SECTION 260560

INSTALLATION OF WIRE AND CABLE

PART 1 - GENERAL

1.1 GENERAL

A. THE PROVISIONS OF SECTION 260500, GENERAL REQUIREMENTS FOR ELECTRICAL WORK, APPLY TO THE WORK OF THIS SECTION.

1.2 CODES AND STANDARDS:

A. PRODUCTS SHALL COMPLY WITH THE FOLLOWING CODES AND STANDARDS AND SHALL BE UL-LISTED AND LABELED WHERE APPLICABLE.

UL 486A	WIRE CONNECTORS AND SOLDERING LUGS FOR USE WITH COPPER CONDUCTORS.
UL 510	ELECTRICAL INSULATING TAPE

PART 2 - PRODUCTS

2.1 WIRE AND CABLE

A. WIRE AND CABLE ARE SPECIFIED IN OTHER SECTIONS OF DIVISION 26.

2.2 TERMINATIONS AND SPLICES

A. POWER WIRING:

1. TERMINAL LUGS, CONNECTORS AND SPLICES SHALL BE TIN PLATED, HIGH CONDUCTIVITY COPPER COMPRESSION TYPE. THEY SHALL HAVE CHAMFERED BARRELS AND BE PERMANENTLY IDENTIFIED WITH CONDUCTOR SIZES.

2. TERMINAL LUGS FOR CONDUCTORS NO. 3/0 AWG AND LARGER SHALL BE LONG BARREL NEMA TWO HOLE TYPE.

3. SPLICES SHALL BE LONG BARREL BUTT TYPE WITH A CENTER STOP IN THE SPLICE BARREL.

4. HYDRAULIC CRIMPING TOOLS WITH PROPER DIE SIZES WHICH REQUIRE FULL CLOSURE BEFORE REOPENING SHALL BE USED.

B. LIGHTING AND BRANCH CIRCUITS

1. SPLICES AND TAPS IN LIGHTING AND BRANCH CIRCUIT WIRING SHALL BE 3M SCOTCHLOK SPRING CONNECTORS OR EQUAL.

C. METAL CLAD CABLE CONNECTORS.

1. FOR NON-JACKETED METAL CLAD CABLE IN DRY LOCATIONS, CABLE TERMINATIONS SHALL BE O.Z. GEDNEY TYPE PK FOR USE WITH GALVANIZED STEEL ARMOR OR TYPE PK-A FOR USE WITH ALUMINUM ARMOR. CABLE TERMINATIONS SHALL BE PROVIDED WITH LOCKNUTS AND BUSHINGS.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW UNLESS OTHERWISE INDICATED:
1. EXPOSED CONDUIT: GRC.
2. CONCEALED CONDUIT, ABOVEGROUND: GRC.
3. UNDERGROUND CONDUIT: RNC, TYPE EPC-40-PVC
4. BOXES AND ENCLOSURES, ABOVEGROUND: NEMA 250, TYPE 3R.

B. INDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW UNLESS OTHERWISE INDICATED:
1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
2. EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: GRC. RACEWAY LOCATIONS INCLUDE THE FOLLOWING:
3. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: TYPE MC CABLE.
4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
5. DAMP OR WET LOCATIONS: GRC.
6. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 4 STAINLESS STEEL IN DAMP OR WET LOCATIONS.

A. MINIMUM RACEWAY SIZE: 3/4"-TRADE SIZE
B. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
1. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS UNLESS OTHERWISE INDICATED. COMPLY WITH NEMA FB 2.10.
2. EMT: USE SETSCREW OR COMPRESSION, STEEL FITTINGS. COMPLY WITH NEMA FB 2.10.
3. FLEXIBLE CONDUIT: USE ONLY FITTINGS LISTED FOR USE WITH FLEXIBLE CONDUIT. COMPLY WITH NEMA FB 2.20.

C. DO NOT INSTALL ALUMINUM CONDUITS, BOXES, OR FITTINGS IN CONTACT WITH CONCRETE OR EARTH.

3.2 PREPARATION OF RACEWAYS

A. RACEWAYS SHALL BE SUBSTANTIALLY COMPLETED BEFORE ANY WIRING IS INSTALLED IN THEM. BEFORE ANY WIRING IS PULLED INTO A CONDUIT, THE CONDUIT SHALL BE CLEANED AND TESTED FOR OBSTRUCTIONS AND CLEARED OF FOREIGN MATERIAL THAT MAY BE FOUND.

3.3 PULLING INTO RACEWAYS

A. ALL POSSIBLE CARE SHALL BE TAKEN IN PULLING OF WIRING INTO CONDUITS OR OTHER RACEWAYS. THE CABLE REELS OR COILS SHALL BE SET UP IN SUCH A WAY THAT THE CONDUCTOR MAY BE TRAINED INTO THE RACEWAY AS DIRECTLY AS POSSIBLE WITH A MINIMUM NUMBER OF CHANGES OF DIRECTION OR AMOUNT OF BENDING. WHERE SEVERAL CABLES ARE CONTAINED IN ONE CONDUIT, ALL SUCH CABLES SHALL BE PULLED IN TOGETHER.

B. THE USE OF PULLING LUBRICANTS SHALL BE RESTRICTED TO NON-HARDENING TYPE, APPROVED BY UL AND THE CABLE MANUFACTURER.

3.4 SPLICES AND TERMINATIONS

A. ALL POWER AND CONTROL WIRING SHALL BE CONTINUOUS AND SHALL NOT BE SPLICED UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

B. BOLTS, NUTS AND HARDWARE USED FOR TERMINATIONS SHALL BE SILICONE BRONZE.

C. WHERE TERMINATIONS ARE MADE ON INSULATED BUSES, THE TERMINATIONS SHALL BE INSULATED USING THE PROPER TAPE(S) AND FILLERS FOR THE VOLTAGE LEVEL OF THE CABLE.

D. CONNECTIONS IN MOTOR TERMINAL BOXES SHALL BE MADE BY INSTALLING COMPRESSION TYPE LUGS ON THE MOTOR BRANCH CIRCUIT CONDUCTORS AND THE MOTOR LEADS AND BOLTING THE LUGS TOGETHER THEN INSULATING WITH MOTOR LEAD CONNECTION KITS, RAYCHEM, 3M OR EQUAL.

3.5 IDENTIFICATION

A. ALL POWER WIRING CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:

PHASE	208Y/120V	480Y/277V
PHASE A	BLACK	BROWN
PHASE B	RED	ORANGE
PHASE C	BLUE	YELLOW
NEUTRAL	WHITE	GRAY
GROUND	GREEN	GREEN

END OF SECTION 260560

SECTION 262200

LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES THE FOLLOWING TYPES OF DRY-TYPE TRANSFORMERS RATED 600 V AND LESS, WITH CAPACITIES UP TO 1000 KVA:

1. DISTRIBUTION TRANSFORMERS.

1.3 ACTION SUBMITTALS
A. PRODUCT DATA: INCLUDE RATED NAMEPLATE DATA, CAPACITIES, WEIGHTS, DIMENSIONS, MINIMUM CLEARANCES, INSTALLED DEVICES AND FEATURES, AND PERFORMANCE FOR EACH TYPE AND SIZE OF TRANSFORMER INDICATED.
B. SHOP DRAWINGS: DETAIL EQUIPMENT ASSEMBLIES AND INDICATE DIMENSIONS, WEIGHTS, LOADS, REQUIRED CLEARANCES, METHOD OF FIELD ASSEMBLY, COMPONENTS, AND LOCATION AND SIZE OF EACH FIELD CONNECTION.

1. WIRING DIAGRAMS: POWER, SIGNAL, AND CONTROL WIRING.

1.4 CLOSEOUT SUBMITTALS
A. OPERATION AND MAINTENANCE DATA: FOR TRANSFORMERS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS.

1.5 QUALITY ASSURANCE
A. SOURCE LIMITATIONS: OBTAIN EACH TRANSFORMER TYPE THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER.
B. 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.
C. COMPLY WITH IEEE C57.12.91, "TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY THE FOLLOWING:

1. EATON ELECTRICAL INC.; CUTLER-HAMMER PRODUCTS.

2.2 GENERAL TRANSFORMER REQUIREMENTS
A. DESCRIPTION: FACTORY-ASSEMBLED AND -TESTED, AIR-COOLED UNITS FOR 60-HZ SERVICE.
B. CORES: GRAIN-ORIENTED, NON-AGING SILICON STEEL.
C. COILS: CONTINUOUS WINDINGS WITHOUT SPLICES EXCEPT FOR TAPS.

1. INTERNAL COIL CONNECTIONS: BRAZED OR PRESSURE TYPE.

2. COIL MATERIAL: ALUMINUM.

2.3 DISTRIBUTION TRANSFORMERS
A. COMPLY WITH NEMA ST 20, AND LIST AND LABEL AS COMPLYING WITH UL 1561.

B. CORES: ONE LEG PER PHASE.

C. ENCLOSURE: VENTILATED, NEMA 250, TYPE 2.

1. CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.

D. TRANSFORMER ENCLOSURE FINISH: COMPLY WITH NEMA 250.

1. FINISH COLOR: ANSI 49 GRAY.

E. TAPS FOR TRANSFORMERS SMALLER THAN 3 KVA: NONE.

F. TAPS FOR TRANSFORMERS 7.5 TO 24 KVA: TWO 5 PERCENT TAPS BELOW RATED VOLTAGE.

G. TAPS FOR TRANSFORMERS 25 KVA AND LARGER: TWO 2.5 PERCENT TAPS ABOVE AND FOUR 2.5 PERCENT TAPS BELOW NORMAL FULL CAPACITY.

H. INSULATION CLASS: 220 DEG C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 150 DEG C RISE ABOVE 40 DEG C AMBIENT TEMPERATURE.

I. ENERGY EFFICIENCY FOR TRANSFORMERS RATED 15 KVA AND LARGER:

1. COMPLYING WITH NEMA TP 1, CLASS 1 EFFICIENCY LEVELS.

2. TESTED ACCORDING TO NEMA TP 2.

J. LOW-SOUND-LEVEL REQUIREMENTS: MINIMUM OF 3 DBA LESS THAN NEMA ST 20 STANDARD SOUND LEVELS WHEN FACTORY TESTED ACCORDING TO IEEE C57.12.91.

2.4 IDENTIFICATION DEVICES

A. NAMEPLATES: ENGRAVED, LAMINATED-PLASTIC OR METAL NAMEPLATE FOR EACH DISTRIBUTION TRANSFORMER, MOUNTED WITH CORROSION-RESISTANT SCREWS. NAMEPLATES AND LABEL PRODUCTS ARE SPECIFIED IN SECTION 260553 "IDENTIFICATION FOR ELECTRICAL SYSTEMS."

2.5 SOURCE QUALITY CONTROL
A. TEST AND INSPECT TRANSFORMERS ACCORDING TO IEEE C57.12.91.

B. FACTORY SOUND-LEVEL TESTS: CONDUCT SOUND-LEVEL TESTS ON EQUIPMENT FOR THIS PROJECT.

PART 3 - EXECUTION

3.1 EXAMINATION
A. EXAMINE CONDITIONS FOR COMPLIANCE WITH ENCLOSURE- AND AMBIENT-TEMPERATURE REQUIREMENTS FOR EACH TRANSFORMER.
B. VERIFY THAT FIELD MEASUREMENTS ARE AS NEEDED TO MAINTAIN WORKING CLEARANCES REQUIRED BY NFPA 70 AND MANUFACTURER'S WRITTEN INSTRUCTIONS.
C. EXAMINE WALLS, FLOORS, ROOFS, AND CONCRETE BASES FOR SUITABLE MOUNTING CONDITIONS WHERE TRANSFORMERS WILL BE INSTALLED.

D. VERIFY THAT GROUND CONNECTIONS ARE IN PLACE AND REQUIREMENTS IN SECTION 260526 "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS" HAVE BEEN MET. MAXIMUM GROUND RESISTANCE SHALL BE 5 OHMS AT LOCATION OF TRANSFORMER.
E. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. CONSTRUCT CONCRETE BASES AND ANCHOR FLOOR-MOUNTING TRANSFORMERS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS, SEISMIC CODES APPLICABLE TO PROJECT, AND REQUIREMENTS IN SECTION 260529 "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS."

3.3 CONNECTIONS
A. GROUND EQUIPMENT ACCORDING TO SECTION 260526 "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS."
B. CONNECT WIRING ACCORDING TO SECTION 260519 "LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES."

3.4 FIELD QUALITY CONTROL

A. TESTS AND INSPECTIONS:

1. PERFORM EACH VISUAL AND MECHANICAL INSPECTION AND ELECTRICAL TEST STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.

B. REMOVE AND REPLACE UNITS THAT DO NOT PASS TESTS OR INSPECTIONS AND RETEST AS SPECIFIED ABOVE.

C. TEST LABELING: ON COMPLETION OF SATISFACTORY TESTING OF EACH UNIT, ATTACH A DATED AND SIGNED "SATISFACTORY TEST" LABEL TO TESTED COMPONENT.

3.5 ADJUSTING
A. RECORD TRANSFORMER SECONDARY VOLTAGE AT EACH UNIT FOR AT LEAST 48 HOURS OF TYPICAL OCCUPANCY PERIOD. ADJUST TRANSFORMER TAPS TO PROVIDE OPTIMUM VOLTAGE CONDITIONS AT SECONDARY TERMINALS. OPTIMUM IS DEFINED AS NOT EXCEEDING NAMEPLATE VOLTAGE PLUS 10 PERCENT AND NOT BEING LOWER THAN NAMEPLATE VOLTAGE MINUS 3 PERCENT AT MAXIMUM LOAD CONDITIONS. SUBMIT RECORDING AND TAP SETTINGS AS TEST RESULTS.

B. CONNECT BUCK-BOOST TRANSFORMERS TO PROVIDE NAMEPLATE VOLTAGE OF EQUIPMENT BEING SERVED, PLUS OR MINUS 5 PERCENT, AT SECONDARY TERMINALS.

C. OUTPUT SETTINGS REPORT: PREPARE A WRITTEN REPORT RECORDING OUTPUT VOLTAGES AND TAP SETTINGS.

3.6 CLEANING
A. VACUUM DIRT AND DEBRIS; DO NOT USE COMPRESSED AIR TO ASSIST IN CLEANING.

END OF SECTION 262200

Reviewed for Code Compliance
Inside Plan Review
Approved as Noted
Date: 09/06/16

REV	DESCRIPTION	DATE
0	PERMIT SET	7-1-16

PERMIT SET
7-1-16

CURRENT ISSUE STATUS:

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SPECIFICATIONS

SHEET TITLE:

0 1/4" 1/2" 1" 2" 3"

SCALE: NONE

PROJECT MANAGER:	KD	PROJECT NO:	16087
A/E OF RECORD:	RB		
JOB CAPTAIN:	SHK		
DRAWN BY:	CDS		
SMRT FILE:	E-003-16087	SHEET No.	E-003

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