

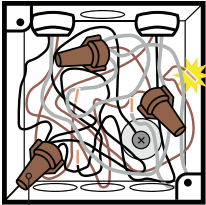


EDITION 19

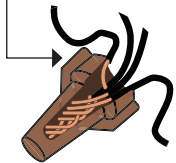
VOLUME 1

20 UNIQUE ENGINEERING ATTRIBUTES OF MCAP[®] CABLE

WRITTEN BY: Dr. Yuhsin Hawig, VP of Applications Engineering | Erika Akins, P.E., Applications Engineering Manager

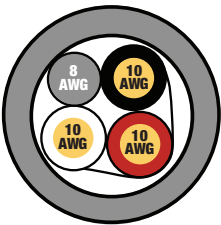


Conventional MC Cable Improper connection after stuffing into box



NECESSITY IS THE MOTHER OF INVENTION

MCAP[®], or "Metal Clad All Purpose", cable was invented over 10 years ago as a solution to loose or improper branch circuit connections resulting from stuffing and overbending Type MC wiring into an electrical box. Electrical contractors needed to reduce terminations per box and declutter the wiring. Southwire has launched abundant novel products in the past 25 years as a result of field feedback and problem-solving solutions. MCAP[®] cable is one of the top proven innovations that has transformed the electrical industry featuring 20 unique engineering attributes.



ALUMINUM EQUIPMENT GROUNDING CONDUCTOR

Standard Type MC cables contain an insulated copper Equipment Grounding Conductor (EGC), which is placed underneath a plastic mylar tape. MCAP[®] cable replaces the insulated copper

EGC with a full-size bare aluminum EGC and relocates it outside of the tape. These two design changes allow the full-sized bare aluminum grounding conductor to bond securely with the aluminum metal clad sheath creating a continuous grounding pathway via the MC armor. This patented integral ground lays in intimate physical contact under the armor throughout the entire length of the cable.



PATENTED INNOVATION

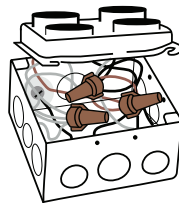
Southwire's U.S. patent application to protect the invention of the MCAP[®] product families was filed over a decade ago. The final patent, US 8,664,532, entitled "METAL-CLAD

CABLE ASSEMBLY" was granted in 2014. We have more than 500 active U.S. and International patents in our intellectual property portfolio. The innovative MCAP[®] product offering ranges from circuit sizes 14 AWG to intermediate circuit sizes up to 6 AWG to deliver a wide range of ampacity for all applications. You can **scan the QR code** to access all engineering specs including MCAP[®] and MC products.

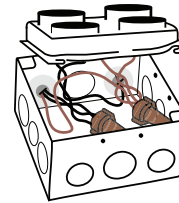


LESS IS ALWAYS MORE

Electricians and electrical contractors practice the work principle of "Less is Always More". MCAP[®] cable provides "4 less burdens" compared to standard Type MC cables. Firstly, it requires fewer parts. Secondly, it reduces the number of manual mechanical connections, which are prone to human errors and can vary greatly due to workmanship. Thirdly, it requires less make-up at every termination point. Lastly, it results in a lower box fill ratio with extra space and a much neater finished panel look.



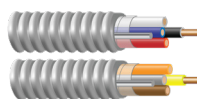
✗ The Old Way



✓ The MCAP[®] Cable Way

NEXT GENERATION MC MEETING FAULT CURRENT TEST

As the next generation of MC cable, MCAP[®] cable has all the same engineering features and more. The use of "Push-On Snap-In" type fittings boost grounding reliability. It does not rely on every screw or locknut being manually tightened. The combined ground path in MCAP[®] cables can carry more ground fault current than the copper grounding conductor in Type MC. Aluminum wire is cut flush with the armor when applying the proper fittings rather than terminating the aluminum wire within the device. Fittings are UL listed as "MCI-A" fittings per UL 514B. The combination of MCAP[®] cable armor, full-size bare aluminum conductor, snap-in MCI-A rated fitting, and the box passes UL 514B fault current tests.



VERSATILE APPLICATIONS

Like standard MC cables, MCAP[®] cables can be deployed on branch, feeder, and service power distribution in commercial, industrial, institutional, and multi-residential buildings. They can be fished or embedded in plaster and can be in a concealed or an exposed installation. One can also use this product in environmental air-handling spaces per NEC 300.22, at places of assembly per NEC 518.4, as well as theaters per NEC 520.5. Installations in cable tray and approved raceways are also permitted. Furthermore, all MC products are allowed to be placed under raised floors to power IT equipment and systems per NEC 645.5(E)(1)&(2).



20 UNIQUE ENGINEERING ATTRIBUTES OF MCAP® CABLE



CONTINGENCY PLAN & BUSINESS CONTINUITY

Southwire has invested heavily in manufacturing facilities where we produce our metal clad products. Older machines are being replaced with the state-of-the-art equipment to perform extrusion, plexing/cabling, armoring, and jacketing processes. The agile factories are modernized to enhance the overall product quality, worker safety, and Overall Equipment Effectiveness (OEE), as well as to reduce the scrap rate. These investment efforts to expand production capabilities and machine redundancies in different states have solidified the best contingency plan and business continuity for Southwire in case of a major natural disaster impacting one specific plant location.



PRODUCT DESIGNS & CONSTRUCTIONS

More than 350 design variations are offered under the MCAP® product category. Solid or stranded fully annealed soft drawn copper, meeting ASTM B3 & B8, can be chosen for the phase conductors. All phases are Type THHN/THWN insulated with

Polyvinyl Chloride with Nylon Sheath. Black (BK)/Red (RD)/Blue (BE)/White (WE) is the standard color scheme to signify the 120V or 208V low voltage ratings for the branch circuits. Brown (BN)/Orange (OE)/Yellow (YW)/Gray (GY) is the color combination to represent the high voltage 277V or 480V ratings. Full-sized bare aluminum grounding/bonding conductor contains the 8000 series aluminum alloy. Aluminum Interlocked Armor (AIA) plus the bare aluminum conductor forms the equipment ground path.



NFPA 70® NEC® COMPLIANCES

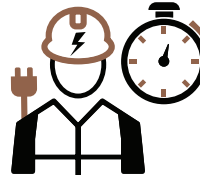
The combined ground path of the outer armor plus the bare aluminum conductor laid underneath is permitted per NEC 250.118(A)(10)(b) (Types of Equipment Grounding

Conductors). The ground path provides the same level of grounding performance as an insulated equipment grounding conductor in a Type MC cable since the bare aluminum conductor is sized per NEC Table 250.122 (Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment). MCAP® EGC is also compliant with NEC 330.108 for Type MC cables (Equipment Grounding Conductor).



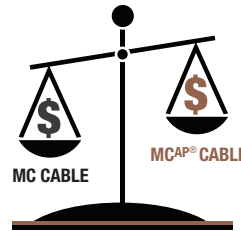
UL COMPLIANCES

MCAP® products are compliant with UL 1569 entitled "Metal-Clad Cables". You will find a marking tape under the armor printed with our unique UL E-file number of E96627. One can also see the text "ARMOR IS EQUIPMENT GROUNDING PATH COMPONENT" printed on the tape to indicate that the combination of the aluminum MC armor with the bare aluminum grounding conductor is suitable for grounding per UL Product Category of PJAZ for metal clad cables. All phases are 600V Type THHN/THWN coextruded with PVC & Nylon meeting UL 83 (Thermoplastic Insulated Wires and Cables). All MC product families also meet UL 1479 (Fire Tests of Penetration Firestops).



ZERO WASTE IN TIME & LABOR

MCAP® cable has an armor assembly that serves as an equipment grounding conductor (EGC) per NEC. Step-by-step installation instructions are provided with every reel and coil package. Cable is reverse wound on the reel for ease of pulling and faster installation. It should be noted that when pulling from coils, pull from the inside to achieve the best efficiency. MCAP® cable is best known for its accelerated conductor make-up, faster wiring device installation, and trim-out when terminating the grounding/bonding conductor at the armor. There is zero waste in time or labor.



COST SAVINGS VALIDATION USING ONLINE CALCULATOR

MCAP® cable can eliminate 1 termination from every electrical outlet and reduce installation time by up to 2 minutes per connection. It helps save manhours, prevent grounding errors, reduce rework, and lower installation costs up to 50% over wiring. **Scan the QR code** to download the free MCAP® cable online calculator to determine the value of labor savings versus traditional MC cables. The calculator will estimate total cost savings based on the total number of outlets, boxes, and light fixtures.



20 UNIQUE ENGINEERING ATTRIBUTES OF MCAP® CABLE



NO MORE MANUAL CONNECTIONS

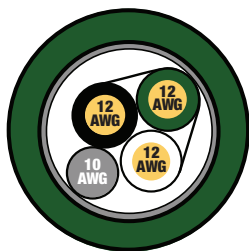
Traditional Type MC or non-MCAP® cables require a manual mechanical process to create the grounding path, which is subject to workmanship. Grounding equipment conductors must be spliced together and bonded to metal enclosing of the circuit conductors, such as metal outlet boxes, metal conduit, and metal clad armor. High conductor fill ratio in boxes and enclosures can impact the reliability of both current-carrying and grounding connections. Additionally, improper or insufficient grounding may not be immediately noticeable.



**STRONG.
SUSTAINABLE.
SOUTHWIRE.**

SUSTAINABLE ALTERNATIVE TO TYPE MC & AC

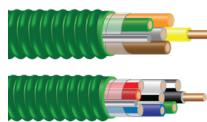
MCAP® cable is one of the principal sustainable product examples because of its numerous user benefits during installation. Advantages include facilitating ground connections with fewer parts and augmenting grounding reliability. Grounding continuity is maintained from the metal clad armor to the fitting, the box, and to the device via a grounding pigtail. Sustainability in the field is achieved as MCAP® cable yields an easy and consistent branch circuit make-up in every electrical box and outlet for every job.



MCAP® HCF CABLE FOR HEALTH CARE FACILITY

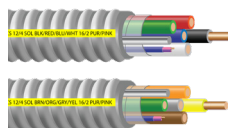
MCAP® HCF cable is an extension of the MCAP® product family and it follows the requirements of NEC 517.13, entitled "Equipment Grounding Conductor for Receptacles and Fixed Electrical

Equipment in Patient Care Spaces". The NEC requires separate and redundant ground-fault current paths for all branch circuits serving patient care spaces to isolate patients from potential stray electrical currents. NEC 517.13(A) states that the metallic cable armor or sheath assembly shall qualify as an equipment grounding return path. A THHN insulated green copper grounding conductor is incorporated into the MCAP® HCF cable assembly to comply with NEC 517.13(B).



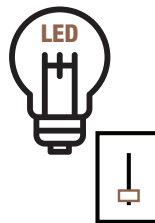
MCAP® HCF CABLE BENEFITS

MCAP® HCF cable is easy to identify and to pull due to its lightweight green aluminum armor. The 12 AWG design features over 350% improvement in grounding path compared to the traditional HCF Type AC cable. The full-sized aluminum equipment grounding/bonding conductor plus armor ground path is equivalent to the copper EGC in Type MC. There is no conductor limit and no need to use anti-short bushings. Single mylar tape covering vs. individually paper-wrapped conductors minimizes waste in the field and raises installation efficiency. This wiring is essential for patient care areas in hospitals and should be installed per NEC® 330 for Type MC cables. Such areas include nursing homes, dental offices, medical clinics, and outpatient facilities. Use in hazardous anesthetizing areas is prohibited.



MC-PCS DUO™ POWER & CONTROL/SIGNAL CABLE

MC-PCS Duo™ cable combines power conductors with a green ground in 10 AWG or 12 AWG plus Class 2 or Class 3 Control/Signal wiring in 16 AWG in the same cable under one aluminum metal-clad armor. All conductors are rated 600V and the construction is identical to MCAP® cable with the exception of a jacketed control & signal TFN pair. Type TFN wire is insulated with a thermoplastic PVC with a flexible Nylon sheath. This design is compliant with NEC 300.3(C)(1) and 725.136(l)(1) &(2). The 30-mil thick PVC jacket, which encloses the pink and purple control and signal wiring, is for the separation of power from lighting circuits to comply with NEC. Yellow stripes/blocks are printed over the armor with the cable marking.



MC-PCS DUO™ CABLE FOR LED LIGHTING

The most commonly deployed application for MC-PCS Duo™ cable is LED lighting with a dimmer switch. The jacketed twisted pair, containing a purple and a pink 16 AWG TFN conductor, is designed as a 0-10 Volt cable to control dimming. The blue PVC jacket is designed for circuit separation and protection. The copper power conductors are produced with either a solid conductor or a stranded design and they are insulated with 600V rated Type THHN with any color combination. Additionally, the circuit identification is printed directly on the armor for easier visual inspections.



EDITION 19
VOLUME 1

20 UNIQUE ENGINEERING ATTRIBUTES OF MCAP® CABLE



SOUTHWIRE SPEED™ SERVICES

Southwire SPEED™ services focus on expedited shipping through our North American customer service centers and agent warehouses from coast to coast. This service can help eliminate minimum order quantities (MOQ), reduce lead time, and provide a concierge service for quoting and ordering processes for all wire and cable products. You can learn more by **scanning the QR code.**



CABLETECHSUPPORT™ SERVICES

Southwire's CableTechSupport™ services team has published many whitepapers to help end users with the selection of products for the most challenging applications. Our Re3™ statement is based on sustainability: to Respond, Rectify, and Restore with the most Reinforced, Resilient, and Reliable solutions. You can download these articles from the website by **scanning the QR code.**

