

**Table 17-1: Example ‘Copper’**

**The copper price**

In Germany and some other countries, copper cables, -leads and piece-goods containing copper may sold at daily copper prices (DEL). The DEL is the Stock Exchange Quotation for German electrolytic copper conducting purpose, i.e. 99.5% pure copper. The DEL is expressed in Euro per 100 kg. It appears in the commercial section of the daily papers under the heading “Commodity Markets”. Example: DEL 247.75 means: 100 kg copper (Cu) cost 247.75 Euro. Currently a 1 % procurement surcharge is added to the daily quotation for cables, leads and piece-goods.

**The copper price basis**

In the list price of many cables, almost all leads and piece-goods, a proportion of the copper price is already included. It is also expressed in Euro per kg.

- Euro 150.-/ 100 kg for almost every flexible cable and leads (e.g. ÖLFLEX® CLASSIC 100) and piece-goods (e.g. ÖLFLEX® SPIRAL 540 P)
- Euro 100.-/ 100 kg for telephone cables and -cords (e.g. J -Y(St)Y)
- Euro 0.-/ 100 kg for cables (e.g. NYY, NYCY, NYCWY), an exclusive copper cost pricing.

Copper basis is indicated at each relevant page of this catalogue, below the article table.

**The copper index**

The copper index (copper number) is the calculated copper weight (kg) of a cable per lengths (km) of a cable or lead, for piece-goods per (1000) piece(s) and is indicated for each catalogue article.

**Other Metals**

This proceeding is applied for other metals sameway, e.g. “Aluminium”. The term “Copper” is then to be replaced by “Aluminium”. General: “Metal”.

**Example I. How to calculate the copper price supplement for cables:**

Flexible cable ÖLFLEX® CLASSIC 100, 3G1.5mm². U. I. Lapp P.N. 0010 064  
Copper index per catalogue: 43 kg/km, Copper base per catalogue: 150.- Euro/100 kg  
Therefore the calucated copper weight is 43 kg per 1 km.

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

ÖLFLEX® CLASSIC 110, 3G1.5mm².  
DEL: 247.75 Euro/ 100 kg. Cu base 150.- Euro/ 100 kg.  
Cu index: 43 kg/km

$$43 \text{ kg/km} \times \frac{(247.75 + 2,48) - 150.00}{1000} = 4,31 \text{ Euro/100 m}$$

In the case of a DEL-quotation of 247.75 Euro/ 100 kg. the additional copper price supplement is 19.56 Euro/100 m for ÖLFLEX® CLASSIC 110 3G1.5 mm².

**Example II. How to calculate the copper price supplement for piece-goods:**

ÖLFLEX® SPIRAL cables 540P 3G1.5 mm² (Part number: 73220150).  
U. I. Lapp P.N. 7322 0150  
Copper index per catalogue: 605.5 kg/1000 pcs.  
Copper price base per catalogue: 150.- Euro/100 kg  
Therefore the calucated copper weight is 605.5 kg/1000 pcs. = 0.605 kg/piece.

$$\text{Copper index (kg/1000 pcs.)} \times \frac{(\text{DEL} + 1\% \text{ procurem. surcharge}) - \text{copper price basis}}{1000} = \text{copper supplement in Euro/100 pcs.}$$

$$605.5 \text{ kg/1000 pcs.} \times \frac{(247.75 + 2,48) - 150.00}{1000} = 60,69 \text{ Euro/100 pcs.}$$

**Price including copper:**

Copper price supplement is accounted separately at the invoice.  
Your net price (without tax) is calculated as follows:  
Catalogue/(gross-) price minus your discount (%) + copper supplement.

ÖLFLEX®  
UNITRONIC®  
ETHERLINE®  
HITRONIC®  
EPIC®  
SKINTOP®  
SILVYN®  
FLEXIMARK®  
ACCESSORIES  
APPENDIX

## T17 Selection Table

T17: Calculation of metal surcharges

### Table 17-2: Background-Information 'Cables'

For the vast majority of our product-range the make of conductors for cables is in line with the international standard DIN EN 60228 (VDE 0295)/IEC 60228.

Standardized limit values are obligatory for the nominal cross-sections, listed there and the conductor materials Copper/Aluminium/Aluminium-Alloy. The relevance of these limit values varies with the individual conductor classes – but a maximum conductor-resistance at 20 °C they all have in common. The conductor-resistance at 20 °C is a crucial value to proof. Further dimensional requirements of DIN EN 60228ff or of product-standards with reference to DIN EN 60228ff serve as safeguard for the compatibility of conductors and connectors but do not state requirements regarding the weight of the conductor materials.

For example the density of copper acc. to DIN EN 13602 as used for cable manufacturing is 8.89 g/cm<sup>3</sup>. Hence a single-conductor cable with a nominal cross-section of 1 mm<sup>2</sup> has a copper-weight of 8.89 kg/km. This mathematical approach to determine the copper-weight delivers a first clue. The actual weight may fall below that,

as it is the maximum conductor resistance at 20 °C that counts. The degree of (+/-) deviation reg. that mathematical value depends on the manufacturing process of the individual producers and on the conductors semi-finished products used in that course.

For invoicing, e.g. when it comes to copper surcharges the – so called – copperindex is applied. 'Calculative copperweight' is also common – meaning the same. The branchtypical\* value is – as per a nominal cross-section of 1 mm<sup>2</sup> – 9.6 kg/km\*\* and includes the necessarily enlarged amount of copper as needed for the cable production.

This enlargement compensates as a general figure additional expenditures – which may vary dependant on the individual cable producers- and which occur in the course of the manufacturing process. These are especially nonreversible losses as caused by starting-up cable lengths, copper abrasion at the drawing dies and an increasing copper consumption through the widening/ wear of the drawing dies. Further additional expenditures come from the twisting of conductors as a very part of

the cable design. This leads to an enlargement of the total (stretched-out) conductor length. Beside that unavoidable manufacturing tolerances may (e.g.) lead to a reduction of the conductor cross-section by tensile forces during extrusion and twisting. To compensation that and to be in line with the requirements of the max. conductor-resistance a safety margin of copper may be included.

It is worth to mention, that this general figure (1 mm<sup>2</sup> – 9.6 kg/km) and it's uniform employment by various cable-producers enables an effective comparison of prices, especially in case of non-screened cables and if it comes to the invoicing of copper surcharges.

This customer-information shall give a view of the technical and commercial background reg. the determination and the employment of the – so called – copper-index. It shall highlight the benefits and the efficiency for customers, producers and trade.

\* U.I. Lapp GmbH is Member of 'Fachverband Kabel und isolierte Drähte' as the cable-expert group of ZVEI

\*\* In analogy – the applicable aluminiumindex is 2.9 kg/km

LAPP GROUP