Cu-OFE is the premium pure copper grade. It is oxygen-free, has a very high purity and thus provides the highest possible electrical conductivity of 101 % IACS. It is suitable for thermal processing like welding and brazing without Precautions because there is no risk of hydrogen embrittlement. It is used in electrical and electronic components, vacuum technology, submarine cables and coaxial cables, semiconductor carriers, heat conducting plates, vacuum gaskets and anodes for vacuum tubes.

### Chemical composition (Reference)

<table>
<thead>
<tr>
<th>Element</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu</td>
<td>≥ 99.99</td>
</tr>
</tbody>
</table>

### Physical properties (Reference values at room temperature)

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical conductivity</td>
<td>58 MS/m</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>391 W/(m-K)</td>
</tr>
<tr>
<td>Coefficient of electrical resistance</td>
<td>3.9 $10^{-3}$/K</td>
</tr>
<tr>
<td>Coefficient of thermal expansion</td>
<td>17.7 $10^{-6}$/K</td>
</tr>
<tr>
<td>Density</td>
<td>8.94 g/cm³</td>
</tr>
<tr>
<td>Modulus of elasticity</td>
<td>115 GPa</td>
</tr>
<tr>
<td>Specific heat</td>
<td>0.385 J/(g·K)</td>
</tr>
<tr>
<td>Poisson’s ratio</td>
<td>0.34</td>
</tr>
</tbody>
</table>

* Between 0 and 300 °C

### Mechanical properties (values in brackets are for information only)

<table>
<thead>
<tr>
<th>Temper</th>
<th>Tensile strength $R_m$ (MPa)</th>
<th>Yield strength $R_{p0.2}$ (MPa)</th>
<th>Elongation $A_{p0}$ (%)</th>
<th>Hardness HV</th>
</tr>
</thead>
<tbody>
<tr>
<td>R220</td>
<td>220-260</td>
<td>≤ 140</td>
<td>≥ 33</td>
<td>(40-70)</td>
</tr>
<tr>
<td>R240</td>
<td>240-300</td>
<td>≥ 180</td>
<td>≥ 8</td>
<td>(65-95)</td>
</tr>
<tr>
<td>R290</td>
<td>290-360</td>
<td>≥ 250</td>
<td>≥ 4</td>
<td>(90-110)</td>
</tr>
<tr>
<td>R360</td>
<td>≥ 360</td>
<td>≥ 320</td>
<td>≥ 2</td>
<td>(110)</td>
</tr>
<tr>
<td>Annealed</td>
<td>180-260</td>
<td>26-38</td>
<td>(70)</td>
<td>(35)</td>
</tr>
<tr>
<td>H01*</td>
<td>235-290</td>
<td>(220)</td>
<td>(23)</td>
<td></td>
</tr>
<tr>
<td>H02*</td>
<td>255-315</td>
<td>(255)</td>
<td>(20)</td>
<td></td>
</tr>
<tr>
<td>H03*</td>
<td>285-345</td>
<td>(295)</td>
<td>(14)</td>
<td></td>
</tr>
<tr>
<td>H04*</td>
<td>295-360</td>
<td>(310)</td>
<td>(9)</td>
<td></td>
</tr>
<tr>
<td>H06*</td>
<td>325-385</td>
<td>(345)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>H08*</td>
<td>345-400</td>
<td>(360)</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>H10*</td>
<td>≥ 360</td>
<td>(≥ 350)</td>
<td>(≥ 51)</td>
<td>(≤ 3)</td>
</tr>
</tbody>
</table>

* According to ASTM B152

### Electrical conductivity

- Good way: rolling direction
- Bad way: II rolling direction

### Bendability (Strip thickness t ≤ 0.5 mm)
The fatigue strength is defined as the maximum bending stress amplitude which a material withstands for $10^7$ load cycles under symmetrical alternate load without breaking. It is dependent on the temper tested and is about 1/3 of the tensile strength $R_m$.

Fatigue strength

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Softening resistance

Stress remaining after thermal relaxation as a function of Larson-Miller parameter $P$

(F. R. Larson, J. Miller, Trans ASME74 (1952) 765–775) given by:

$$P = (20 + \log(t))(T + 273)*0.001.$$  
Time $t$ in hours, temperature $T$ in °C.

Example: $P = 9$ is equivalent to 1,000 h/118 °C.

Measured on rolled to temper specimens parallel to rolling direction.

Total stress relaxation depends on the applied stress level. Furthermore, it is increased to some extent by cold deformation.

Types and formats available

- Standard coils with outside diameters up to 1,400 mm
- Traverse-wound coils with drum weights up to 1.5 t
- Multicoil up to 5 t
- Hot-dip tinned strip
- Contour-milled strip
- Strip thickness from 0.10 mm, thinner gauges on request
- Strip width from 3 mm, however min. 10 x strip thickness

Dimensions available

- Strip thickness from 0.10 mm, thinner gauges on request
- Strip width from 3 mm, however min. 10 x strip thickness

Vickers hardness after heat treatment (typical values)