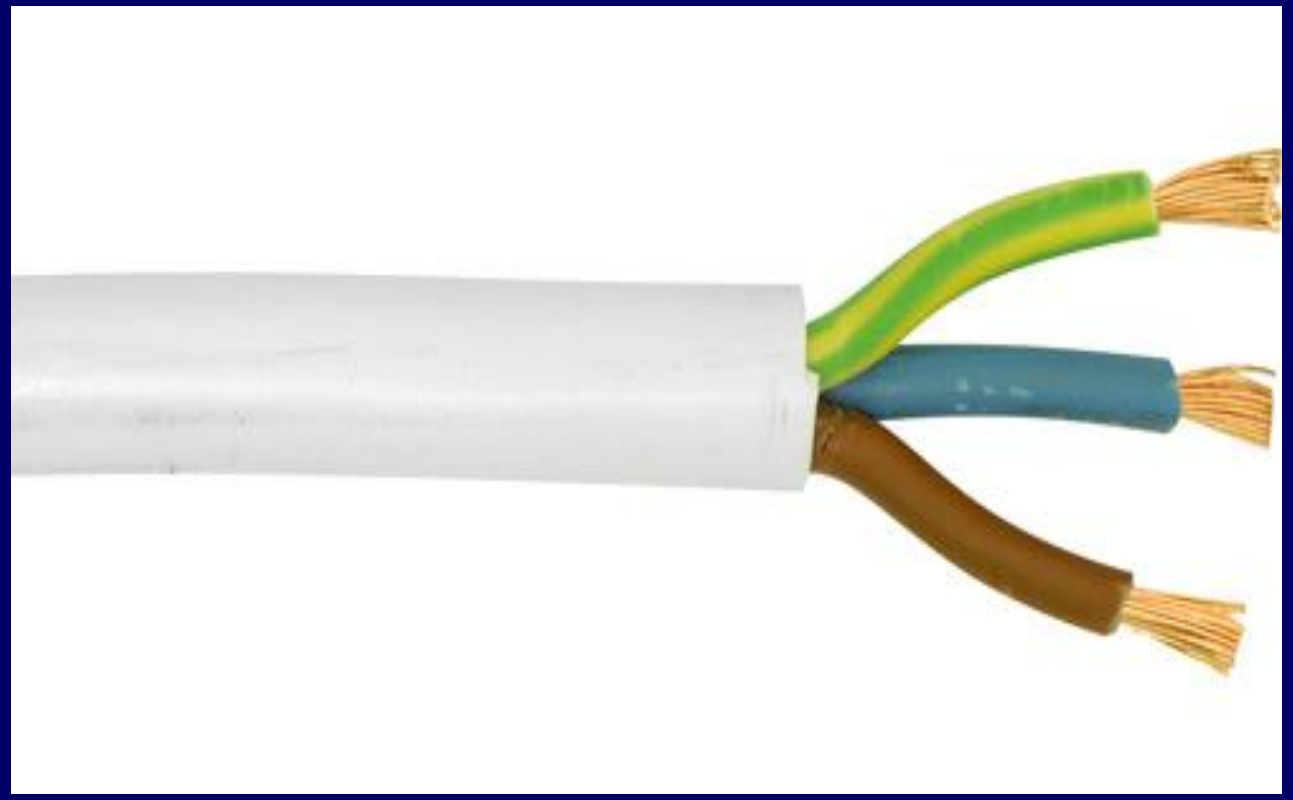
Which can also be contained within another insulated sheath.

Types of cables:

The most common have ***copper conductors*** with ***PVC insulation*** which are used over a large range of conductor sizes.

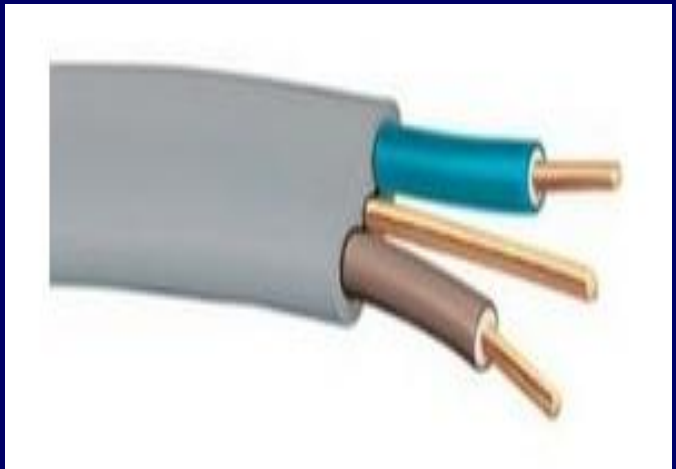
Types of cables

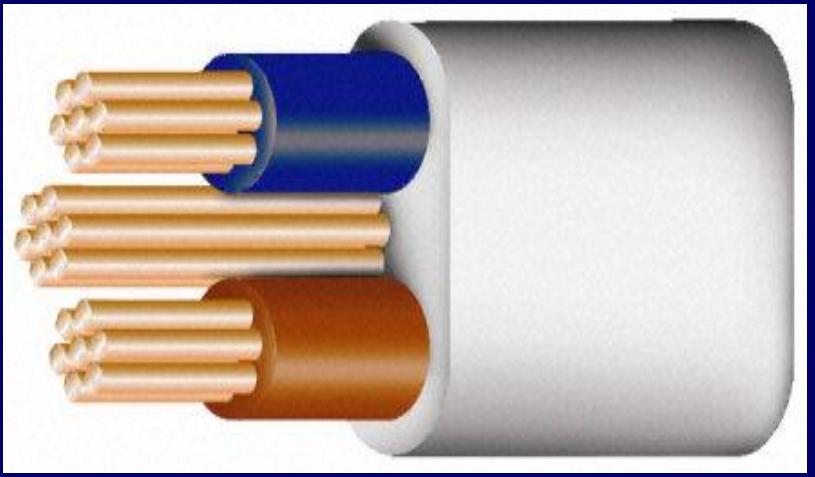
Three core flex/cord (Portable appliances)



Types of cables

Surface Mounted Flat Twin & Earth
(Domestic Lighting & Power)



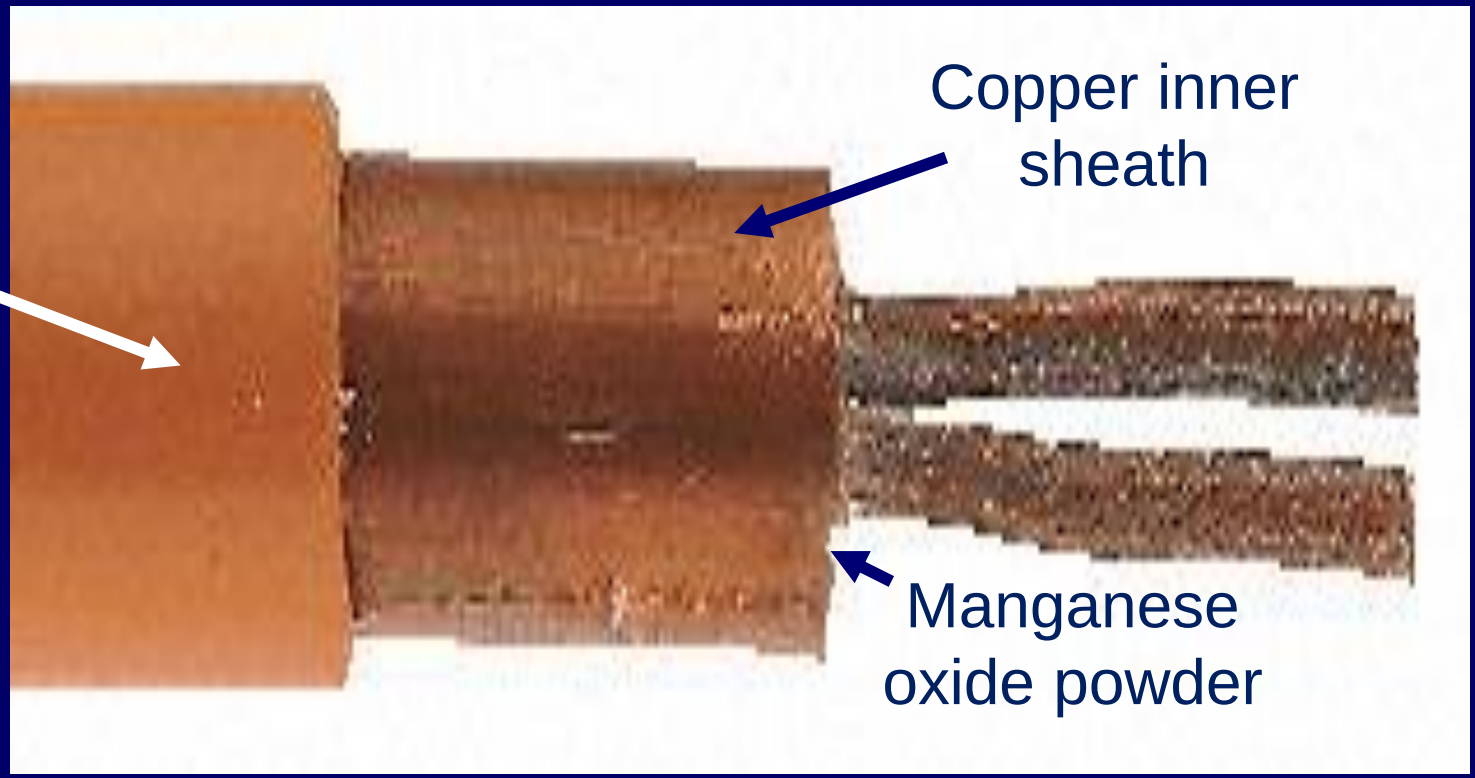


Types of cables

Steel wire armoured cable (Power & Sub main)

Types of cables

Mineral insulated (MIMS) (High risk fire installations)



Types of cables

Multi-core cables (Signalling / comms)

Current carrying capacity of cables

The amount of current a cable can carry without it burning out depends directly upon the Cross-Sectional-Area of its conductor's

CSA for Solid = πr^2

CSA for Stranded = $\pi d^2 n \div 4$

In the UK, conductors are sized in mm^2 and cables are designated by their individual conductor size followed by the number of cores and type

Terminating wires

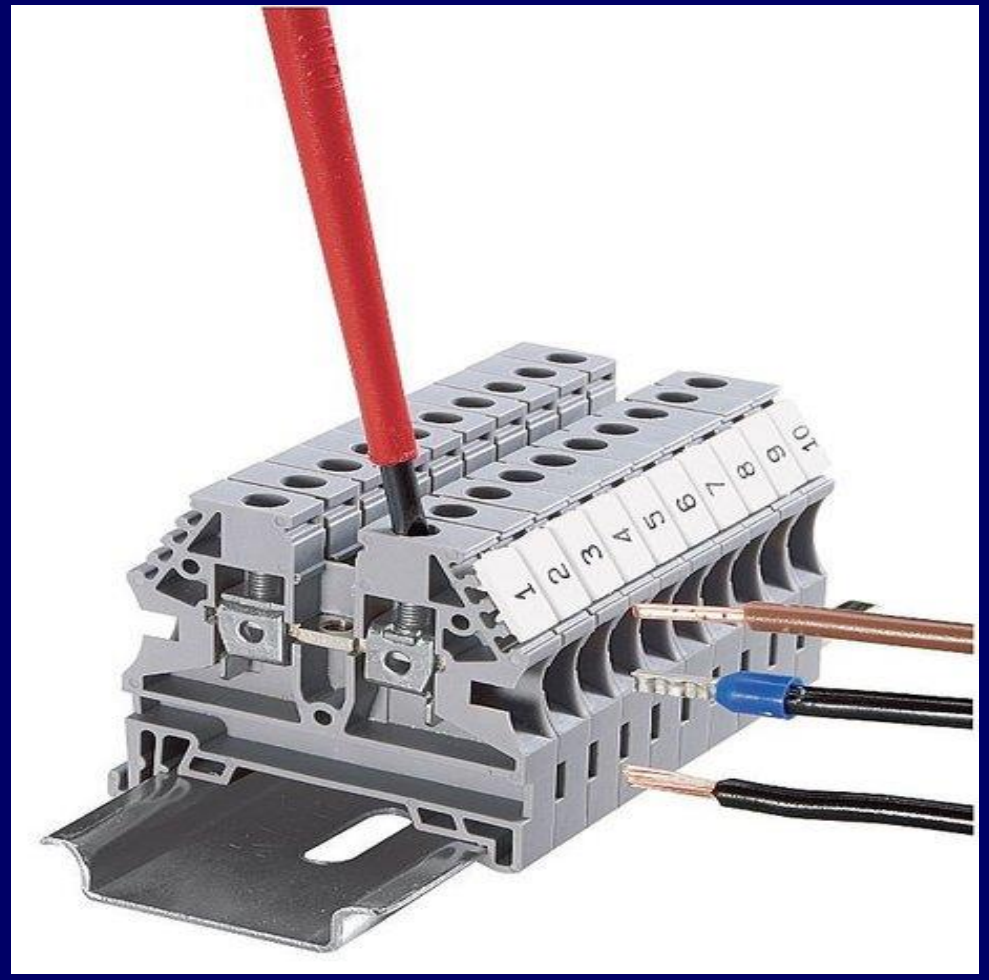
There are many ways to terminate conductors, but here we will deal with the basic three:

Compression Screw/terminal stud post

Soldering

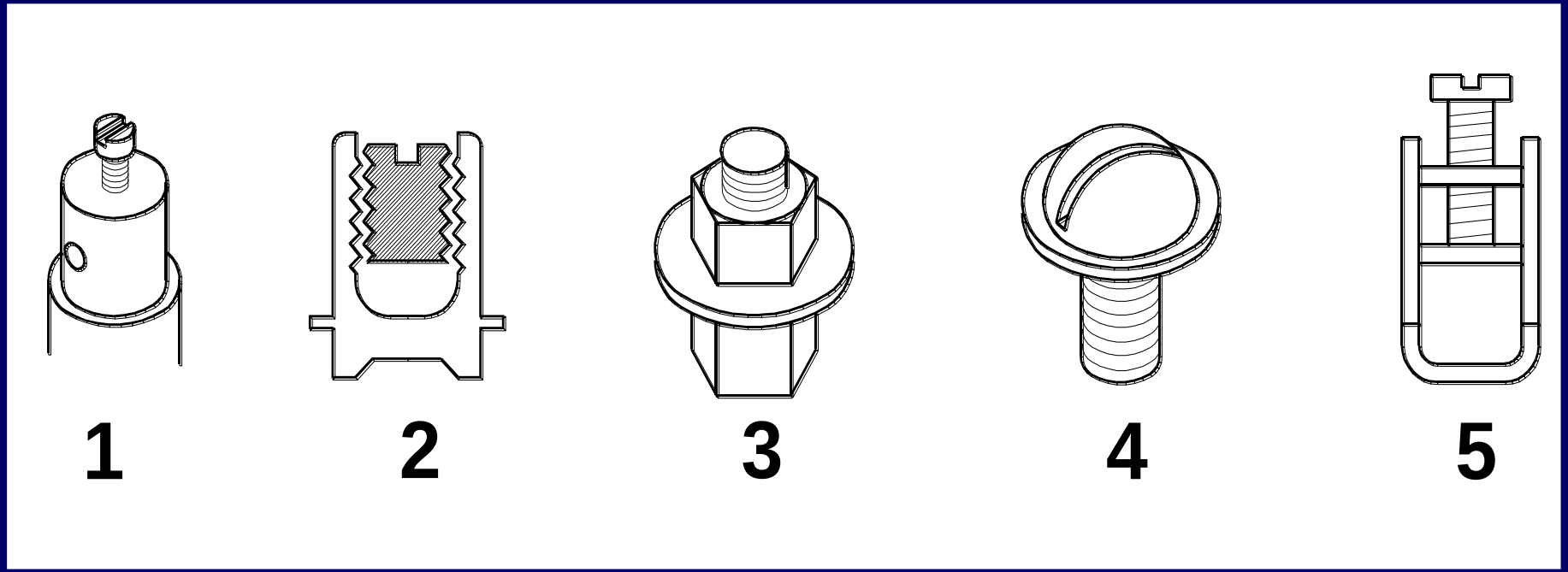
Crimping

Compression Screw



This is where the conductors are trapped directly into the terminal by screw pressure, applied directly onto the conductor by tightening a screw with a screwdriver.

Terminals



Screw Terminal

Split Terminal

Post Terminal

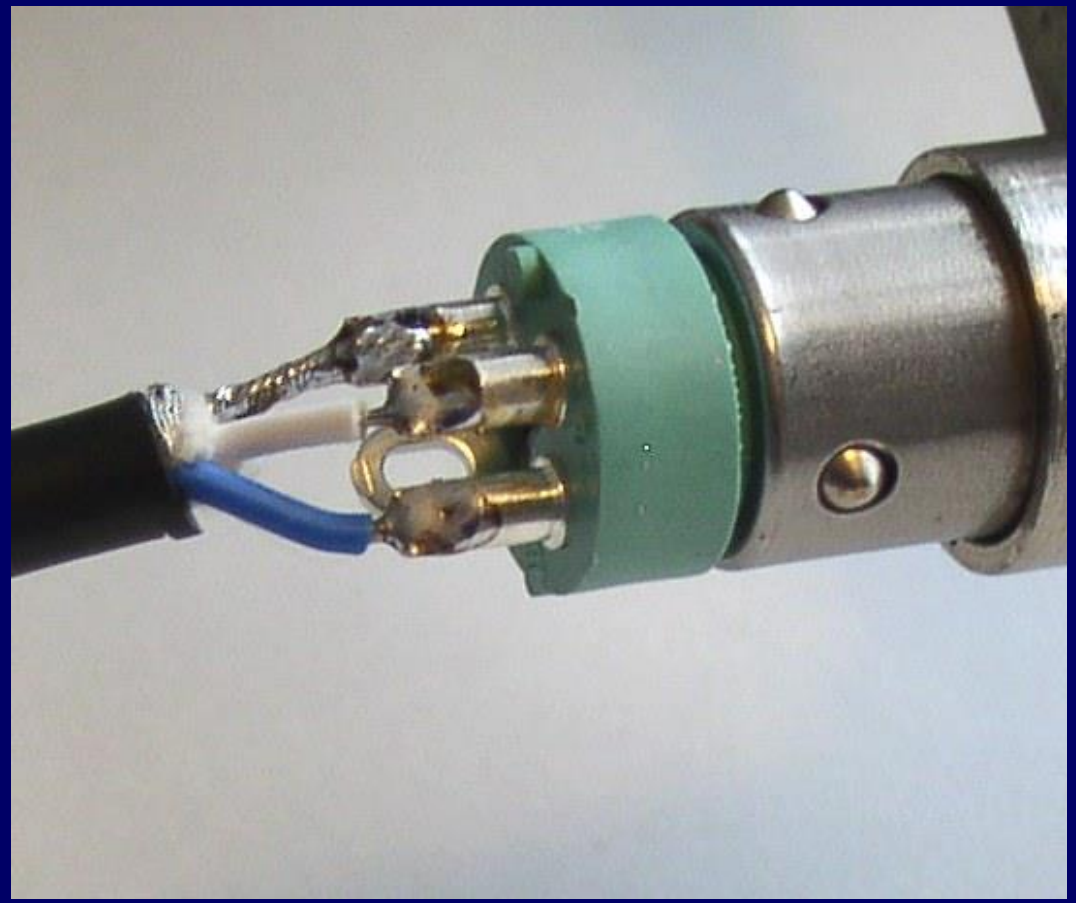
Screw Head Terminal

Clamp Terminal

Terminal Stud Post

This is where the conductors are trapped directly between two washers held together by pressure from a nut and washers tightened with a spanner or drive socket

Soldered



This is where the conductors are coated in molten solder then left to cool down to form a solid connection

Crimped (PIDG) pre insulated diamond grip

This is where the conductors are fitted with different types of crimp lug, by special tools which squeeze the lug onto the conductor

Crimp Lugs

Ring terminal for connecting to terminal posts

Fork terminal for quick release applications

Pin terminal for screw terminal

Terminating cables

There are many ways to terminate cables, but again we will deal with the basic three:

SWA Glands (BW CW EX)

SY Glands

PVC Compression Glands

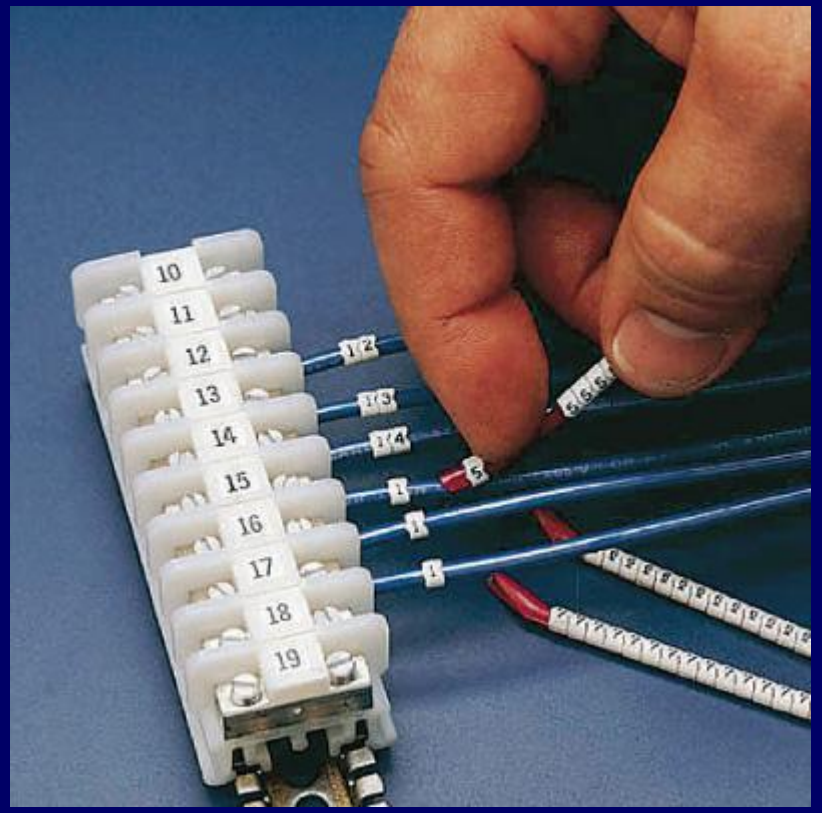
Compression Glands

BW SWA (indoor power)

SY (Power and control)

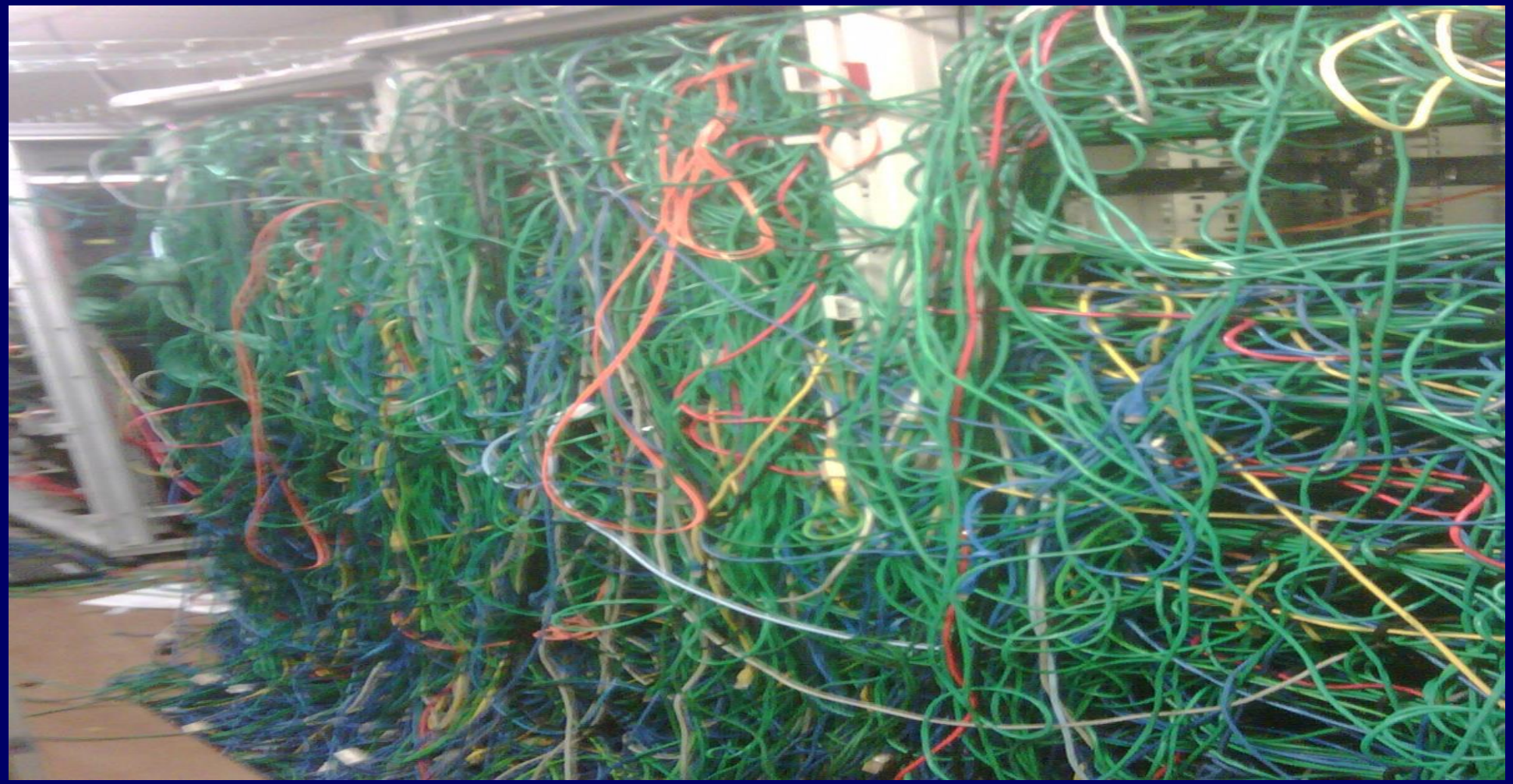
PVC (flexible cables)

Labels & Tags

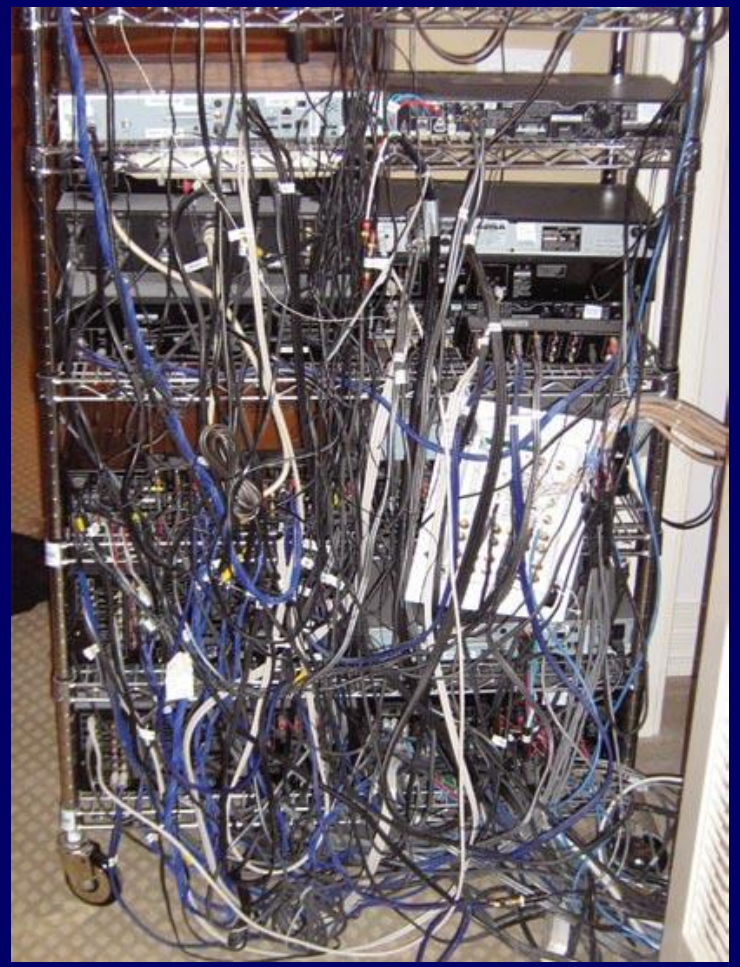


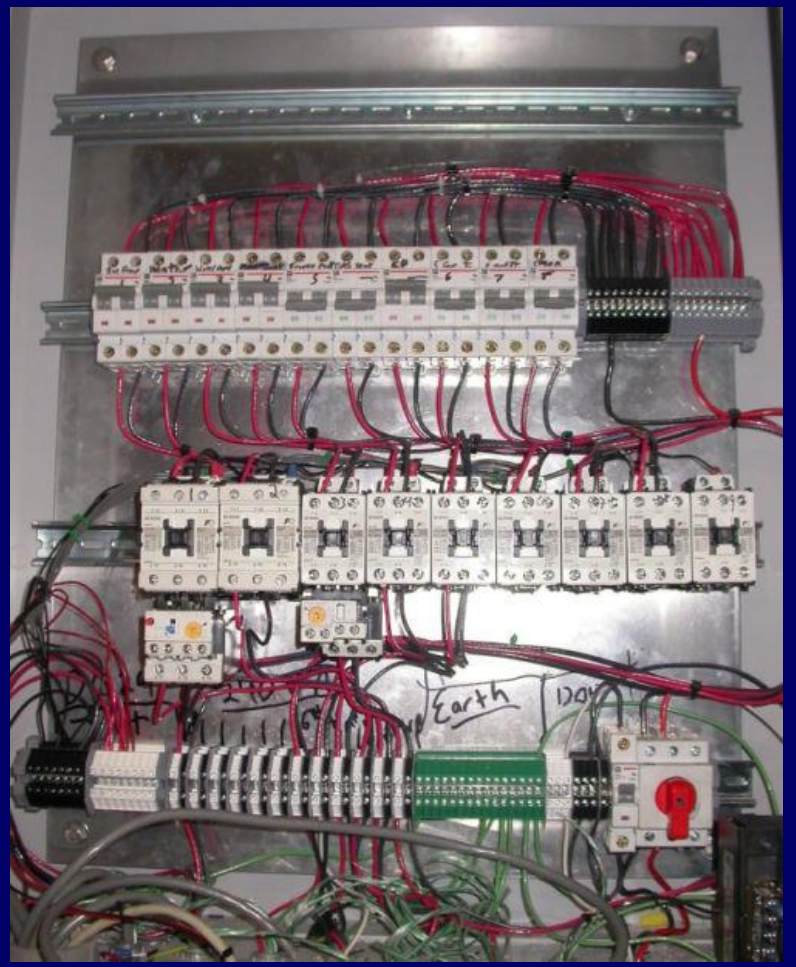
For ease of identification

Cable Management



Cable Management





Cable Management

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