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# Introduction to Building Wires

## TECHNICAL BULLETIN

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## Introduction on building wires

Building wire is one of the most efficient and most sold products in OCI. It comes with different colors. It is used in the construction of almost every commercial, industrial, and residential property in the world. OCI as leading cables manufacturer always try to improve the building wires quality. FIGURE1 shows different color of building wires.

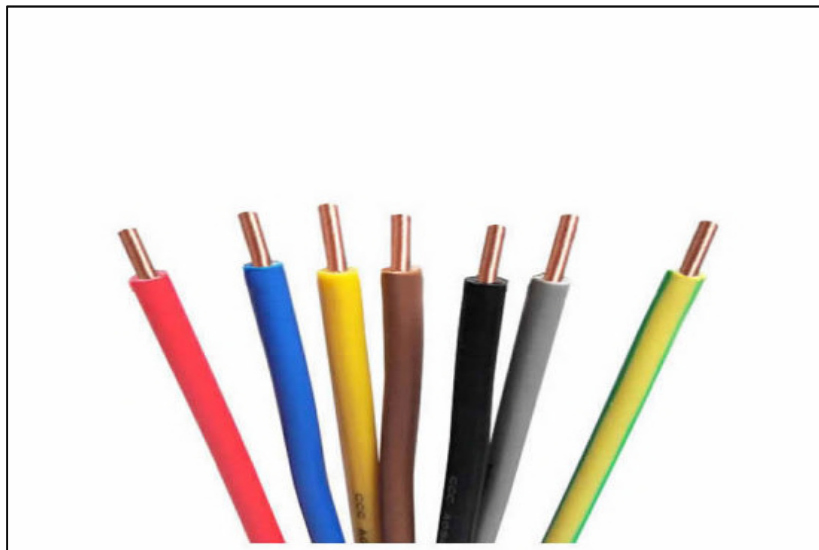


FIGURE 1 DIFFERENT COLOURS OF BUILDING WIRES

## The general function of building wires

Building wire is used mainly to transfer the energy from the power source to the equipment.

## What does building wire consist of?

Building wires consist of two layers. The first one is the conductor which is copper. The second layer is the insulation sheath which can be PVC, XLPE, PE, HDPE, or LSZH (Low Smoke Zero Halogen). The common insulation for building wires is PVC. FIGURE 2 shows the components of building wires.

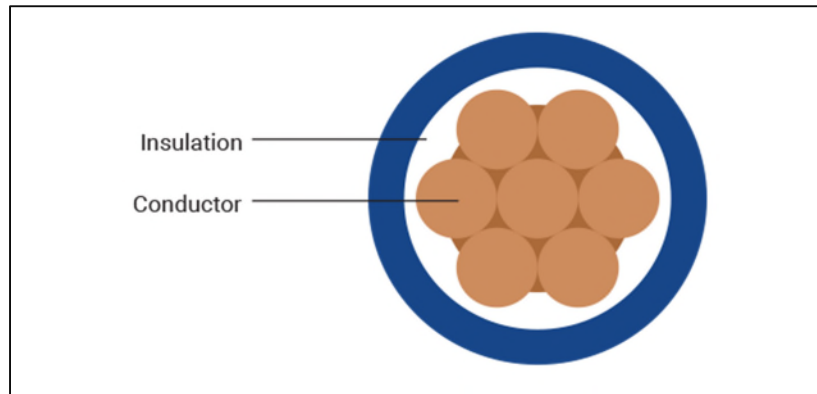


FIGURE 2 BUILDING WIRES COMPONENTS

## The function of each layer in building wire

The function of each layer in building wires are summarized in Figure 3 as follows:

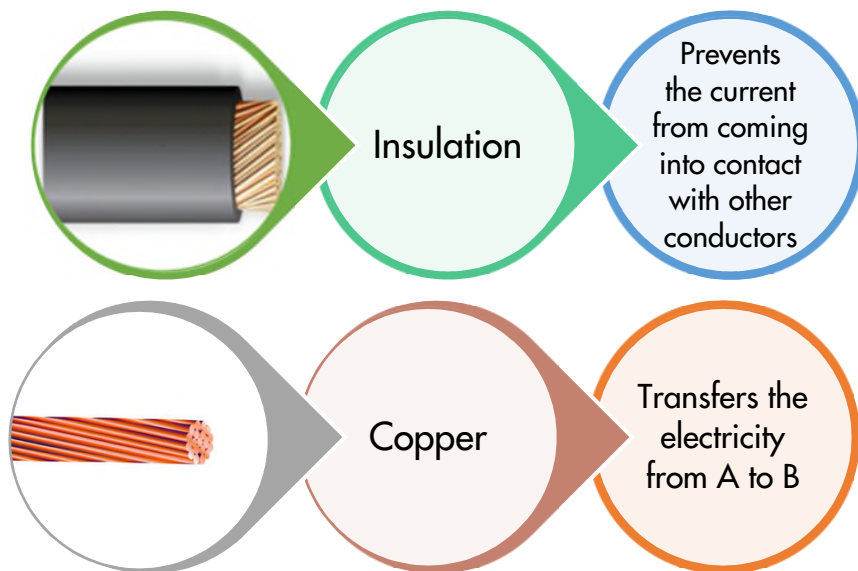


FIGURE 3 THE FUNCTION OF EACH LAYER IN BUILDING WIRE

## PVC as building wire's insulation

The PVC which is a short for Polyvinyl chloride is used as insulation for building wires. The building wires required to have certain properties such as the flexibility. PVC can be easily modified and therefore its properties can be freely customized to very different requirements depending on the intended use. In order to form a PVC with the required properties, different chemicals are added.

FIGURE 4 shows the main additives of PVC.

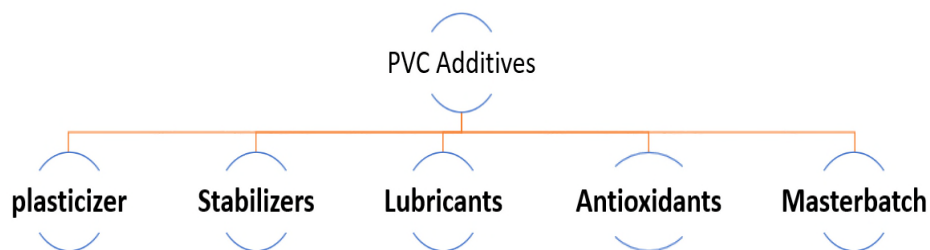


FIGURE 4 PVC ADDITIVES

Each additive is required for certain purpose. The plasticizers are used to increase the flexibility. The stabilizers are added to prevent degradation of PVC when processing. Lubricants are added to increase the processability and dispersibility. Antioxidant are used to protect PVC against thermally induced oxidation. Finally, Masterbatch is used to color the PVC.

## OCI Innovation

OCI has introduced a new building wire's design by reducing the use of masterbatch for several reasons. The presence of carbon black influences the cable properties. Carbon black is one of the main coloring substances used in the plastic industry and it is used to produce coloring masterbatches. Carbon black has a negative effect on the mechanical properties of PVC. The tensile strength, Elongation at break, toughness and ductility - is when a solid material stretches under tensile stress - of PVC are decreased by the presence of carbon black. PVC with carbon black content of about 15% has a tensile strength

of about 37 MPa. However, if the carbon black content is increased to 20% the tensile strength will be reduced to around 28 MPa. In addition, the elongation at break of pure PVC is around 6.5% but with the carbon black additive for coloring, the elongation at break of PVC dropped to around 3.5%. Both elongation at break and tensile strength are important for cables. A cable with more tensile strength means it will withstand more stretching or pulling stress before breaking. Also, a cable with more elongation at break will resist changes of shape without the formation of cracks. FIGURE 5 shows the new cable design of OCI.

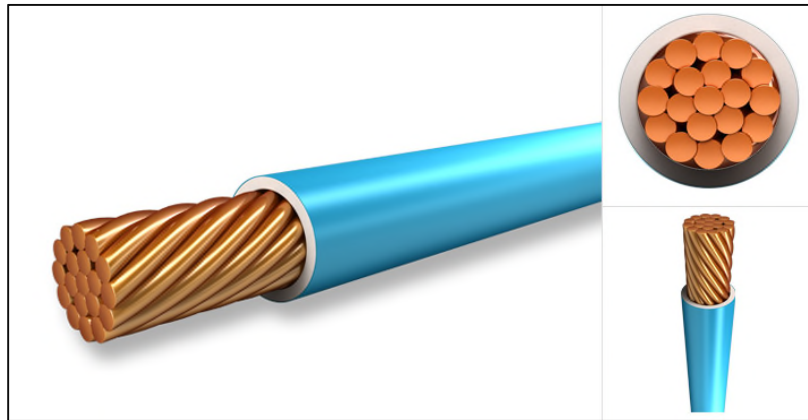


FIGURE 5 OCI INNOVATIVE CABLE DESIGN

## Environmental and Health Aspects

OCI cares about health and environment. Reducing the use of carbon black will lead to cleaner environment and healthier workplace. Most exposure to carbon black occurs by inhaling contaminated air. This type of exposure usually happens in the workplace. However, industries can release traces to the outdoor air. The exposure to carbon black can lead to lung disease.

Inhaling carbon black particles also can cause eyes, nose and throat irritation. When people are exposed to high levels of carbon black over many years, the

particles may settle in their lungs. If it stays in the lungs, the condition may lead to bronchitis and eventually to a chronic condition called "obstructive pulmonary disease". Carbon black usage can be reduced by reducing the masterbatch in PVC plant. The new innovative building wire is a wire which will be more health and environment friendly.

## FAQ

### **Is reducing the masterbatch has a negative effect on the cable?**

No, it has no negative effect at all, on the contrary it will improve the cable mechanical properties.

### **Does reducing the master batch increases the cost of PVC processing and hence increases the overall cost of Building Wires?**

Changing the recipe will require to modify the process and it will have an impact on the actual cost but for better cables and better environment, OCI is doing the change without increasing the building wires price.

### **Is it possible to strip the color master batch layer from the insulation?**

No, we cannot strip the color master batch layer from the insulation layer as it is part of it not a different layer added to the same.

## Technical Support

For more information on building wires, please visit Oman Cables Industry SAOG website:

Website: [www.omancables.com](http://www.omancables.com)

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