



Safety-Certified Battery-Powered Hydraulic Tools

Introducing the Panduit® BlackFin™ Battery-Powered Crimping Tools

The Panduit® BlackFin™ battery-powered crimping tools are the first in the industry to meet Occupational Safety and Health Administration (OSHA) and international safety standards for battery-operated hand tools. Panduit® BlackFin™ tools meet OSHA requirements as tested to UL60745-1 / CSA C22.2 No. 60745-1 per CSA under file 268531. These tools are also certified by SiQ to meet IEC / EN 62841-1 which satisfies the requirements of the EU Machinery Directive 2006/42/EC.

What does this all mean? It means that the end user has a fully compliant tool that meets the strictest safety standards on the market today.

These tools provide the following features:

- One Button Operation - to deliver crimping force necessary to facilitate irreversible compression connections
- In-Line Tool Designs – mitigate motion wrist injuries
- Ergonomically Balanced - weight forward handle design provides balanced operation for pistol grip tools
- No-Slip Grips – comprised of soft composite materials to provide secure and comfortable tool operation
- Quick Motor Stop – stops motor immediately upon release of activation trigger to prevent damage to components or injury to operator
- Audible and Visual LED Warning – signals when crimping operation is complete
- Rotating Crimp Head – facilitates ease of tool operations in constrained spaces
- Auto Piston Retraction – provides visual verification that crimp cycle is complete
- LED Signal Light – notifies when tool requires maintenance to extend tool life

The battery-powered tools are available in versions ranging from 1.7 tons to 15 tons compression force and include varying capabilities such as the ability to cut wire, rod, or rebar, and crimping a connector onto wire. Battery chargers accompany the tools and are available in versions specific to voltage and plug type.

- standard part number for USA Type A plug
- part number with “INT” for EU Type C plug
- part number with “UK” for UK Type G plug
- part number with “AUS” for AUS Type I plug

Note: The Part number with “TO” is only the tool for customers that already have batteries and chargers.

In the Appendix, each tool is showcased along with the features and specifics.

Background

Battery-powered hydraulic crimping tools facilitate the installation of irreversible compression connectors used to connect or terminate electrical wire in the field. The technology allows for many crimps on a single battery charge while providing the crimping force tonnage necessary to achieve certified connections. This allows the worker to bring the tool to the job rather than the job to the tool, requires no need for nearby sources of electricity, and provides consistent, reliable crimps.

Advances in the state-of-the-art technology for battery-powered hydraulic crimping tools have allowed contractors to perform many more crimps per work shift with far less effort than would be possible with manual hydraulic tools.

However, there remains the risk of repetitive stress injuries and other hazards arising from electric motor-operated hand-held tools. National and International governing bodies and agencies recognize the need for occupational safety and strive to advance the cause. Whether it is OSHA or European Union (EU) through specific directives, collaborative work between these entities and standards committees continue the effort to mitigate risks to tool users.

Is Your Tool Compliant?

Workers have a right to a safe workplace. If you are an employer responsible for the safety and well-being of your employees, you have a responsibility to ensure your employees have a safe work environment, which extends to the tools used on the job. Failure to meet established safety standards could result in fines. How do you know if a tool used on the job sufficiently meets established safety standards? The best solution is to refer to agencies such as OSHA to determine the basic requirements and whether the tools are in compliance.

OSHA gives credence to a tool that has been certified by an OSHA accredited nationally recognized test lab (NRTL) to verify that the tool meets the requirements of UL60745-1 / CSA C22.2 No. 60745-1. This standard, Hand-Held Motor-Operated Electric Tools – Safety – Part 1: General Requirements, based on IEC 60745-1, establishes a set of tests needed to determine and qualify the safety of the tool under test. Recognizing that the use and operation of tools can contribute to fire, electric shock, mechanical and noise hazards to workers, OSHA has deemed that this standard sufficiently covers all aspects of safety for tools under investigation. It addresses the common hazards that workers encounter when using handheld tools and the reasonably foreseeable misuse of tools. It also contains a myriad of test clauses used to gauge performance against the standard. Each clause contains a battery of tests under different environmental conditions. These clauses subject the tool in test to the following conditions:

- Heating (ensuring excessive temperatures not attained under normal load)
- Abnormal Operation (ensuring no hazard due to abnormal operation, no hazard results in the event of an electronic equipment failure, no hazards occurring under fault conditions)
- Mechanical Hazards (ensuring adequate protection against injury provided against moving and dangerous parts)
- Mechanical Strength (ensuring that enclosure of electronic and hydraulic parts have adequate strength to withstand subjected blows and impact due to drops on concrete without impairing compliance with the standard)
- Construction (ensuring that the designated switch used to control the operation of the tool is in a fixed, correct position and cannot be forced to be seated in the wrong position)
- Components (ensuring that components making up the tool follow relevant IEC standards and are used in accordance with their markings; switches follow specified standards)
- Screws and Connections (ensuring that electrical connections and other fixings are able to withstand mechanical stresses occurring in normal use)
- Creepage Distances, Clearances, and Distances Through Insulation (ensuring all clearances remain within the defined values given in the standard)
- Resistance to Heat, Fire, and Tracking (ensuring external parts are sufficiently resistant to heat and that parts do not propagate flames but are resistant to ignition and spread of fire)
- Battery Tools and Battery Packs (ensuring temperature rises meet established values and that battery tools and battery packs have adequate mechanical strength after subjection to test)

The comprehensiveness of this demonstrates a thorough test protocol. However, a new standard will eventually replace IEC / EN / (UL) 60745-1. This new standard, IEC / EN / (UL) 62841-1, is a technical revision to IEC 60745-1 and maintains the test clauses while adding requirements for electronic safety critical functions and for Li-Ion battery systems. While this standard is not yet published on the complete list of test standards determined to be appropriate for use under

OSHA's NRTL Program, OSHA will likely soon favor this standard over the older UL 60745-1. Europe is a step ahead because EN 62841-1 is now included in the List of Harmonized Standards for the Machinery Directive 2006/42/EC, categorized as a Type-C standard, though not scheduled to supersede EN 60745-1 until Feb. 22, 2018.

In addition to tests outlined in EN 60745-1 and EN 62841-1, Directive 2006/42/EC also addresses ergonomic and safety features of machinery that go beyond the scope of EN 60745-1/62841-1. The Directive includes EN ISO 12100 and lists this as an important standard complementing EN 60745-1 and EN 62841-1. The standard provides a framework for the design behind the tool to facilitate the achievement of safety in the design of the machinery. EN ISO 12100 guides the tool design by laying out the following:

- Provisions for stability
- Provisions for maintainability
- Observation of ergonomic principles
- Preventing electrical hazards
- Preventing hazards from pneumatic and hydraulic equipment
- Applying safe design measures to the control system
- Minimizing the probability of failure of safety functions
- Limiting the exposure to hazards through equipment reliability
- Limiting the exposure to hazards through automation of loading (feeding) / unloading (removal) operations
- Limiting the exposure to hazards through setting location and maintenance points outside of danger zones
- Safeguarding and complementary protective measures
- Inclusion of markings, signs, and written warnings

These standards cover ergonomic, construction, operationality, and general safeguarding, but the member states of the EU also require compliance to the EMC directive. One of the "new approach" directives in the EU, Directive 2014/30/EU applies to all electronic or electrical products that can cause, or be disturbed by, electromagnetic interference. The EU requires that manufacturers ensure their products are compliant with the requirements of the directive. Products must meet this directive to display the CE marking. The pertinent IEC / EN standards are:

- IEC / EN 61000-4-2 – Electrostatic discharge immunity test; the objective of this standard is to establish a common and reproducible basis for evaluating the performance of electrical equipment when subjected to electrostatic discharges. It also addresses electrostatic discharges which may occur from the operator to objects near sensitive electronic equipment.
- EN 61000-4-3 – Radiated, radio-frequency, electromagnetic field immunity test; the objective of this standard is to provide a common guideline for evaluating the immunity of electrical equipment when subjected to radiated, radio-frequency electromagnetic fields such as from digital radio telephones and other RF emitting devices.
- EN 61000-6-1 – Immunity standard for residential, commercial, and light-industrial environments; it lays out generic EMC immunity requirements applicable to electrical and electronic equipment for use in residential, commercial, and light-industrial environments and covers the frequency range of 0 Hz to 400 GHz.

In summary, agencies and commissions continue the mission to assure safe working conditions for working men and women, and they do this by setting and enforcing standards. Both OSHA and the EU continue to review and assure standards related to the safety of machinery and tools are adequate, thorough, and appropriate. Are your tools compliant to these standards?

Conclusion

Panduit® BlackFin™ tools are safe and effective and meet the strictest of standards as recognized by organizations such as OSHA, EU and others, and are certified accordingly. With careful attention to ergonomics, these tools have been optimally designed with the end user in mind so each tool is easy to operate (includes a one-button operation and features a rotatable crimp head), requires less effort (reduces fatigue factor as each tool is ergonomically balanced so the load is better distributed, allowing the tool to feel “lighter”), and provides for better handling (includes soft rubber inlay comfort grip) all while delivering large-scale crimping forces necessary to facilitate the installation of irreversible compression connectors.

Referenced Standards

- Directive 2014/30/EU, 2014
- Directive 2006/42/EC, 2006
- UL 60745-1, “Hand-Held Motor-Operated Electric Tools – Part 1: General Requirement,” 2007
- ISO 12100-1, “Safety of Machinery – Basic Concepts, General Principles for Design – Part 1: Basic Terminology, Methodology,” 2003
- ISO 12100-2, “Safety of Machinery – Basic Concepts, General Principles for Design – Part 2: Technical Principles,” 2003
- IEC 62841-1, “Electric Motor-Operated Hand-Held Tools, Transportable Tools, and Lawn and Garden Machinery – Safety – Part 1: General Requirements,” 2014
- IEC 61000-4-2, “Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test,” 2008
- IEC 61000-4-3, “Electromagnetic Compatibility (EMC) – Part 4-3: Testing and Measurement Techniques – Radiated, Radio-Frequency, Electromagnetic Field Immunity Test,” 2006
- IEC 61000-6-1, “Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards – Immunity Standard for Residential, Commercial and Light-Industrial Environments,” 2016

Disclaimer

The information contained herein is intended as a guide for use by persons having technical skill at their own discretion and risk. Panduit disclaims any liability arising from any information contained herein or for the absence of same.

About Panduit

Panduit is a world-class developer and provider of leading-edge solutions that help customers optimize the physical infrastructure through simplification, increased agility and operational efficiency. Panduit provides flexible, end-to-end solutions tailored by application and industry to drive performance, operational and financial advantages. Panduit’s global manufacturing, logistics, and e-commerce capabilities along with a global network of distribution partners help customers reduce supply chain risk. Strong technology relationships with industry leading systems vendors and an engaged partner ecosystem of consultants, integrators and contractors together with its global staff and unmatched service and support make Panduit a valuable and trusted partner.

APPENDIX – Tools, Features, and Specifications

CT-3001/ST, shown in Figure 1, is an inline, 6.7 ton, battery-powered crimping tool that uses Panduit select dies to crimp lugs, terminals, and ferrules. It has a flip-top crimp head that can be rotated as needed. The automatic piston retraction feature signals a complete crimp, and the automatic position control locks out the piston retraction stop when needed to save battery life. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals if a full crimp force is not attained. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomic, low profile, in-line design. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 1:

CT-3001/ST

CT-3980, shown in Figure 2, is an innovative dieless tool that utilizes a two-stage telescopic indenter to provide a workable crimping force range of 3.4 tons to 6.7 tons. This battery-powered tool features a flip-top crimp head that can be rotated as needed. The automatic piston retraction feature signals a complete crimp, and the manual retraction stop includes a “teach in” feature that sets the position of the piston stop. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals if a full crimp force is not attained. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomic, low profile, in-line design. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 2: CT-3980

CT-3001/CCP, shown in Figure 3, is an inline, 6.7 ton, battery-powered 3-in-1 crimping, cutting, and punching tool. It has a flip-top crimp head that can be rotated as needed. The automatic piston retraction feature signals a complete crimp, and the manual retraction stop includes a “teach in” feature that sets the position of the piston stop. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomic, low profile, in-line design. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 3: CT-3001/CCP

CT-2920/CCP, shown in Figure 4, is a pistol grip, 12 ton, battery-powered 3-in-1 tool that utilizes interchangeable adapters and dies to crimp, cut, and punch. It has a flip-top crimp head that can be rotated as needed. The automatic

piston retraction feature signals a complete crimp, and the manual retraction stop includes a “teach in” feature that sets the position of the piston stop. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomically designed, weight-balanced pistol grip tool. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 4: CT-2920/CCP

CT-2931/ST, shown in Figure 5, is a pistol grip, 12 ton, battery-powered crimping tool that uses Panduit select dies to crimp connectors and lugs. It has an open C-head to allow easy placement of connectors in the tool. As an option, the tool can be ordered with an incorporated 2-layer PVC insulation over the metal crimp head for added safety in certain environments. The automatic piston retraction feature signals a complete crimp, and the automatic position control locks

out the piston retraction stop when needed to save battery life. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals if a full crimp force is not attained. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomically designed, weight-balanced pistol grip tool. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 5: CT-2931/ST

CT-2940/ST, shown in Figure 6, is a pistol grip, 15 ton, battery-powered crimping tool that uses Panduit select dies to crimp heavy duty connectors and lugs when the smaller CT-2931/ST is not sufficient. It has an open C-head to allow easy placement of connectors in the tool. The automatic piston retraction feature signals a complete crimp, and the automatic position control locks out the piston retraction stop when needed to save battery life. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals if a full crimp force is not attained. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features

a one push-button operation all in an ergonomically designed, weight-balanced pistol grip tool. It also includes a support handle that can be mounted to either side of the crimp head to aid in handling. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 6: CT-2940/ST

CT-2980/ST, shown in Figure 7, is a 6.2 ton, pistol grip, battery-operated crimping tool that is completely dieless. This battery-powered tool features a flip-top crimp head that can be fully rotated. The automatic piston retraction feature signals a complete crimp, and the automatic position control locks out the piston retraction stop when needed to save battery life. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals if a full crimp force is not attained. This tool features a one push-button operation all in an ergonomically designed, weight-balanced pistol grip tool. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes.

Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 7: CT-2980/ST

CT-2500/L, shown in Figure 8, is an inline, 1.7 ton, battery-powered crimping tool that uses Panduit select crimp heads to crimp Panduit rings, forks, disconnects, splices, and ferrules. Crimp heads can be quickly changed with a quick release pin feature. The tool allows the crimp head to rotate 360 degrees. The automatic piston retraction feature signals a complete crimp. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals to alert the user of any crimping errors. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomic, low profile, in-line design. It utilizes a 10 VDC 1.5 amp-hour Li-ion battery that can be fully charged in 15 minutes. Included in this tool is an infrared sensor that allows

the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 8: CT-2500/L

CT-2600/L, shown in Figure 9, is an inline, 4.0 ton, battery-powered crimping tool that uses Panduit dies to crimp Panduit terminals, butt splices, and lugs. This battery-powered tool features a flip-top crimp head that can be fully rotated, and it has a slim profile, ideal for working within tight spaces. The automatic piston retraction feature signals a complete crimp. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals to alert the user of any crimping errors. This tool is equipped with an LED work light and soft rubber inlay comfort grips. It features a one push-button operation all in an ergonomic, low profile, in-line design. It utilizes an 18 VDC Li-ion battery that can be fully charged within 22 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 9: CT-2600/L

CT-2300/ST, shown in Figure 10, is an inline, 1.7 ton, battery-powered crimping tool that uses select Panduit crimp dies to crimp Panduit terminals, disconnects, splices, ferrules, and lugs. This battery-powered tool features a 120mm jaw for holding the crimp dies. The tool mechanics include an integrated pressure measurement system to provide visual and audible signals to alert the user of any crimping errors. This tool is equipped with an LED work light and soft rubber inlay comfort grips and comes with an innovative trigger with power sensing technology, all in an ergonomic, low profile, in-line design. It utilizes a 10.8 VDC 1.5 amp-hour Li-ion battery that can be fully charged in 15 minutes. Included in this tool is an infrared sensor that allows the historical statistical performance data to be transferred from the tool to FINs software via the Panduit® CT-USB accessory.

Compliance:

- Tested to UL 60745-1 (OSHA)
- Tested to IEC 62841-1 (EU Machinery Directive, 2006/42/EC)
- Tested to EN 61000 (EU EMC Directive, 2014/30/EU)
- Meets ISO 12100 (Ergonomically designed, also meets EU Machinery Directive, 2006/42/EC)



Figure 10: CT-2300/ST