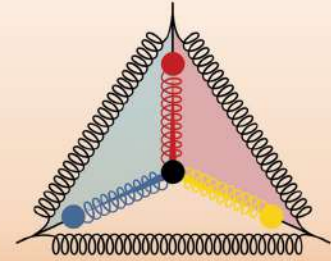


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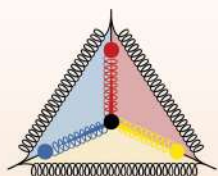
**Copper
Aluminium
DPC Paper Covered
Super Enamel**

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DPC Paper Covered Conductors

Paper Covered Wires & Strips (PICC) – Powering Reliable Transformers In transformer manufacturing, insulation defines reliability.

Paper Covered Copper Conductors (PICC) – available in round wires and rectangular strips – are specially designed for oil-filled power and distribution transformers.

Unlike enamelled wires used in motors.

PICC conductors are built for:

- High voltage applications
- Oil-immersed insulation systems
- Superior dielectric strength
- Long service life

Why Paper Insulation?

When electrical grade kraft paper absorbs transformer oil, it forms a highly stable composite insulation system that offers:

- Excellent dielectric performance
- Strong short-circuit withstand capacity
- Better heat dissipation
- High thermal stability

This is why paper insulation remains the preferred choice in heavy-duty transformer applications.



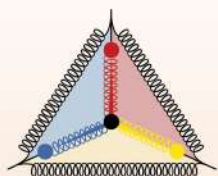
Key Manufacturing Factors

- 99.9%+ ETP grade copper
- Uniform paper wrapping
- Controlled moisture level
- Accurate dimensional tolerance
- Smooth surface finish

Even minor defects like uneven overlap or air gaps can impact transformer life.

Applications

- Power Transformers
- Distribution Transformers
- Furnace & Rectifier Transformers
- Oil-immersed electrical equipment



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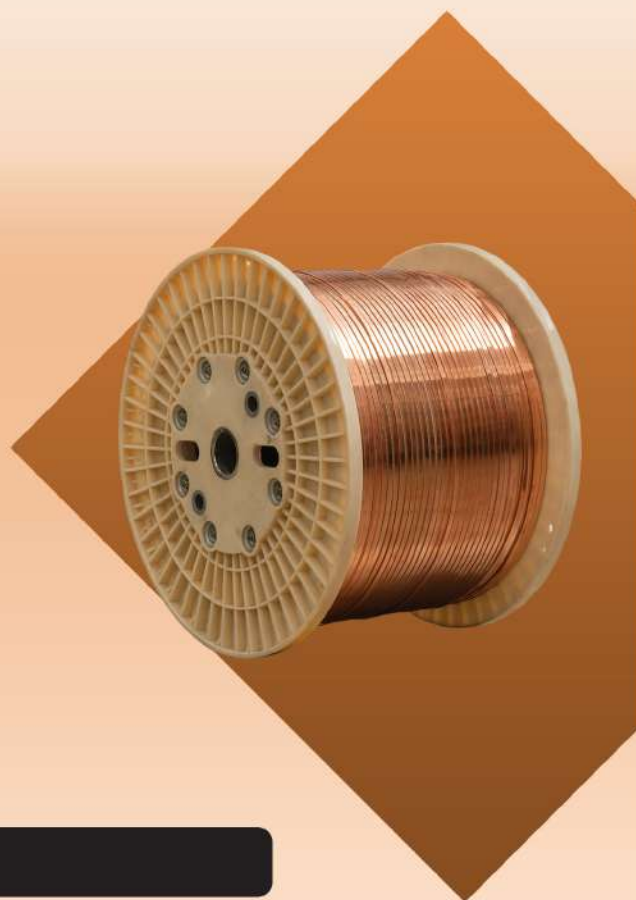
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Copper — Conductors

In modern power networks, efficiency, reliability, and long-term performance depend heavily on the quality of conductors used.

Among all materials, Copper Conductors stand out among all materials as an optimal option for consistent, high-quality transmission of electricity thanks to their unmatched conductivity, durability, and versatility – remaining an integral component of many electrical systems worldwide.

Copper is a soft, malleable metal that has been widely used for thousands of years in a multitude of applications from jewellery to kitchen appliances, to power cables to space rockets. Following experiments around the first electrical power distribution systems by pioneering electrical engineers such as Nikola Tesla and Thomas Edison in the late 19th century, copper has been a popular choice to make electrical wires.



1. Exceptional Electrical Conductivity

Copper ranks high on the conductivity scale, enabling smooth current flow with minimal resistance and energy loss, increasing system efficiency, and maintaining stable voltage across long distances. Therefore, many industries that evaluate electrical wires and cables often choose copper to meet performance-oriented applications without compromises.

2. Excellent Mechanical Strength

Copper has inherent tensile strength, making it durable and resistant to breakage – qualities which are especially crucial in overhead networks, industrial systems, and demanding environments. Due to this property, many wire and cable manufacturers favor copper for heavy-duty electrical installations.

3. Superior Thermal Performance

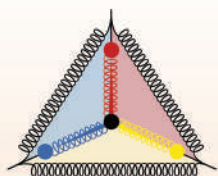
Copper conducts heat efficiently and cools rapidly, preventing overheating during high electrical loads. This thermal stability extends the lifespan of cables—especially those produced by top electrical cable wire manufacturers across India.

4. Higher Corrosion Resistance

Copper is highly resistant to corrosion, ensuring long-term reliability even in challenging environmental conditions. This property makes it an excellent choice for

5. Versatile Applications Across Industries

Copper wiring and cables have long been considered an optimal choice for high performance electrical applications, both residential and industrial power grids alike. Their adaptability, strength and safety make them popular choices.



Why Are Copper Conductors the First Choice for Industries?

Industries rely on conductors that provide stable output, long life, and low maintenance. The main reason for this is because copper is a good conductor of electricity.

Copper Conductors meet all these needs thanks to

- Low resistive losses
- Excellent electrical performance
- High flexibility and mechanical toughness
- Extended operational lifespan

What makes copper a good electrical conductor?

Copper and aluminium are both popular metals used as electrical conductors, however, copper wins out in several areas.

High conductivity : Copper is a much better conductor of electricity than aluminium and is surpassed only by silver. It conducts electricity so well because it has readily available (valance) electrons in every atom, which can move freely in an electric field – compared to aluminium. Despite aluminium having valance electrons, they have less freedom to move. Copper atoms have precisely 29 electrons, and they can carry their negative charge through a copper wire easily. Aluminium atoms have fewer electrons (13), but atoms of silver have many more (47) which makes silver wire an even better conductor.

Low level of resistivity : Resistivity refers to how strongly a metal resists the flow of electrons making the electrical current. The more conductivity a metal has, the lower its resistivity. The structure of the copper atom and the behaviour of its electrons combine to give a lower resistivity than aluminium.

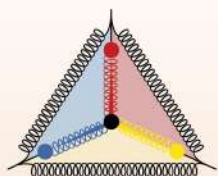
High thermal conductivity : Thermal conductivity is a measure of how well a material conducts heat. Metals with high thermal conductivity can transfer heat very quickly from one location to another. This distribution of heat can help reduce any localised overheating and reducing the overall temperature. Out of all the engineered metals, copper has the highest thermal conductivity.

Pliability : Cable conductors need to be pliable enough to be installed throughout a building, e.g. routed under floors, above ceilings, indoors and outdoors. The finer the wires in the conductor, the more pliable the finished cable will be. Conductors are often formed of many strands of copper wires, specifically to allow the cable to be flexed in use or under load as required. Because aluminium is a less efficient conductor, the conductors need to be larger, which makes aluminium cables bulkier, less flexible and more difficult to install.

The benefits of copper make it hugely popular in the industry, but as the price of copper has increased, there are calls for more aluminium conductors to be used. Aluminium is both cheaper and lighter. However, an aluminium conductor is only around 61% as conductive as the same sized copper conductor, so its diameter needs to be greater. A larger conductor means more insulation, more armouring and more final sheathing. Extra materials can easily reduce the savings made using cheaper aluminium and also less cable will fit on the drum which means more joints!

Aluminium also reacts with oxygen to form an insulating film of oxide on its surface. This can compromise continuity at joints and terminations and may create hot spots, which can cause fires. Aluminium has a lower melting point (660.3°C) than copper (1,085 °C), which means it could soften more readily in a short circuit condition.

In short, copper has several advantages over other non-precious metals. Thanks to its high conductivity, low resistivity, high thermal conductivity and pliability, copper is a universally accepted choice for electrical cables but the 'aluminium questions' are always there.



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Aluminium Conductors

Aluminium strip conductors are lightweight, cost-effective alternatives to copper, widely used in transformer windings, electric motors, and power distribution for their excellent conductivity-to-weight ratio.

Featuring high flexibility and often insulated with enamel or anodized layers, they offer superior space utilization and high-temperature performance, especially in compact electrical designs.

Key Characteristics and Applications

- **Material Properties:** Aluminum offers ~65% of the electrical conductivity of copper but is about one-third the weight. It is highly ductile, allowing for easy shaping, though it requires specialized handling for connections to prevent oxidation issues.
- **Transformers and Windings:** Super enameled or foil aluminum strips are increasingly popular for transformer windings due to their ability to handle high winding stresses.
- **High-Temperature Operation:** Anodized aluminum strip wires can operate at very high temperatures (up to 350°C-600°C), making them ideal for specialized, high-efficiency motors.
- **Efficiency:** They offer superior power density in electrical machines compared to round wire due to better packing factors.



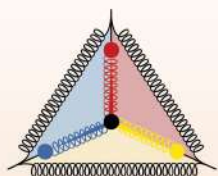
Advantages

- **Cost Efficiency:** Significant cost savings compared to copper.
- **Weight Reduction:** Roughly 50% lighter than equivalent copper, reducing structural load in applications like electric motors.
- **Sustainability:** Easy to recycle and efficient to produce.

Limitations

- **Oxidation:** Forms a surface oxide layer that can cause connection failures if not managed with proper connectors and techniques.
- **Strength:** Generally lower mechanical strength compared to copper, though specific alloys (like 6xxx series) or composite designs (ACSS) are used to overcome this.

Aluminium strip conductors represent a step-change in electrical design, providing a balance of **high performance**, low weight, and cost-effectiveness for modern electrical engineering applications.



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Super Enamel Conductors

Super enamel strip conductors are high-precision, film-insulated rectangular copper or aluminum conductors designed for maximum space utilization in electromagnetic windings.

Offering superior thermal stability (up to 200°C), high mechanical strength, and excellent dielectric properties, they are essential for transformers, generators, motors, and automotive applications.

Key Characteristics and Applications

- **Design & Efficiency:** The rectangular shape with rounded corners allows for a high stacking factor, optimizing space in critical applications like transformers.
- **Insulation Types:** Typically insulated with Polyester (155°C), Polyesterimide (180°C), or Dual Coat (PEI + PAI, 200°C) to withstand thermal and mechanical stress.
- **Applications:** Widely used in Sorgen Inc transformers, motors, alternators, RR Shramik generators, Vimlesh Industries hermetic motors, and Sorgen Inc auto electricals.
- **Dimensions:** Commonly produced in sizes with widths up to 15mm or 14mm, and thicknesses ranging from 0.50mm to 5mm.
- **Standards:** Manufactured in compliance with Indian Standards (IS 13730) and international standards (IEC 60317).



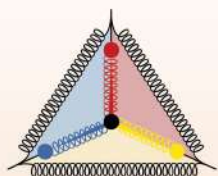
Performance Advantages

- **Thermal Stability:** Designed to operate efficiently at high continuous temperatures without degrading.
- **Mechanical Flexibility:** The enamel coating provides flexibility, crucial for winding, bending, and shaping without causing short circuits.
- **Surface Quality:** Smooth surface ensures suitability for high-speed winding processes.

These conductors are critical components in both domestic equipment and industrial heavy-duty machinery, ensuring efficient energy conversion.

Material Variations

- **Super Enamelled Copper Strip:** Known for high conductivity and durability.
- **Super Enamelled Aluminium Strip:** Used for cost-effective, lightweight alternatives in similar applications.



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Flexible Creep Paper — Insulated Cables

Insulating crepe paper is an insulating material made from cellulose as a base material through a special crepe-forming process.

This crepe-forming process endows insulating crepe paper with flexibility, ductility, and high tensile strength. Compared to flat insulating paper, insulating crepe paper can adhere more tightly to the surface of irregular components such as wires and coils when wound, thus avoiding air gaps.

This paper has a crinkled texture that allows it to stretch and mold around joints, terminals, or oddly shaped cable components. It offers higher elasticity than Kraft paper and reduces stress points in areas where rigid insulation would crack.

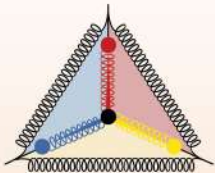
- Ideal for transformer windings, leads, and splices,
- Excellent for increasing insulation thickness without bulk,
- Often used in medium-voltage equipment.

Rational Engineers often recommend it for complex insulation geometries where flexibility is non-negotiable.



Core Performance Advantages

- **Extremely High Electrical Strength:** They can withstand extremely high short-term and long-term voltage stress, effectively preventing breakdown.
- **Excellent Thermal Stability:** They Typically withstand temperatures from 105°C (Class A) to 220°C (Class C) and above for extended periods, depending on the impregnating resin.
- **Excellent Flexibility and Adhesion:** The wrinkled structure allows for stretching and compression, tightly adhering to the conductor, eliminating air gaps, and reducing partial discharge.
- **Low Dielectric Loss:** They can help reduce energy loss and heat generation during equipment operation.
- **Superior Mechanical Strength:** The tear and tensile strength of crepe paper is far superior to ordinary insulating paper. Crepe paper tubes possess very high radial and axial mechanical strength.
- **Environmentally Friendly and Biodegradable:** They are primarily composed of natural cellulose, and is environmentally friendly.



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How to Contact Us



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