

Table 17-1: example using “copper”

Copper prices

Cables, wires and piece goods are sold at daily copper prices (DEL). DEL is the stock exchange listing for German electrolytic copper for conducting purposes, i. e. 99.9% pure copper. The DEL is expressed in euros per 100 kg and can usually be found in the business section of daily newspapers under “Commodity markets”.

FOR EXAMPLE: DEL 576.93 means: 100 kg copper (Cu) costs EUR 576.93. Currently a 1% procurement surcharge is added to the daily quotation for cables, wires and piece goods. Further information, particularly concerning the DEL quote, can be obtained from the ZVEI professional association for cables and insulated wires: www.zvei.org

Copper price basis

A proportion of the copper price is already included in the list price for many cables and almost all wires and piece goods. This is also expressed in euros per 100 kg.

- EUR 150.00 / 100 kg for most flexible cables (e. g. ÖLFLEX® CLASSIC 110) and piece goods (e. g. ÖLFLEX® SPIRAL 540 P)
- EUR 100.00 / 100 kg for telephone cables (e. g. J -Y(St)Y)
- EUR 0.00 / 100 kg for underground cables (e. g. power cable NYY), i. e. hollow price.

Exact details can be found on each page of the catalogue beneath the article table.

Copper index

The copper index is the calculated copper weight of a cable, wire (kg/km) or piece good (kg/ 1000 pc) and is specified for each catalogue item.

Other metals

This same method is also used for other metals, e. g. “aluminium”. In this case, replace “copper” with “aluminium”. General term: “metal”.

Example I: Calculating the copper surcharge for goods sold by the meter:

Cable ÖLFLEX® CLASSIC 110, 3G1.5 mm²

Copper index as per catalogue 43 kg/km

The calculated copper weight of the cable is 43 kg per 1 km.

$$\text{Copper index (kg/km)} \times \frac{(\text{DEL} + 1\% \text{ procurement costs}) - \text{copper price basis}}{1000} = \text{Copper surcharge in Euro/100 m}$$

ÖLFLEX® CLASSIC 110, 3G1.5 mm².

DEL: EUR 576.93/100 kg. Cu basis EUR 150.00/100 kg.

Cu index: 43 kg/km

$$43 \text{ kg/km} \times \frac{(576.93 + 5.77) - 150.00}{1000} = \text{Euro } 18.61 / 100 \text{ m}$$

Assuming a DEL quotation of EUR 576.93/100 kg, this figure represents the copper surcharge for 100 m ÖLFLEX® CLASSIC 110 3G1.5 mm².

Example II: Calculating the copper surcharge for piece goods:

ÖLFLEX® SPIRAL 540P 3G1.5 mm² (item no.: 73220150).

Copper index as per catalogue: 516 kg/ 1000 pc.

Copper price basis as per catalogue: EUR 150.00/100 kg

The calculated copper weight (copper index) of the piece good spiral cable is 516 kg/1000 pc.

Formula for calculating the copper surcharge for piece goods:

$$\text{Copper index (kg/ 1000 pc)} \times \frac{(\text{DEL} + 1\% \text{ procurement costs}) - \text{copper price basis}}{1000} = \text{Copper surcharge in Euro/100 pc}$$

$$516 \text{ kg / 1000 pc} \times \frac{(576.93 + 5.77) - 150.00}{1000} = \text{Euro } 223.27 / 100 \text{ pc}$$

Price including copper:

The net price is calculated as follows:

Gross price - % discount + copper surcharge = net price including copper.

The copper surcharge is shown separately on the invoice.

Table 17-2: background information on cables

For the majority of our product range, the construction of conductors for cables and insulated wires is governed by the international standard DIN EN 60228 (VDE 0295)/IEC 60228. Normative threshold values are defined for the nominal cross sections and the conductor materials copper/aluminium/aluminium alloy listed in the standard. The application of these threshold values varies for the different conductor classes, however, they all exhibit a maximum conductor resistance at 20 °C.

Conductor resistance at 20 °C is an important normative compliance value. Other geometric requirements in DIN EN 60228 et seqq. and in product standards that reference DIN EN 60228 et seqq., serve to ensure the compatibility of conductors and connectors and do not contain any requirements concerning the weight of the conductor materials used in the wire or cable.

For example, the density of copper used in the manufacture of cables and wires is specified as 8.89 g/cm³ in accordance with DIN EN 13602. Therefore, a single-core cable with a nominal cross section of 1 mm² has a copper content of 8.89 kg/km. This simple formula for calculating the copper content provides an indication. However, the actual value may be lower than this, as it is the maximum conductor resistance at 20 °C that is important. The extent of the (+/-) deviation from this calculation value depends on the production process employed by individual manufacturers and the semfinished conductors they use.

When it comes to invoicing, e.g. for copper surcharges, the copper index is used. You may also see the term “calculated copper weight” being used instead of “copper index”. This typical industry value* is 9.6 kg/km** – based on the nominal cross section of 1 mm² – and factors in the necessary increased use of material/copper.

This increase generalises individual (manufacturer-dependent) additional expenditure during the manufacturing process. In particular, this includes irreversible losses resulting from lead-in lengths and abrasion on the drawing dies as well as from the widening (wearing) of the dies during wire production. It also includes additional expenditure due to twisting of the conductors and the resulting enlargement of the stretched length. There are also surcharges to ensure the conductor resistance at unavoidable manufacturing tolerances – e.g. cross section reduction due to the tensile load during extrusion and twisting. It should also be mentioned that the copper index calculated in this manner is the only way to enable standardisation across manufacturers – particularly in the case of unshielded cables – and therefore serves as the basis for price comparisons, particularly when calculating copper surcharges.

The aim of this customer information is to explain the technical and commercial background for determining and using the copper index and to demonstrate the benefits and efficiency of its use for manufacturers, traders and customers alike.

*U.I. Lapp GmbH is a member of the professional association for cables and insulated wires of ZVEI

**The corresponding figure to be used for aluminium is 2.9 kg/km