TEST YOUR KNOWLEDGE
HEALTH & SAFETY

QUIZ: PERSONAL PROTECTIVE EQUIPMENT

On the job, you'll face all sorts of risks, so make sure you're wearing the right Personal Protective Equipment (PPE).

Test your PPE knowledge with this multiple-choice quiz. Good luck!

Q1	What is the primary function of a hard hat?	Ans.
A	To keep your head warm	
B	To shield your head from falling objects and accidental bumps	✕
C	To make you look professional	
D	To store small tools	

Q2	Why are safety goggles or specs important?	Ans.
A	To enhance your vision	
B	To protect your eyes from flying debris, sparks, and other airborne hazards	✕
C	To help you read small print	
D	To look stylish on-site	

Q3	How do ear defenders protect you?	Ans.
A	By enhancing your hearing	
B	By reducing loud noises from power tools and electrical equipment	✕
C	By providing music while you work	
D	By acting as a fashion accessory	

Q4	What is the purpose of a hi-vis vest?	Ans.
A	To keep you warm	
B	To make you visible, especially in low-light settings or on busy construction sites	✕
C	To hold tools and equipment	
D	To add an extra layer of protection from electrical shocks	

Q5	What do protective gloves guard against?	Ans.
A	Only sharp objects	
B	Only electrical shocks	
C	Cuts, shocks, and abrasions from sharp objects and electrical hazards	✕
D	Making your hands too warm	

Q6	Why are knee pads essential?	Ans.
A	To improve your running speed	
B	To offer comfort and protection when kneeling on hard surfaces or sharp objects	✕
C	To enhance your appearance	
D	To keep your knees warm and cosy whilst working	

Q7	What benefit do steel toe caps provide?	Ans.
A	They make the boots lighter	
B	They prevent foot injuries from falling tools and heavy equipment	✗
C	They add extra grip on slippery surfaces	
D	They make the boots waterproof	

Q8	What feature should workwear trousers have to provide extra safety for electricians?	Ans.
A	Multiple pockets	
B	Bright colours	
C	Lightweight fabric	
D	Flame-resistant material	✗

Q9	Why are non-conductive electrical safety boots important for electricians, besides having steel toe caps?	Ans.
A	They provide electrical insulation	✗
B	They are made of waterproof material	
C	They come in various colours	
D	They have a stylish design	

Q10	What type of jacket is recommended for electricians working outdoors?	Ans.
A	Hi-vis, flame-resistant jacket	✗
B	Leather jacket	
C	Denim jacket	
D	Woollen jacket	

Q11	Why might an electrician wear a face shield?	Ans.
A	To protect against flying debris and electrical sparks	✗
B	To keep their face warm	
C	To improve their visibility	
D	To look more professional	

Q12	What type of PPE should be worn to protect against respiratory hazards such as dust or fumes?	Ans.
A	Ear defenders	
B	Respirator or dust mask	✗
C	Safety goggles	
D	Hard hat	



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QUIZ: FILL THE GAPS

Ready to test your health and safety knowledge? Fill in the gaps by selecting the correct words or terms from the list provided below. Good luck!

1. An electrician should wear **Rubber gloves** and **safety glasses** when working live.
2. If you come across an unfamiliar piece of electrical equipment, you should **Refer to the manufacturer's instructions** to understand its operation.
3. A Residual Current Device (RCD) is primarily used to **To prevent electric shock**.
4. If you see a damaged electrical cable, you should **Report it to a supervisor** to ensure it is handled safely.
5. The Electricity at Work Regulations 1989 require that only **Qualified** persons can undertake electrical work.
6. When working with electricity, you should not **Wear a metal watch or bracelet**.
7. Portable electrical equipment in a high-risk environment should be tested every **Every six months**.
8. A properly worn safety hat can protect you from **Falling objects**.
9. A **Water** fire extinguisher is not suitable for electrical fires.
10. The first thing you should do when working with electrical systems is to **Isolate the system** and prove dead.
11. In the event of an electrical fire, the first thing you should do is **Disconnect the electricity**, if it's safe to do so.
12. In the context of electrical enclosures, "IP" stands for **Ingress Protection**.

Answers:

Refer to the manufacturer's instructions
Rubber gloves and safety glasses
Isolate the system
Ingress Protection
Every six months
Disconnect the electricity
Qualified
Report it to a supervisor
Water
Falling objects
To prevent electric shock
Wear a metal watch or bracelet

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QUIZ: SAFETY SIGNS

Go to sparks-magazine.co.uk to download exercise answers for free.

How well do you know your safety signs? Test your knowledge by labelling each safety sign illustrated below. Good luck!

PROHIBITION SIGNS



1 No Aerosols



2 Do not extinguish with water

WARNING SIGNS



1 Flammable material or high temperature



2 Danger: electricity

MANDATORY SIGNS



1 Eye protection must be worn

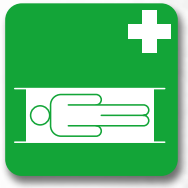


2 Safety helmet must be worn

EMERGENCY ESCAPE OR FIRST-AID SIGNS



1 Assembly Point



2 Stretcher



3 Not drinkable



3 Toxic material



3 Safety gloves must be worn



3 Exist



4 Smoking and naked flames forbidden



4 Radioactive material



4 Face protection must be worn



4 Eyewash



5 Do Not Use Ladders



5 Overhead load



5 Safety boots must be worn



5 Safety shower



6 No access for unauthorised persons



6 Industrial vehicles



6 High visibility vests must be worn



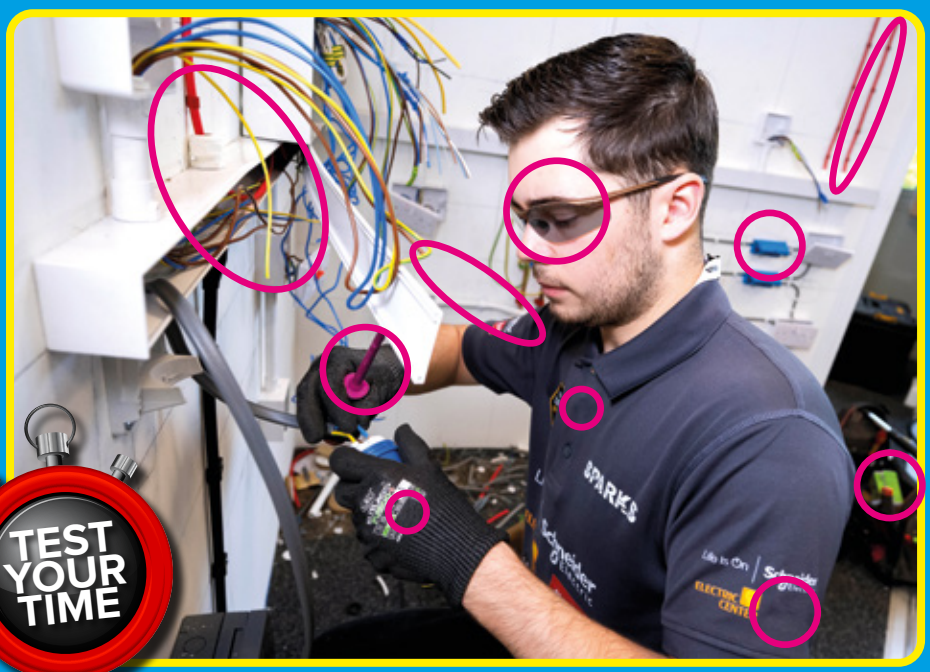
6 Emergency telephone for first aid or escape

SPOT THE DIFFERENCE

Spot the ten differences between these two photos of a SPARKS Learner of the Year competitor hard at work.



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TEST YOUR KNOWLEDGE

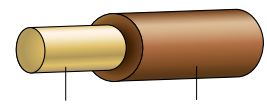
ELECTRIC CABLE

ELECTRIC CABLE

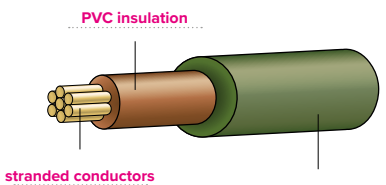
Selecting the right cable for the task at hand is important to ensure safe and efficient use of cable.

Test your knowledge with the following questions and tasks.

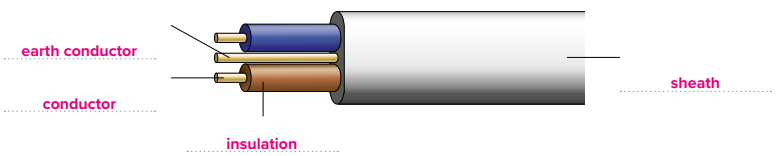
1. An electric cable is designed to safely carry **electric current.**
2. The typical construction of an electric cable will consist of a solid or **stranded** conductor and a protective layer called the **insulation.**
3. Cable insulation is generally a layer of PVC that may be over-covered with an additional layer called the **sheath.**
4. The insulating material used in the construction of MICC cable is **magnesium oxide.**
5. The current rating of an electric cable depends on the method of installation and the cable **size.**
6. The cross-sectional area of an electric cable is expressed in mm^2 and refers to the **area.** of the conductor.
7. Complete the labels for the following cable samples...



conductor — insulation



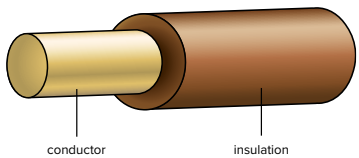
8. Composite cables are cables that can be clipped direct to a surface and consist of two or more cores. One example of a composite cable is **twin and earth cable.**



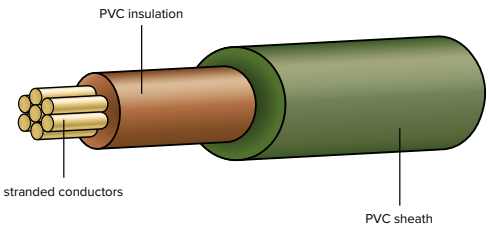
9 The abbreviation BASEC is the registered mark for the British Approvals Service for Cable.

10 What is the function of the BASEC mark found on electric cables? To ensure that the cables meet the required standards for safety and performance.

11 The following illustration shows a coaxial cable.

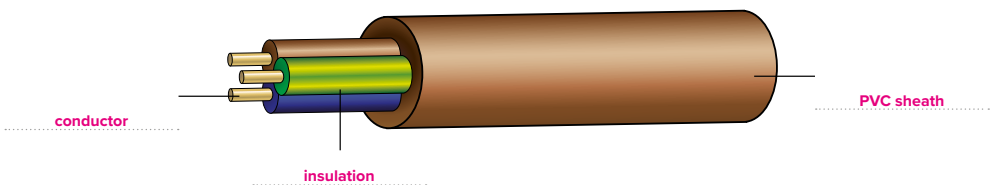


12 The following illustration shows an ethernet cable.



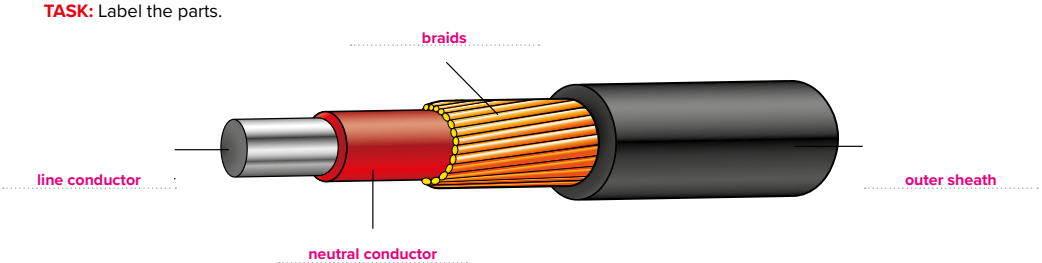
13 Flexible cable has a multi-strand core (usually 32 strands of copper conductor). All cores are insulated with an over-covering of PVC or silicon rubber as shown below.

TASK: Label the parts.



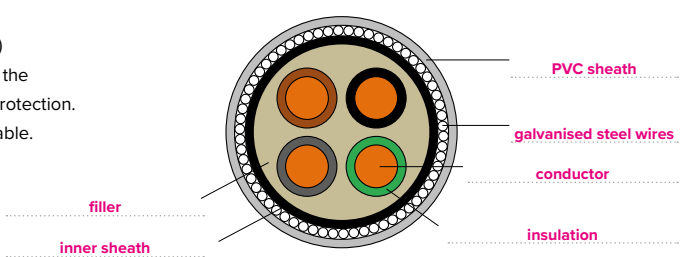
14 Single-phase power supplies into domestic premises may be supplied using a **concentric cable**. The central core is the line and the neutral conductor surrounds it and provides mechanical protection.

TASK: Label the parts.



15 PVC insulated Steel-Wire-Armour (SWA) has galvanised steel wires surrounding the insulated cores providing mechanical protection. Single and multicore versions are available.

TASK: Label the parts.



16 In situations likely to have high temperatures present for long periods of time, or a risk of explosion exists, Mineral Insulated Copper Covered (MICC) cable may be selected. What are the **two main advantages** of MICC cable?

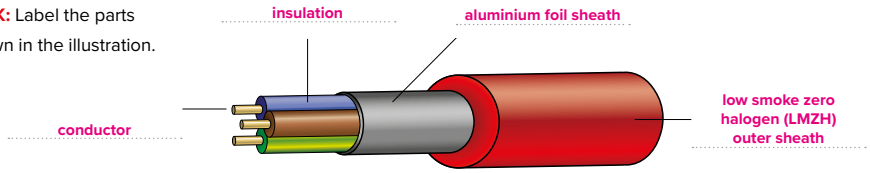
1. High-temperature resistance
2. Fire resistance

TASK: The illustration shows a single-core non-sheathed or bare copper sheath MICC cable. Label the parts.



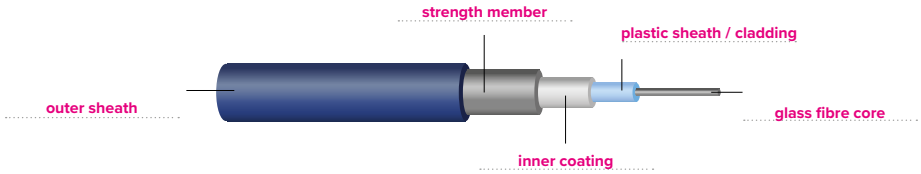
17 Fire-Proof or FP cable is fire resistant and may be used where mechanical protection is required without secondary containment.

TASK: Label the parts shown in the illustration.



18 Fibre Optic cable is used for data transmission and electrical signals that need to be protected from electro-magnetic interference. The 'conductor' consists of a very fine glass fibre through which energy, in the form of light, is passed. (*There is no solid copper or aluminium conductor and therefore current, as we understand it, will not pass through this type of cable*).

TASK: Label the illustration for a single-core fibre optic cable.



SUMMARY OF CABLE FACTS

CONDUCTOR: Usually made from copper and arranged in solid, stranded or multi-stranded format for a range of cross-sectional areas.

INSULATION: This is the protective covering surrounding a conductor. Insulation is usually polyvinyl chloride (PVC), synthetic rubber or silicon rubber.

SHEATH: This provides the basic protection against electric shock and a mechanical protective layer for the conductors.

TWIN AND THREE-CORE 'FLAT' CABLE: Twin and Earth cables have an over-covering of PVC that provides mechanical protection for the separately insulated line and neutral conductors and the bare circuit protective conductor. This cable is a composite cable insofar as it can be clipped direct to a surface without additional protection or mechanical containment.

SPECIAL CABLES: PVC SWA, FP and MICC are composite cables and can be installed using proprietary clips or cleats and cable-ties without the need for secondary containment.

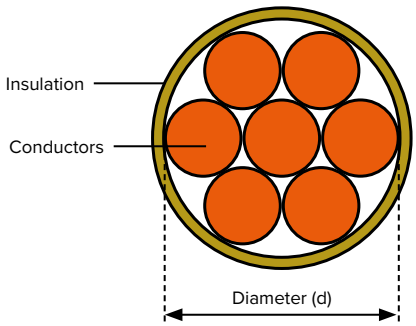
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CORRECTLY SIZING CABLE

Understanding the correct sizing of cables is crucial for safety and efficiency in electrical installations.

This guide will help you learn how to accurately measure and calculate the cross-sectional area (CSA) of a cable, ensuring you select the right cable for your needs.

Note: All cables are identified by the cross-sectional area of the conductor and not the overall cross-sectional area of the cable.



The cable size in mm^2 is the total area of the conductors.

To determine the CSA of a cable it will be necessary to measure the diameter of the conductor.

Measurement can be made using a ruler, callipers and ruler, or a micrometer.

1 Which one of the instruments listed above provides the most accurate result? micrometer

HOW TO CALCULATE THE CSA

To calculate the CSA having accurately measured the diameter of the conductor, it will be necessary to apply a formula.

One of two formulae can be used:

i. Area (a) = $\frac{\pi d^2}{4}$ **ii.** Area (a) = πr^2 **Note**: the diameter must be halved for this formula.

TRY THESE PROBLEMS:

2 A conductor has a diameter of 1.78mm. What is the CSA?

i. Area (a) = $\frac{\pi d^2}{4}$

a = 2.487mm²

3 A cable has a radius of 1.38mm. What is the CSA?

ii. Area (a) = πr^2

a = 5.98mm²

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