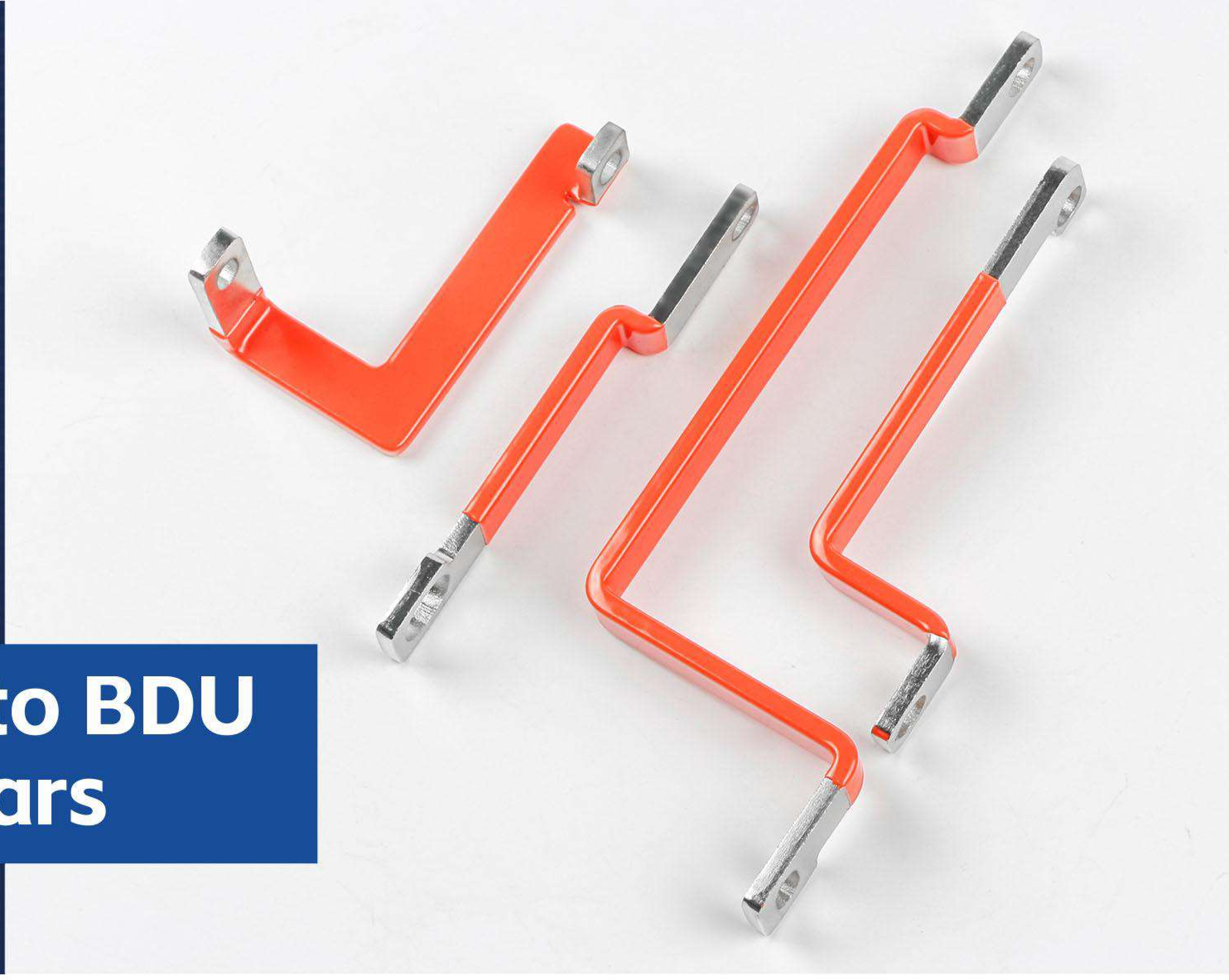
RHI®

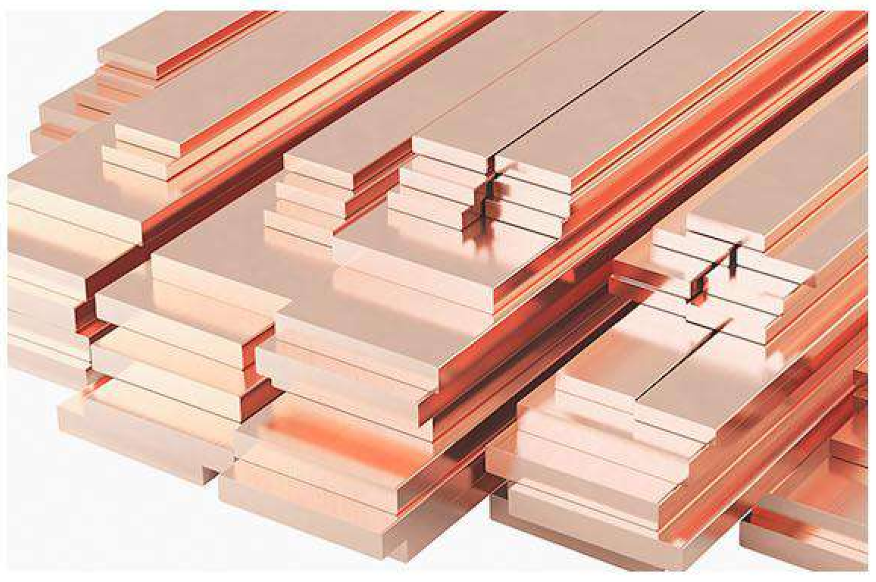


Introduction to BDU Copper Busbars

BDU (Battery Disconnect Unit) Function: The Battery Disconnect Unit (BDU) is essential in electric vehicles (EVs) and energy storage systems, providing high-voltage battery isolation and power cutoff protection, which enhance safety and reliability. As battery capacities and voltages rise, the BDU's rapid response and isolation capabilities are increasingly crucial to ensure stable and safe operation across varying conditions.

Advantages and Applications of BDU Busbars: Rigid copper busbars in BDUs deliver high conductivity and low resistance, minimizing energy loss, while their mechanical strength and corrosion resistance ensure durability. With excellent thermal stability, these busbars help manage heat and reduce overheating risks, making them ideal for high-voltage battery and energy storage applications.

Materials and Standards for BDU Copper Busbars

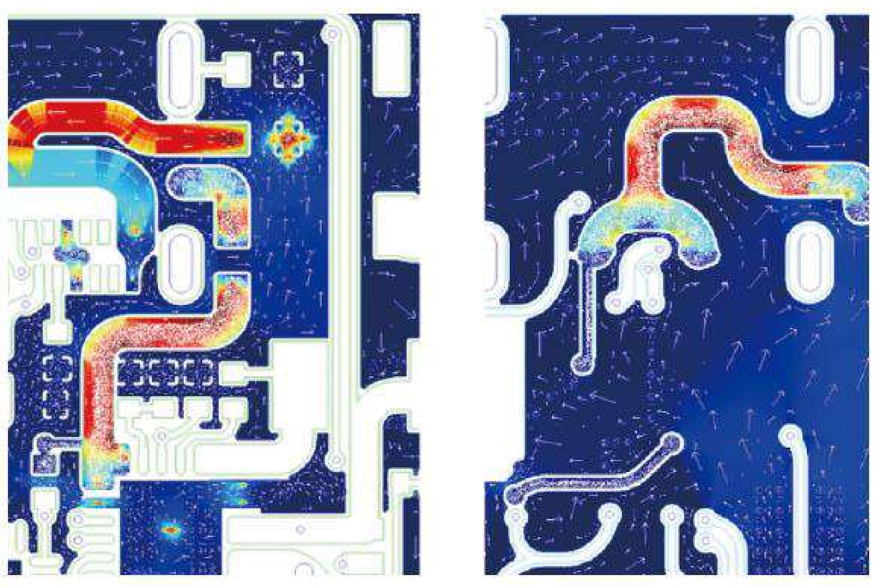


Common Materials:

BDU copper busbars are typically made from T2Y2 hard copper, offering excellent conductivity and corrosion resistance to meet the high conductivity and durability requirements of the new energy industry.

Busbar Shape and Bending Standards:

The shape and bending processes of BDU copper busbars adhere to the GB/T5585.1-2005 standard (see Appendix 1 for details), ensuring compliance with design specifications for shape, thickness, and bending angles. This standard deines minimum bending radii and angles to prevent stress concentration and cracking, improving assembly accuracy, durability, and system reliability.



Current-Carrying Capacity Calculation:

The current-carrying capacity of copper busbars is determined by cross-sectional area and current-temperature rise factors, typically based on cable ampacity and current-temperature rise curves (see Appendix 2 for details). Busbar dimensions must meet high current demands while controlling temperature rise to ensure safe, reliable operation in EV and energy storage systems.

Zhejiang RHI Electric Co., Ltd.
www.rhielectric.com

Phone: 0577-61988777

BDU Copper Busbar Types and Characteristics

BDU Copper Busbar - PVC Dip Coated

Production Process:
In the PVC dip coating process, specially formulated PVC material is heated to a liquid state, and the copper busbar is immersed in it, forming a smooth, uniform, and highly adhesive insulation layer.

The insulation thickness and color can be customized based on customer requirements.

Application Features:
Suitable for both flexible and rigid busbars, especially for complex shapes, enabling high-efficiency and low-cost production.

The insulation layer has good mechanical strength, effectively protecting the busbar from environmental corrosion.

Applicable Scenarios:
Widely used in new energy systems requiring cost-effective and efficient insulated connection structures.

BDU Copper Busbar - Epoxy Resin Powder Coated

Production Process:
The epoxy resin (EP) powder coating insulation process involves dipping the substrate in powder coating and then heat-curing it to form a dense, smooth insulation layer.

The thickness is typically 0.4-0.8 mm, providing a thinner insulation layer with improved heat dissipation. It also offers high voltage insulation, ensuring reliable insulation and structural strength.

Application Features:
Excellent temperature resistance and high insulation voltage capability, suitable for high-temperature environments and high-voltage systems.

The thin and uniform insulation layer enhances heat dissipation, ideal for applications requiring high thermal performance.

Applicable Scenarios:
Suitable for insulating rigid busbars with complex shapes, widely used in high-voltage battery systems, energy storage devices, and other high-temperature environments.

BDU Copper Busbar Advantages

- **High Conductivity:**
  T2Y2 copper ensures excellent conductivity, reducing resistance losses and enhancing power transmission efficiency.
- **Efficient Heat Dissipation:**
  Epoxy powder coating provides effective heat dissipation, ideal for high-current, thermally demanding applications.
- **High Temperature Resistance:**
  Both PVC and epoxy coatings offer insulation stability at elevated temperatures, suited for high-temperature environments.
- **Customizable:**
  Insulation thickness, color, and design can be tailored to specific application needs.

Zhejiang RHI Electric Co., Ltd.
www.rhielectric.com

Phone: 0577-61988777

Key Applications

- EV Battery Management Systems (BMS):
  BDU copper busbars are critical for high-voltage battery connections, providing stable current paths and fuse protection to ensure safety and reduce current losses.

- Energy Storage Systems (ESS):
  Used for high-power battery connections, BDU busbars deliver high-current capacity, minimizing resistance losses and maintaining stability under high load and temperature demands, enhancing system reliability for new energy applications.

Appendix 1

GB/T 5585.1-2005 Standards for BDU Copper Busbar Shape and Bending

Shape and Dimensions:
Busbars should be rectangular, flat, and within tolerance limits (thickness: 2-6 mm, width: 10-100 mm) for consistent electrical and mechanical performance.

Minimum Bending Radius:
Must be at least 1.5 times the thickness to avoid stress concentration and cracking.

Angle Control:
Bending angles should meet design specs, avoiding sharp angles to maintain integrity.

Surface Treatment:
Tin or nickel plating enhances corrosion resistance and conductivity.

Flatness:
Busbars should remain flat after bending, with no twisting, to ensure accurate installation and reliable connections.

Fatigue Resistance:
Must withstand frequent use and temperature changes for extended service life.

Appendix 2

Copper busbar current-carrying capacity is mainly influenced by cross-sectional area, conductivity, and temperature rise, with calculations adjusted for operating environment and heat dissipation. Below is the general estimation formula and reference table.

Estimation Formula

Based on GB/T 5585.1-2005, under standard conditions (25 ° C), the current-carrying capacity of copper busbars can be estimated as follows:

$$I = k \times A^{0.6}$$

- I: Current capacity (A)
- K: Empirical coefficient (0.7 1.0), adjusted for heat dissipation and surface treatment
- A: Busbar cross-sectional area (mm^2)

Zhejiang RHI Electric Co., Ltd.
www.rhielectric.com

Phone: 0577-61988777

Current-Carrying Capacity Reference Table (GB/T 5585.1-2005)

The table below shows current-carrying capacities for common copper busbar sizes at 25 ° C. Adjustments may be needed based on actual environmental conditions.

Width (mm)	Thikness (mm)	Cross-sectional Area A (mm^2)	Current-Carrying Capacity I (A)
10	2	20	70-90
20	2	40	120-140
30	3	90	190-230
40	4	160	270-340
50	5	250	380-470
60	6	360	500-620
80	8	640	720-880

Recommendation: In engineering applications, verify current-carrying capacity using empirical data or calculation software, especially in high-current or specialized environments, to ensure design safety and reliability.