

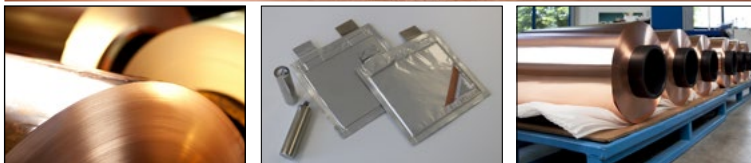
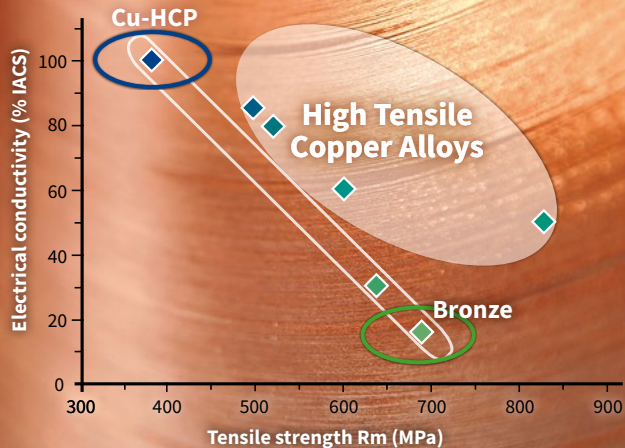
# High Tensile Copper Foils

for ultimate strength & durability




SCHLENK 



- Maximum tensile strength
- High electrical conductivity
- Suitable for Si-based technologies



## Competencies

-  Rolling:  
Wide, ultra-thin, different materials
-  Slitting:  
Narrow, thin, precise
-  Surface upgradings:  
Degreasing, roll cladding  
single or double-sided

## Materials

Rolled (RA) foil based on the following copper alloys:

- C14415 (CuSn0.15)
- C15500 (CuMgAgP)
- C19400 (CuFe2P)
- C26000 (CuZn30)
- C51900 (CuSn6)
- C70250 (CuNi3Si)

... and more on request

Thickness: 0.010 mm - 0.100 mm (0.0004" - 0.004")  
Width: 0.6 mm - 650 mm (.024" - 25.6")

## Properties

- Ultimate Tensile Strength of 600 MPa (87 ksi) and more
- Electrical Conductivity of up to 86% IACS possible

=> Standard copper foil shows ~ 400 MPa at 100% IACS

## Advantages of High Tensile Copper Foils

Battery-grade copper foil with excellent mechanical strength and electrical conductivity for advanced battery coatings.

- 50% higher tensile strength compared to pure copper
- different alloys available with distinct features
- available as thin as 0.010 mm (0.0004") - thinner on request
- different surface qualities (standard and enhanced degreasing)
- available for testing with SCHLENK Battery Sample Kit

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For around 90 years SCHLENK has specialized in the manufacturing of the thinnest rolled (RA) metal foils with a wide variety of possible surface treatments and supply formats. SCHLENK has supplied copper and nickel foils to battery manufacturers for over 2 decades.

Under the brand new High Tensile Alloy program, SCHLENK has tested different materials based on copper alloys rolled to thin gauges for advanced battery coatings.

## Battery Sample Kit

For the increasing market of energy storage systems, SCHLENK launched a brand new Battery Sample Kit. SCHLENK supports R&D work with the new Battery Sample Kit.

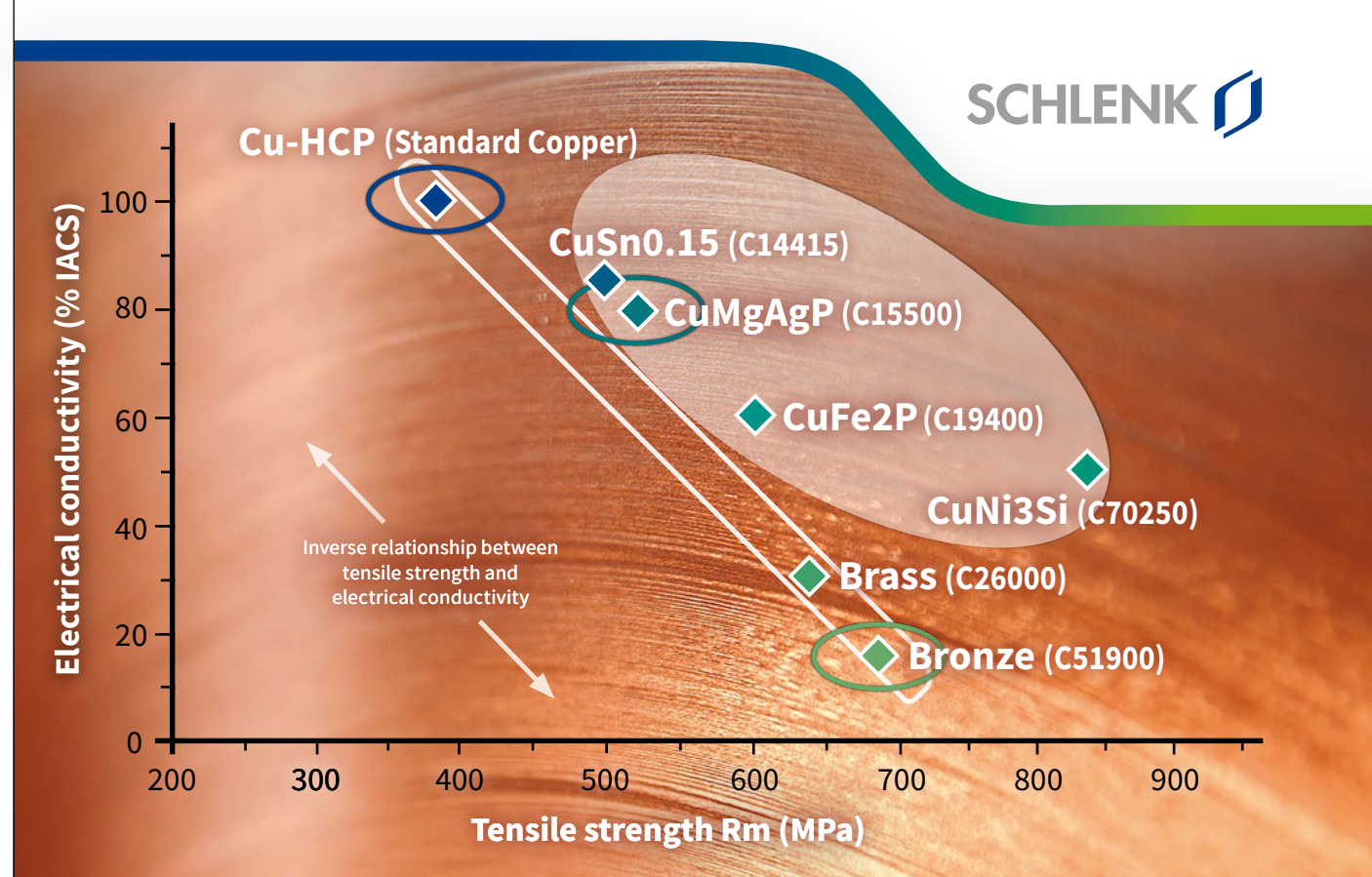
The Battery Sample Kit includes a package of 3 rolls in 250 mm width and 100 m length for material testing. The following material specifications are available:

### Materials

- RA Copper Foil, 10  $\mu\text{m}$  (.0004") and 18  $\mu\text{m}$  (.0007")
- RA Nickel Foil, 11  $\mu\text{m}$  (.0004")
- SCHLENK High Tensile Copper Foil, 10  $\mu\text{m}$  (.0004")

### Surface qualities

- Lamination quality (standard degreasing)
- Specially degreasing quality (enhanced degreasing)



## Application

A lot of R&D has been invested to increase the capacity and cycle endurance of batteries with high-power electrodes coating based on silicon or other additives. This leads to new challenges for the anode and cathode foil that need to be solved. SCHLENK has developed thin rolled (RA) metal foils based on High Tensile Alloys. Used as a current collector foil in batteries, these foils help to improve stability of advanced battery coatings.

**SCHLENK High Tensile Anode Foils offer elevated tensile strength (Rm) and improved conductivity (% IACS).**

Technical Differences	High Tensile Foils	Standard RA foil	
<b>Manufacturing process</b>	Rolling process (RA)	Rolling process (RA)	Rolling process (RA)
<b>Material</b>	Copper alloys	Pure copper	Pure nickel
<b>Ultimate tensile strength</b>	> 600 MPa (87 ksi)	400-420 MPa (58-61 ksi)	> 600 MPa (87 ksi)
<b>Electrical conductivity</b>	~ 86 % IACS at 600 MPa ~ 40 % IACS at 750 MPa (other combinations possible, depending on specific alloy)	~100 % IACS	~ 20 % IACS
<b>Available thickness</b>	currently 10 $\mu\text{m}$ minimum (at 640 mm width)	6 $\mu\text{m}$ minimum (at 300 mm width)	8 $\mu\text{m}$ minimum (at 300 mm width)
<b>Available surface</b>	Plain and treated	Plain and treated	Plain only