

Battery Terminal Lug - Official Commercial BESS Technical Overview & Datasheet

BATTERY TERMINAL LUG: HIGH-RELIABILITY DC CONDUCTIVE INTERFACE FOR BESS APPLICATIONS

EXECUTIVE SUMMARY

The Battery Terminal Lug is a mission-critical conductive component engineered for high-current, low-resistance termination between battery modules, high-voltage DC busbars, and power conversion systems (PCS). Designed for Tier-1 BESS racks and containerized storage platforms, this lug family ensures stable torque retention, corrosion resistance under thermal cycling, and compatibility with standard M8/M10 battery terminal studs. All variants meet UL 486A-486B and IEC 61238-1 mechanical and electrical connection standards.



SYSTEM ARCHITECTURE & SAFETY INTEGRATION

The lug serves as the primary DC current path within battery rack assemblies. Manufactured from oxygen-free high-conductivity (OFHC) copper with tin or nickel plating, it provides galvanic compatibility with aluminum or copper busbars. A flared barrel entry and closed-end design prevent stray wire strands, while the inspection window confirms full cable insertion. Safety features include: integrated heat-shrink insulation sleeve (optional), anti-vibration lock washers compatible, and surface marking for torque specification (e.g., 12 Nm).

KEY FEATURES

- Material: OFHC Copper, $\geq 99.9\%$ IACS conductivity
- Plating Options: Tin-plated (standard, for Al/Cu interfaces), Nickel-plated (high-temp $>150^{\circ}\text{C}$ applications)

- Termination Stud Sizes: M6, M8, M10, M12 (customizable to battery module terminals)
- Cable Acceptance: 35mm² to 240mm² (AWG 2 to 500 kcmil)
- Operating Temperature Range: -40°C to +125°C (tin-plated), -40°C to +200°C (nickel-plated)
- Torque Retention: ≥500 thermal cycles (IEC 61238-1 Class 2)
- Voltage Rating: 1500V DC (typical for utility-scale BESS)

COMPLIANCE & STANDARDS

- UL 486A-486B: Wire connectors and soldering lugs for copper conductors
- IEC 61238-1: Compression connectors for power cables
- RoHS 3 (EU) / REACH (SVHC compliant)
- DFARS (domestic procurement variant available)
- Flame rating: V-0 per UL 94 (with insulation sleeve)

TECHNICAL SPECIFICATIONS TABLE

Parameter	Specification (Tin-Plated Cu)	Specification (Nickel-Plated Cu)
Conductor Cross-Section	35–240 mm ² (AWG 2–500 kcmil)	50–185 mm ² (AWG 1/0–350 kcmil)

Continuous Current Rating (90°C cable)	150 – 520 A (depending on cable size)	160–480 A
Stud Hole Diameter	8.4 mm (M8), 10.5 mm (M10)	8.4 mm (M8), 10.5 mm (M10)
Pad Thickness	2.5–4.0 mm	2.5–4.0 mm
Maximum Operating Temperature	+125°C	+200°C
Resistance (micro-ohm @ 120 mm ²)	≤ 9 μΩ after crimp	≤ 11 μΩ after crimp
Compliance	UL 486A, IEC 61238-1 Class 2	IEC 61238-1 Class 2, high-temp variant

MECHANICAL INSTALLATION PROFILE

Each lug includes a double-hole NEMA standard or single-hole terminal pad with chamfered edges to avoid stress risers. The barrel is seamless and internally serrated to penetrate oxide layers on stranded aluminum cables (when using bi-metallic versions). For liquid-cooled BESS racks where vibration is present, a captured spring washer interface is recommended between lug and battery terminal.



INDUSTRIAL DEPLOYMENT GUIDANCE

- Recommended Crimping Tool: Hexagonal or indent crimping per tool manufacturer calibration (e.g., 12–18 tons for 150mm²)
- Pull-out Force Verification: $\geq$ specified minimum by cable gauge (field test via calibrated pull tester)
- Torque Sequence: Two-step progressive tightening to prevent terminal stud galling
- Galvanic Compatibility: Use tin-plated lugs for all Cu-Al interfaces; apply anti-oxidant compound on aluminum conductor insertion
- Storage & Handling: Keep in low-humidity environment (<60% RH) until installation to prevent pre-oxidation

WARRANTY & SUPPORT

20-year performance warranty against mechanical failure under specified operating conditions when installed with approved crimping tools. Full traceability via laser-etched lot code on each lug.