

Copper, just as gold and silver, has extremely high thermal and electric conductivity and antibacterial properties.

**Resistex® Copper** is an excellent yarn, obtained by combining and twisting natural or artificial fibres with a thin pure copper filament.

## FEATURES

### The Human Body

Copper is necessary for growth and development in human metabolism, and is essential for good health. An adult requires a daily intake of 0.9 mg of copper (according to the National Academy of Science, USA). The required amount of copper per kg of body weight is even higher in the early years of life and in specific physiological conditions, such as those during pregnancy and while breast-feeding.

RECOMMENDED DAILY AMOUNT OF COPPER	
Adults	<b>0.9 mg</b>
Pregnant woman	<b>1.0 mg</b>
Breast-feeding women	<b>1.3 mg</b>

Source: International Copper Association

Scientific research has shown that at least twenty enzymes contain copper, and around ten of these depend on it to function correctly. Copper is necessary for embryo development, infant growth, strong bones, red and white blood cell maturation, iron transport, cholesterol and glucose metabolism, cardiac muscle contraction and brain development. Lack of copper can cause some health problems, including: anaemia, cardiac and circulatory problems, bone abnormalities, complications in nervous and immune system function, in lung and kidney function and in thyroid and pancreas function. It is highly unlikely that copper ingested normally through food or drinking water could cause health problems. However, in the unlikely case of ingestion being sufficiently high to cause toxicity, the body protects itself, by expelling the excess before it is absorbed through vomiting. Copper is present in many organs of the human body, even in noteworthy concentrations, with a general average of 1.0 mg/kg.

CONCENTRATION MG Cu/Kg (persone adulte)	
Liver	<b>6.7</b>
Heart	<b>3.3</b>
Brain	<b>5.8</b>
Skeleton	<b>0.72</b>
Hair	<b>16</b>

Source: Landner & Linderstrom, Copper in society and environment

There are no occupational diseases linked to copper. The medical literature reports two rare diseases related to copper: Wilson's disease, which causes an accumulation of metal, and Menkes' disease, which instead causes a high copper deficiency. In both cases, these dysfunctions of the human metabolism are of genetic origin.



## Copper and Health

Copper is present in nature and is available in various forms and concentrations in the earth's crust, as well as in oceans, lakes and rivers. Just as animal and plant life, human life has developed together with this metal present in nature and therefore most organisms have internal mechanisms adapted for its use. Human beings and animals absorb copper from various sources. As copper is a natural element, it is contained in most of the foods we eat and in the water we drink. The body's digestive tract absorbs the correct amount of copper required for good health through an efficient absorption system, homeostasis. Any excess copper absorbed is expelled. Copper is essential for good health: it is extremely useful for infant development, strong bones, the formation of red and white blood cells, iron transport, cholesterol and glucose metabolism, cardiac muscle contraction and brain development. Lack of copper can cause health problems such as anaemia, cardiac and circulatory problems, abnormal bone development, as well as complications in nervous and immune system function, lung and kidney function and thyroid and pancreas function. Besides all this, copper plays a very important role in public health; it has natural antibacterial properties and is therefore able to prevent pathogens from spreading in drinking water and on domestic surfaces. Copper piping in the plumbing system can help to protect against some viruses and bacteria, such as those that cause Legionellosis.

## An ally for our health

Perhaps not even those who take great care of their looks, those who know all about free radicals, are aware that copper can effectively help to prevent aging. Copper is in fact present in the superoxide dismutase enzyme, which has a valid "scavenging" action on free radicals, the cause of aging. However, besides aesthetics, copper also has a beneficial action on our organism: as an element essential for plant and animal metabolism, copper is present in the adult human organism in an amount of 1.4 to 2.1 mg per kilogram of body weight, with amounts three times as high in the first years of life. A daily intake of copper (2-3 mg in normal conditions, 3-4 in specific physiological conditions, such as pregnancy) is therefore necessary to maintain correct balance, as in normal conditions the human organism only retains 1% of the copper ingested. Practically all foods contain copper; therefore, it is not difficult to include foods containing a consistent amount of this precious element in our diet.

## Copper Therapy

The term "copper therapy" refers to treatment through copper. In actual fact, this term indicates the use of copper bracelets, which was already popular 6000 years BC. Among those who recommended them to improve health, we can name Aristotle, Galen, Hippocrates and Avicenna.

Copper acts on three levels:

- 1 - biochemical level, through absorption of copper by the skin via osmosis
- 2 - electromagnetic level, as a resonance circuit
- 3 - bioelectric level, regulating the body's microcurrents

Recently, there were reports on a trial conducted on 300 arthritis sufferers, who had worn copper: a "significant number" of them declared that they had benefited from wearing the bracelet. Moreover, these bracelets were weighed before and after the experiment and proved to have lost 50 mg in a period of 50 days.

**In conclusion, not only can copper be absorbed through food and drinking water, but also through the skin.**



## USES

### Excellent electrical conductor

After silver, copper is the best conductor of electricity, but is obviously the best compromise between technological features and costs to sustain. Besides considerations on cost and electrical conductivity, copper is appreciated for its ductility, robustness, creep and corrosion resistance. This makes it possible to obtain very thin wires, compatible with all modern insulating materials. Moreover, it is sufficiently strong and flexible to be wound tightly without breaking.

### Excellent thermal conductor

After silver, copper is the best conductor of heat; therefore, it offers the best compromise between technological features and economy. For this reason, copper is also the material most preferred for systems that convey hot fluids. It is used in heat exchangers, solar panels, domestic heating systems (such as radiant panels); copper is not affected by sudden increases in temperature, as it has a melting point of 1083°C: so boiling water does not soften it! Moreover, due to its low coefficient of thermal expansion, it causes fewer problems to masonry structures, making it advantageous compared to other alternative materials.

### Bacteriostatic properties of Copper

A less well-known aspect of copper is its role in combating the development of germs and bacteria potentially harmful to human health: it is a bacteriostatic material, in other words, it is capable of inhibiting the spread of bacteria on its surface. However, uses of this property are more widespread than we imagine: Euro coins are made of copper alloy also for reasons of public hygiene. Due to its bactericidal qualities, copper is used in a variety of environments:

- drinking water systems (it actively combats bacteria that cause legionellosis)
- surfaces with which patients and medical personnel come into contact
- air conditioning and ventilation systems

Metals such as Copper and Silver are known as bactericidal agents and this effect is due to their action on the cell wall of the micro-organism.

The **Resistex® Copper** yarn range is well-known for its antistatic features, its excellent thermoconductivity and antibacterial properties and its vivid colour.

Thanks to its extraordinary features, Resistex® Copper is currently used in the production of:

- Fabrics for fashion clothing
- Sportswear fabrics
- Industrial (antistatic) fabrics
- Furnishing materials
- Fabrics for curtains and drapes
- Warming fabrics
- Fabrics for shoes