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### **Electrical Conductivity of Metals**

There are several definitions to the term of conductivity. Conductivity is the ability of a body or environment to conduct electrical current. It is also defined of a property of the body or environment that determines the appearance of electric current under the influence of an electric field. It also means the measure unit of this ability and opposite to the electrical resistance.

The classical theory of metal conductivity originated in the early twentieth century. It was developed by the German physicist Carl Rikke. He stated in the experiment that the passage of the charge through the metal is not associated with the transfer of the conductor atoms of the conductor, in contrast to liquid electrolytes. However, this discovery did not explain what carries electrical impulses in the metal structure.

The nature of the electrical conductivity of metals can be explained by the fact that the electric current is caused by external influences on the metal when the electrons start moving in a particular order. Without any external influence, the metal is unable to produce electric charges. But as soon as an external source of influence is connected, electrons arrange in a structured sequence and possess the electric current. With the temperature increasing, the conductivity of metals decreases.

Electron theory of metal conductivity was developed in the works by Paul Drude. He was able to open such a property as resistance that occurs when electric current passes through a conductor. This fact allowed to classify different substances according to the level of conductivity. The results showed which metal would be suitable for the manufacture of different kinds of cables. This is very important as an improper material may cause fire due to overheating from excessive current flow voltage.

Silver has the highest conductivity. But silver wirings are very expensive to manufacture; that is why it is rarely used for this purpose. The metal with the highest electrical conductivity among all the elements of base group is copper. It is one of the most common conductors used for domestic and industrial purposes. It withstands constant electrical loads and is characterized by durability and reliability. Its high melting point allows the wire to operate for a long time in a heated state.

One more metal with high electrical conductivity is aluminum. It is used in low-voltage systems as it has almost twice lower melting temperature than copper and is unable to withstand increased loads.