SECTION 26 05 19

WIRES AND CABLES

PART ONE - GENERAL:

1.01 CONDUCTORS:

A. Provide soft-drawn copper conductors in raceways as shown on Drawings. Conductors shall conform to the latest NEC requirements and meet ASTM specifications, with 75/90 degree C, Type THWN/THHN insulation.

B. All wire and cable shall be new, with size, grade of insulation, voltage and manufacturer's name permanently imprinted on outer covering at regular intervals, and delivered to the job site in complete coils and reels. All wires sized #10 and smaller shall be solid, and sizes #8 and larger shall be stranded.

1.02 COLOR CODING:

A. Wire and cable shall have colored insulation in sizes #10 and smaller; and in sizes #8 and larger shall be color coded on the job using Scotch color tape, E-Z code, Brady, or equal wire markers. Color coding shall be as follows:

240 DELTA/120 or 208 WYE/120 VOLT SYSTEM	480 WYE/277 VOLT SYSTEM
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Grounding - Green	

*Provide permanent identification of color coding in each branch circuit panelboard as per NEC.

PART TWO - PRODUCTS:

2.01 CONDUCTORS:

A. Wire and cable shall be as manufactured by Colonial Wire & Cable, Essex, Southwire Co., General Cable, Rome Cable, or approved equal.

2.02 CONNECTORS:

A. Connectors, lugs, and terminals, shall be as manufactured by 3M Company, Ideal, Anderson, Thomas & Betts, OZ Electrical Mfg. Co., or approved equal.

PART THREE - EXECUTION:

3.01 CONDUCTORS:

A. Minimum wire size for all branch circuits shall be #12 except where indicated otherwise. If the

distance from the panelboards to the first outlet exceeds 50 ft., the minimum size conductor for this run shall be #10. If the distance from the panelboards to the first outlet exceeds 100 ft., the minimum size conductor for this run shall be #8. If in special cases this distance must be exceeded, larger conductors of sizes noted on the plans shall be installed.

B. Do not pull conductors before completion of masonry, concrete, and other trades which generate dust and debris.

C. Wire and cables shall be suitably protected from weather during storage and handling and shall be in good condition when installed.

3.02 TERMINATIONS:

A. Conductors #8 and larger shall be connected to equipment by means of pressure type mechanical lugs. Where multiple conductors are connected to the same terminal, each conductor shall be provided with an individual lug.

B. Solderless connectors of the proper type shall be used for all wiring connections. Where compression type connectors are noted on the plans and in the specifications, they shall be installed with approved hydraulic tools to assure a permanent, mechanically secure, high-conductivity joint. Where soldered joints are specified, the cable joint shall be mechanically strong before soldering. Solder shall be carefully applied without use of acid. Soldered connection shall be wrapped with rubber and friction or insulating plastic tape in a manner approved for circuit voltage.

3.03 TAPS AND SPLICES:

A. All cable taps, and splices shall be made secure with solderless pressure type connectors, unless otherwise specified. Where compression type connectors are noted on the plans and in the specifications, they shall be installed with approved hydraulic tools to assure a permanent, mechanically secure, high-conductivity joint. Where soldered joints are specified, the cable joint shall be mechanically strong before soldering. Solder shall be carefully applied without use of acid. Soldered connection shall be wrapped with rubber and friction or insulating plastic tape in a manner approved for circuit voltage.

B. All high-voltage conductor and cable splices, connections, and terminations shall be made with termination or splicing kits containing the necessary connectors and insulating materials for the specific cable size and type involved.

C. Where conductors are to be connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed.

D. Join conductors with twist on wire connectors sized for the number and gauge of conductors or by soldering, brazing, or welding. Tape all soldered or brazed connections or cover with approved prefabricated insulating devices to provide insulation resistance at the connection equal to that of the wire. Make splices in boxes or fittings only. Push in type wire connectors shall not be used.

3.04 INSULATION RESISTANCE TESTING

A. All panel board and switchboard feeders shall be tested prior to energizing. 480V feeders shall be

tested at 1000 VDC, 208V and 240V feeders shall be tested at 500 VDC.

B. All current carrying and neutral conductors in every set of conductors shall be tested. Each current carrying and neutral conductor shall be tested to ground and to each other.

C. All resistance measurements shall be recorded after 60 seconds and all measurements shall be temperature corrected to 60 degrees F.

D. For each test measurement, the electrical contractor shall record the following information: Project name, date, temperature, humidity, testers name, testing device manufacturer and model number, feeder origin and termination points, test voltage, set number (for parallel feeders), conductor length, conductor size, measurement origin and termination (for example “A phase to ground “or” A phase to B phase”), insulation resistance in meg-ohms per foot at 60 degrees F, and the signature of the tester. A sample form is attached and a spreadsheet which calculates the corrected insulation readings in meg-ohms per foot at 60 degrees F is available from the engineer.

E. All feeder insulation resistance measurements shall be forwarded to the engineer for review prior to energizing of the feeder. Copies shall also be collected into a binder and submitted to the owner as part of the operations and maintenance (O & M) documentation.

F. Cables with an insulation resistance measurement corrected to 60 degrees F, which is less than 2 meg-ohms per foot shall be replaced by the electrical contractor at no additional cost to the owner.

END OF SECTION

Project Name			**Tester's Name**		
Test Date			**Tester's Signature**		
Test Voltage (use 1000 volts for 480V, 500 volts for 208 /240V)		Volts DC	**Testing Device (Make & Model)**		
Feeder Origin			**Feeder Destination**		
Feeder Operating Voltage		Volts	**Feeder Length**		Feet
Temperature		Degree F	**Humidity**		% RH

	MEASURED INSULATION READING (in Meg Ohms at ambient temperature)													
Set #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
A TO B														
A TO C														
B TO C														
A TO N														
B TO N														
C TO N														
A TO G														
B TO G														
C TO G														
N TO G														

	CORRECTED INSULATION READING (Meg Ohms/ft at 60 deg F temperature)													
Set #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
A TO B														
A TO C														
B TO C														
A TO N														
B TO N														
C TO N														
A TO G														
B TO G														
C TO G														
N TO G														