

## Kaf-Tech

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## SECTION 26 05 19

### METAL CLAD CABLE –STEEL MC TUFF®

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Steel Metal Clad Cable (Type MC).
  - 2. Wiring connections and terminations.
  - 3. Installation methods and procedures.
- B. Related Sections include the following:
  - 1. Division 26 Section "Common Work Results for Electrical".
  - 2. Division 26 Section "Grounding and Bonding for Electrical Systems".
  - 3. Division 26 Section "Raceway and Boxes for Electrical Systems".

##### 1.3 REFERENCES

- A. UL 83 – Standard for Thermoplastic Insulated Wires and Cables
- B. UL 1569 – Standard for Metal Clad Cable
- C. UL1479 – Fire Tests of Through-Penetration Fire Stops (ASTM 814)
- D. UL 1581 – Reference Standard for Electrical Wires, Cables, and Flexible Cords
- E. UL 2556 – Wire and Cable Test Methods
- F. UL 514B – Conduit and Cable Fittings
- G. Federal Specification A-A-59544, Wire and Cable, Electrical (formerly J-C-30B)
- H. NFPA 70, NEC – Articles 230.43, 300.22(C), 392, 396, 330, 501.10(B)(1), 502.10(B)(1), 503.10(A), 503.10(B), 517.13, 517.30(C)(3), 518, 520, 530, 645.
- I. ASTM International.
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

#### 1.4 SUBMITTALS

- A. Product Data: For each type of metal clad cable and fitting indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Electrical equipment and materials shall be new and within one year of manufacture, complying with the latest codes and standards. No used, re-built, refurbished and/or re-manufactured electrical equipment and materials shall be furnished on this project.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Metal-Clad Cable (MC) shall be manufactured in accordance with UL 1569 – Standard for Metal-Clad Cable for installation in accordance with NFPA 70 (NEC).

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in unopened cartons or bundles as appropriate, clearly identified with manufacturer's name, Underwriter's or other approved label, grade or identifying number.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. AFC Cable Systems, Inc.

#### 2.2 METAL CLAD CABLE ASSEMBLY

- A. Metal clad cable assemblies shall consist of 2 or more insulated, current carrying copper conductors a green insulated copper ground conductor. The Metal-Clad Cable shall be UL Classified as a Through-Penetrating Product (XHLY) for use in One, Two or Three-Hour Through-Penetration Firestop Systems (XHEZ). Assembly shall be suitable for use in cable trays in accordance with the NEC.

- B. Current-Carrying Conductors: Soft annealed copper in compliance with the latest edition of ASTM B3 and/or B8.
- C. Insulated Equipment Grounding Conductor: The equipment ground shall be full-sized in accordance with Table 6.1 of UL 1569 and shall be soft-annealed copper in compliance with the latest edition of ASTM B3 and/or B8. The insulated conductor shall be Type THHN 90°C DRY in accordance with 2.2D.
- D. Insulated Conductor: The insulated conductor shall be Type THHN 90°C DRY. The Type THHN Insulated Conductor shall be manufactured and tested in accordance with UL 83 and UL 1569. Insulated conductor identification shall be in accordance with Section 2.4 COLOR CODES.
- E. Armor: A zinc coated galvanized steel armor shall be applied over the cabled wire assembly with an interlock in compliance with Section 13 of UL 1569. Armor shall be colored in accordance with AFC Cable Systems ColorSpec™ ID System.

### 2.3 FITTINGS

- A. Fittings shall be UL listed and identified for use with metal clad interlocking armor ground.
- B. Connectors shall be of steel or malleable iron and shall have saddle clamp to insure a tight termination of MC Cable to box.

### 2.4 COLOR CODES

- A. Current-Carrying Conductors: Conductors are to be identified to preserve the following color code.

	480Y/277 System	208Y/120V System
Phase A	Brown	Black
Phase B	Orange	Red
Phase C	Yellow	Blue
Neutral	Gray	White
Insulated Ground	Green	Green
Isolated Ground	Green with yellow stripe	Green with yellow stripe

- B. Armor: The Armor Color shall be in accordance with AFC Cable Systems, Inc. ColorSpec™ ID System for the applicable size range.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Pathways and Raceways are the support system for the infrastructure. All pathways shall be run perpendicular or parallel to the building structure. MC Cable bend radius shall not be less than 7 times the external diameter of the cable. All horizontal cable shall be properly supported every 72". Infrastructure Support Systems include, but may not be limited to the following:
  - 1. Properly supported Cable Trays
  - 2. Independent Cable Hangers spaced no more than 60" apart
  - 3. "Trapeze" style supports
- B. In existing buildings the preferred method of support is independently supported cable hangers. These hangers are to be suitable for installation of MC Cable.
- C. In new buildings the preferred method is a combination of Cable Tray and/or J Cable Hangers. All backbone cable shall also follow these cable tray pathways. The primary cable routes will be located over corridors for future maintenance and access.
- D. Wiring shall be installed in compliance with the latest version of the National Electrical Code and other applicable codes and standards as indicated elsewhere in these specifications.
- E. Use of metal clad cable shall be permitted for lighting, equipment and receptacle branch circuits indicated on the Construction Drawings.
- F. Bends in metal clad cable shall be made so that the cable will not be damaged. The radius of the curve of the inner edge of a bend shall not be less than 7 times the diameter of the metallic sheath.
- G. Each branch circuit shall have its own neutral conductor from the branch circuit load back to the circuit breaker panelboard. Shared neutral conductors shall not be installed.
- H. All wiring shall be identified with permanent wire labels, using alphanumeric designations. Terminations and splices shall be identically labeled for the same wire (i.e. common conductors terminated in multiple locations). Wire labels shall agree with the circuit designations on the Construction Drawings.
- I. Identify conductors in outlets, pull boxes and similar locations where conductors are accessible with printed plastic adhesive tapes to show circuit numbers. Wrap tapes at least two turns around conductor. Mark panel identification number with felt tip pen on cloth or plastic tag and attach to entering conductors with nylon string.
- J. Conductors in Enclosures: Provide neat and workmanlike installation with conductors tied with nylon wire ties in terminal cabinets, gutters and similar locations.

### 3.2 SPLICES AND TERMINATIONS

- A. Splices at junction boxes shall be made with an approved, insulated, live spring type connector such as those manufactured by Scotchlock, 3M or Ideal.

### 3.3 FITTINGS

- A. Fittings used for connecting metal clad cable to boxes, light fixtures or other equipment shall be UL listed and identified for such use, as noted in 2.3(A).
- B. Cable preparation for installation of fittings shall follow manufacturer's instructions.
- C. The cable end shall be cleanly cut with metal clad cable rotary cutting tool to ensure flush seating of the cable into the fitting. Fitting securement screws shall be properly torqued.

### 3.4 ARRANGEMENT AND SUPPORT

- A. Where metal clad cables are exposed, run parallel with walls or structural elements. Vertical runs shall be plumb; horizontal runs level and parallel with structure, as appropriate. Groups shall be racked together neatly with both straight runs and bends parallel and uniformly spaced.
- B. Metal clad cables shall be securely fastened in place at intervals of not more than six feet, with suitable clamps or fasteners of approved type, and vertical runs shall be properly supported to present a secure installation.
- C. Metal clad cable installed parallel to framing members, such as studs, joist, or rafters, shall be supported so that the nearest outside surface of the cable is not less than 1-1/4 inches (31 mm) from the nearest edge of the framing member. Where this distance cannot be maintained, the cable shall be protected by a steel plate, sleeve, or equivalent that is at least 1/16-inch thick.
- D. Maintain at least 6-inch clearance between metal clad cables and other piping systems. Maintain 12-inch (300 mm) clearance between metal clad cables and heat sources such as flues, steam pipes, and heating appliances.
- E. No metal clad cable shall be fastened to other conduits or pipes or installed so as to prevent the ready removal of other pipes or ducts for repairs.
- F. Individual metal clad cables hung from roof structure or structural ceiling shall be supported by split-ring hangers and wrought-iron hanger rods. Where 3 or more metal clad cables are suspended from the ceiling in parallel runs, use steel channels, Unistrut or equal, hung from 1/2-inch (13 mm) rods to support the cables. The cables on these channels shall be held in place with metal clad cable clamps designed for the particular channel that is used.
- G. Secure metal clad cable support racks to concrete walls and ceilings by means of cast-in-place anchors; die-cast, rustproof alloy expansion shields; or cast flush anchors. Wooden plugs, plastic inserts, or gunpowder driven inserts shall not be used as a base to secure conduit supports.

- H. Metal clad cable shall be supported immediately on each side of a bend and not more than 1 foot (300 mm) from an enclosure where a run of metal clad cable ends.
- I. Use of cable tray:
  - 1. Basket, ladder rack, or ventilated cable tray may be utilized for support of metal clad cabling.
  - 2. The sum of the cross-sectional areas of cables shall not exceed the maximum allowable cable fill area allowed by NEC Tables 392.22(A), 392.22(A)(5) and 392.22(A)(6)
  - 3. Ampacity of cables installed in cable tray shall meet the requirements of NEC 392.11.
- J. Terminating metal clad cables into panelboards:
  - 1. Provide a junction box within plenum space with sweep elbows down to panelboard, or
  - 2. Use a ladder tray mounted vertically above the panelboard. Strap cables to rungs and install cover on cable tray.

### 3.5 INSPECTION AND TESTS

- A. General: The electrical installation shall be inspected and tested to ensure safety to building occupants and operating personnel and conformity to Code authorities and Subcontract documents. Field tests shall be performed in conformance with the National Electrical Testing Association (NETA) Standards.
- B. All fittings and locknuts shall be re-examined for tightness. A continuity test is to be performed at each connection as a final means of inspection for tightness of joints.