

## Competencies



**Rolling:**  
Wide, ultra-thin, different materials



**Slitting:**  
Narrow, thin, precise



**Surface upgradings:**  
Degreasing, roll cladding (single or double sided), ultra-smooth surface

## Materials

### SCHLENK Battery Foil based on the following copper alloys:

- HTA-520
- HTA-600
- HTA-750

**Thickness:** 0.008 mm - 0.100 mm

**Width:** 0.6 mm - 650 mm

**Additional: copper, nickel, aluminum clad foils, tin clad foils**

## Properties

- Ultimate Tensile Strength of 500 to 750 MPa
- High Thermal-Stability of up to 500°C
- Electrical conductivity between 40% and 86% IACS possible

-> Standard copper foil shows 300 to 400 MPa at 100% IACS and softens at 200°C

## Advantages of High Tensile Copper Foils

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

- 50-100% higher tensile strength compared to pure copper
- Mechanical strength maintained even under high temperatures
- Different alloys available with distinct features
- Available as thin as 0.008 - 0.020 mm
- Different surface qualities: solvent or electrolytically degreased
- Available for testing in SCHLENK Battery Sample Kit



SCHLENK Rolling mill Roth-Bernlohe



SCHLENK Georgensgmünd

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SCHLENK Flyer Rolled Foils in Batteries

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SCHLENK Flyer High Tensile Alloy Foils

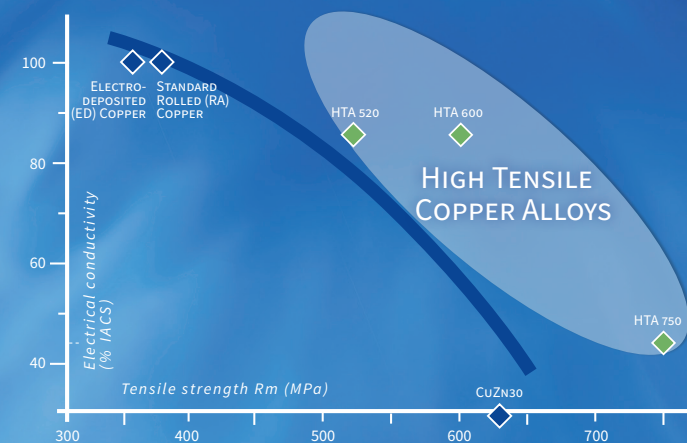
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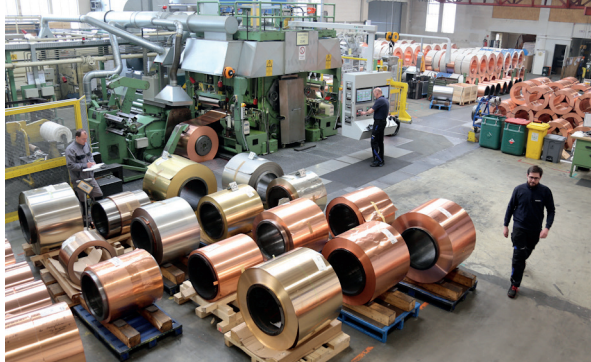
# HIGH TENSILE ALLOY FOILS

Made by SCHLENK



- Maximum tensile strength
- Excellent temperature stability
- Suitable for silicon-dominant anodes





For nearly 100 years SCHLENK has specialized in the manufacturing of the thinnest rolled (RA) metal foils with a wide variety of possible surface finishes and supply formats. SCHLENK has supplied copper and nickel foils to the battery industry for over three decades.

Under the High Tensile Alloy program, SCHLENK offers thin anode foils based on high-strength copper alloys for advanced silicon-based coatings.

## Battery Sample Kit

SCHLENK introduces the Battery Sample Kit to support R&D work.

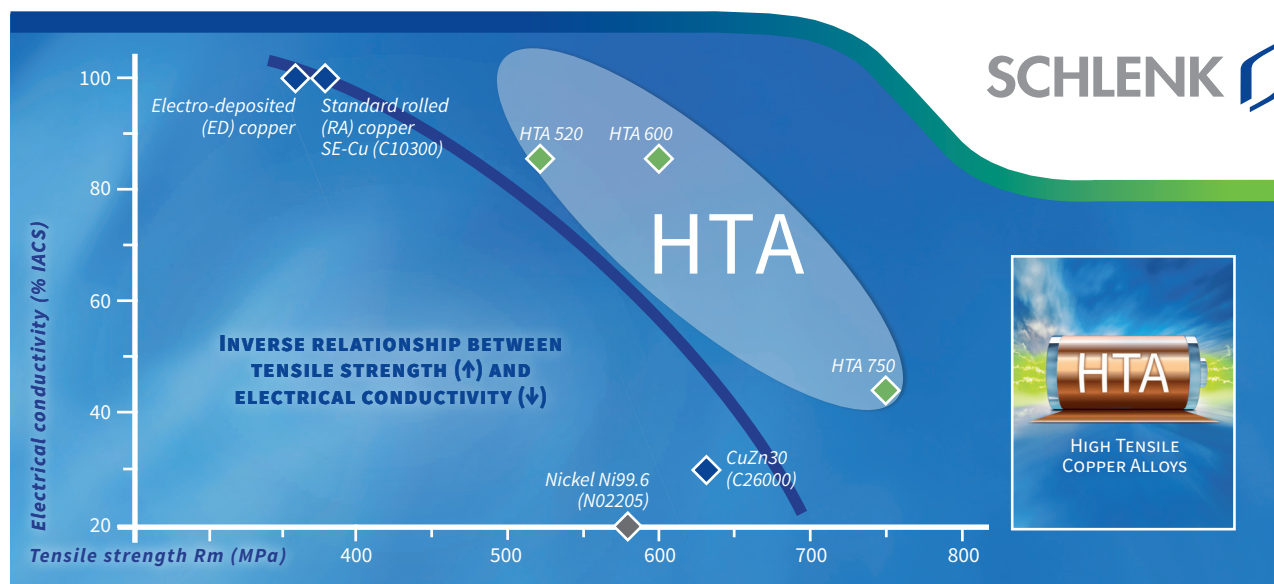
The Battery Sample Kit includes a package of 3 rolls in 250 mm width and 100 m length for material testing. The following materials are available\*:

### Materials\*\*

- RA Copper, 10µm
- RA Nickel, 10µm
- High Tensile Alloys – HTA 10µm
- Roll clad Copper, 10µm

### Surface qualities\*\*

- Standard degreased (LQ) with organic passivation
- Special degreased (SQ) with chromate passivation



## Application - current collector foil in silicon-based anodes

**SCHLENK High Tensile Anode Foils offer elevated tensile strength and excellent temperature stability. SCHLENK also offers foils for Future Battery Generations like solid-state batteries (SSB), Lithium-metal anodes and others\*\*.**

A lot of R&D has been invested into novel battery technologies based on **high concentrations of silicon (Si)**. The additional Si leads to an expansion of the anode when the cell is charged. If the anode cannot withstand the increased stress created by the addition of Si the battery fails.

SCHLENK has developed thin rolled (RA) copper foils based on High Tensile Alloys. Used as a current collector foil in **silicon-based anodes**, the mechanical strength of these foils helps to improve the stability of advanced battery coatings. The High Tensile Alloys also provide excellent thermal stability when exposed to temperatures of up to 500°C in special coating processes. The increase in mechanical strength and temperature stability comes at the expense of a reduced electrical conductivity.

## Technical Differences

	Standard ED Foil	Standard RA Foil	High Tensile Foil - HTA
<b>Manufacturing process</b>	Electrodeposition process (ED)	Rolling process (RA)	Rolling process (RA)
<b>Material</b>	Only pure copper possible	Pure copper	Copper alloys
<b>Ultimate tensile strength</b>	max. 400 MPa	>360 MPa	500 - 750 MPa
<b>Electrical conductivity</b>	~ 100 % IACS	~100 % IACS	From 40 - 86 % IACS, from 520 - 750 MPa
<b>Available thickness</b>	typically 4.5 - 10 µm	typically 6 - 20 µm	typically 8 - 20 µm
<b>Available surface</b>	Matte and shiny side	Equally smooth sides	Equally smooth sides

\* For detailed specifications see separate stock list.

\*\* Please visit our battery website or download our flyers.