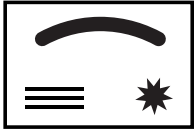




EDITION 2

VOLUME 1

# THE TOP 10 FEATURES OF SOUTHWIRE'S PATENTED LIQUID-COOLED CHARGING CABLE



## PATENTED CABLE DESIGNS

Southwire's design, covered by US patent 10,811,170 and European patent 3,459,087, creates a forced cooling & liquid circulating

assembly that enables the system to achieve the highest heat transfer coefficient, high power charging current, and ultra-fast charging time.



## HIGH CURRENT & FAST CHARGING

Air-cooled charging cables typically yield less than 200 amps of charging current. Southwire's patented technology can supply currents from 400 amps to 1,000+ amps, which is 2-5 times greater than conventional air-cooled EV cables.



## HEAT GENERATION

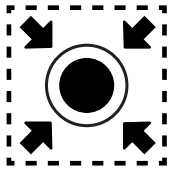
EV cables can be exposed to a wide range of operating temperatures depending on the specific type of insulation material. Heat

generated by copper wiring derates the current carrying capacity of the cables; thus, heat dissipation efficiency is a critical part of the design.



## COOLING DEVICE & CONFIGURATIONS

Southwire's closed-loop cooling design strategically connects the load station with energy storing battery packs with the power supply source and the coolant pump station. This innovative configuration using the supply vs. return coolant hoses with a long coolant pathway with bifurcation points allows the heat to be exchanged optimally using the largest surface area.



## COMPACT & FLEXIBLE DESIGN

As the electric charging current increases, the standard listed cable may become too large, too heavy, and too inflexible for a consumer to use. Southwire's patented design produces the most

compact size to carry the highest current rating without sacrificing the mechanical durability and electrical performance.



## SOURCING OF QUALITY MATERIALS

From high performance compounds, flexible braided shields, high temperature tubing for coolant, to marker & binder tapes, Southwire sources the most reliable and consistent raw materials and cable components via a sustainable supply chain and global vendors.



## COMPONENTS & CABLE DESIGN

Many factors impact charging efficiency, including the conductor size, coolant type,

tubing wall thickness, number of supply vs. return coolant hoses, the layout & the length of the circulation paths, the intimate physical contact area where heat can be exchanged, etc. All these parameters are reviewed and designed into our complete cable design.



## UNPARALLELED ENGINEERING SUPPORT

Southwire's CableTechSupport™ Services team provides Re<sup>3</sup>™ engineering consultation services through the custom design of reinforced cables and the support of critical infrastructure projects where resilience and reliability are non-negotiable.



## ONE-STOP SHOP TO SAVE TIME & COST

Southwire offers a complete line of wire & cable solutions to complement EV infrastructure

installations, including copper and aluminum SIMpull® building wire, SIMpull® Cable-in-Conduit (CIC), bare copper grounding conductors, pre-terminated power assemblies, Maxis® pulling equipment, cable management solutions, battery cables, primary lead wire, hook-up wire, communication cables, control cables, underground medium voltage cables, and halogen-free HDPE conduits.



## SUSTAINABILITY

Many of Southwire's wire & cable products are compliant with RoHs and REACH, including EV solutions. We utilize energy-saving manufacturing equipment, processes, and facilities to deliver power responsibly.



For more information, please contact cabletechsupport@southwire.com or visit southwire.com.

©2021 Southwire Company, LLC. All rights reserved. ®Registered Trademark & ™Trademark of Southwire Company, LLC.



EDITION 2

VOLUME 1

# A Re<sup>3</sup>™ PUBLICATION PEER-REVIEWED & APPROVED

BY SIX SUBJECT MATTER EXPERTS FROM SOUTHWIRE'S ENGINEERING COMMITTEE



## WRITTEN BY **DR. YUHSIN HAWIG**

**VP, ENGINEERING**

25 years of material science expertise with the focus on life expectancy of wire & cables, long-term electrical, thermal, mechanical, physical, and chemical properties vs. performance of metals and dielectric materials. Author of 20 technical journal publications since 2001, inventor of 5 US & international patents, and guest speaker for IEEE conferences & Southeastern Electric Exchange trade association. Writer of over 200 technical whitepapers on cable products. A diverse career path including National Institute of Standards & Technology (NIST). An active management board member for NEETRAC/Georgia Tech since 2015.



## **SY SHAHEEN, MBA**

**DIRECTOR, APPLICATIONS ENGINEERING**

35 years of expertise in underground power distribution, automotive, power generations, and industrial plant projects with the emphasis on root cause & forensic analysis and operation troubleshooting. 11 years of utility transmission, sub-transmission, distribution network designs & support, as well as a specialty in safety & systems engineering for nuclear power plants.



## **EDWIN MARQUEZ**

**ENGINEERING MANAGER**

15 years of designs, testing, global codes & standards compliance reviews and technical support for all products including low voltage, medium & high voltage cables. Unique cable designs for 20+ countries and in-depth knowledge of UL, ANCE, CFE, IEC, CIDEV, UNE, BASEC and VDE standards. Advanced electrical modeling and complex ampacity calculations for underground cable systems. Keynote speaker for international seminars with over 500 participants.



## **DAVE WATSON**

**PRINCIPAL ENGINEER**

25 years of experience in multiple industries including Military, Aerospace, Auto-Identification, and Wire & Cable. Represents Southwire in numerous codes & standards organizations including NEC Code Making Panels 6 & 8, multiple UL and CSA standards technical panels, and NEMA and CANENA technical committees. Training instructor on "Top NEC Code Changes in 2020" and various infrastructure application seminars with over 350 participants.



## **MARK DULIK**

**CHIEF ENGINEER**

36 years of hands-on electrical industry experience including residential, commercial, and industrial applications. Over 20 years of field expertise installing, maintaining and troubleshooting medium voltage cables and switchgears in industrial spaces and substations. A medium voltage cable splicer and instructor certified through NJATC with a NCSCB certificate.



## **PAUL MCCRACKEN**

**CHIEF ENGINEER**

20 years in wire and cable industry, specialized in complex low voltage and EV, automotive, OEM product designs with hands-on experience in manufacturing, quality, codes & standards, technical assistance, and cable applications assistance. 10 years of end user support and R&D for electric vehicle charging applications. Co-developer of liquid-cooled cable for Ultra-Fast EV charging. Active in the National Electrical Code (NEC) Making Panel 12 (CMP-12).



## **ERIKA AKINS**

**CHIEF ENGINEER**

10 years of knowledge on codes (NEC, CEC, NESC) and standards (UL, CSA, ICEA), manufacturing quality, and end user support for wire and cable products across all markets. Training instructor on "Fundamentals of Electrical Testing" and "Renewable & Utility Applications" with over 300 participants. Winner of 2020 Wire Link Traveling Scholarship award.

