SECTION 262416

PANELBOARDS

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:

NEMA AB–1	MOLDED CASE CIRCUIT BREAKERS
NEMA PB–1	PANELBOARDS
UL 50	ENCLOSURES FOR ELECTRICAL EQUIPMENT
UL 67	PANELBOARDS
UL 489	MOLDED CASE CIRCUIT BREAKERS AND CIRCUIT BREAKER ENCLOSURES

1.3 SUBMITTALS

A. MANUFACTURER'S PRODUCT DATA SHEETS.

B. CIRCUIT BREAKER SCHEDULES.

C. DIMENSIONED PLANS, ELEVATIONS, SECTIONS AND DETAILS.

1.4 MANUFACTURERS

A. SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION:

SQUARE D
APPROVED EQUAL

PART 2 – PRODUCTS

2.1 GENERAL

A. PANELBOARDS SHALL BE OF THE SIZES, RATING AND ARRANGEMENT SHOWN ON THE DRAWINGS.

B. PANELBOARDS SHALL BE PROVIDED COMPLETE WITH ALL OVERCURRENT DEVICES, ACCESSORIES AND TRIM.

C. ALL PANELBOARDS SHALL BE PROVIDED WITH SAFETY BARRIERS FOR DEAD FRONT CONSTRUCTION.

D. THE REQUIRED SHORT CIRCUIT RATINGS OF ASSEMBLED PANELBOARDS ARE SHOWN ON THE DRAWINGS. THE SHORT CIRCUIT RATING OF EVERY OVERCURRENT DEVICE IN THE PANEL SHALL MEET OR EXCEED THE PANEL RATING. UNLESS OTHERWISE NOTED ON THE DRAWINGS, SERIES RATED COMBINATIONS WILL NOT BE PERMITTED.

E. PROVIDE THROUGH–FEED OR SUB–FEED LUGS AS INDICATED ON PANEL SCHEDULES.

F. LOAD CENTER SHALL NOT BE ACCEPTED.

2.2 CABINETS

A. BOXES SHALL BE CODE GAUGE GALVANIZED SHEET STEEL.

B. TRIM SHALL BE CODE GAUGE STEEL, ANSI–61 GRAY FINISH WITH STAINLESS STEEL FLUSH TYPE LOCK/LATCH HANDLE. ALL LOCKS SHALL BE KEYED ALIKE.

C. TRIM FOR SURFACE MOUNTED PANELS SHALL BE DOOR–IN–DOOR CONSTRUCTION SUCH THAT THE GUTTER SPACE MAY BE EXPOSED BY A HINGED DOOR.

D. DIRECTORY FRAMES SHALL BE METAL FRAME WITH PLASTIC COVERS.

2.3 BUS

A. ALL BUS WORK SHALL BE COPPER.

B. NEUTRAL BUSSES SHALL BE 100% RATED WITH ADEQUATE CONNECTIONS FOR ALL OUTGOING NEUTRAL CONDUCTORS.

C. PANELBOARDS SHALL BE PROVIDED WITH COPPER GROUND BUSSES. PROVIDE ISOLATED GROUND BUSES WHERE INDICATED ON THE DRAWINGS.

D. BUS SHALL BE DESIGNED FOR SEQUENCE PHASE CONNECTION TO ALLOW THE INSTALLATION OF ONE, TWO OR THREE POLE BRANCH CIRCUIT BREAKERS IN ANY POSITION.

2.4 OVERCURRENT DEVICES

A. OVERCURRENT DEVICES SHALL BE TRIP–FREE MOLDED CASE, BOLT–ON, THERMAL–MAGNETIC CIRCUIT BREAKERS.

B. MAIN CIRCUIT BREAKERS SHALL BE INDIVIDUALLY MOUNTED AND BOLTED TO BUS ASSEMBLY. BACK–FED BRANCH MOUNTED CIRCUIT BREAKERS ARE PROHIBITED.

C. FRONT FACES OF ALL CIRCUIT BREAKERS SHALL BE FLUSH. TRIP INDICATION SHALL BE CLEARLY SHOWN BY THE HANDLE POSITION BETWEEN THE ON AND OFF POSITIONS.

D. GROUND FAULT AND ARC FAULT CIRCUIT BREAKERS SHALL REQUIRE NO MORE PANEL SPACE THAN STANDARD BREAKERS.

E. ALL CONNECTIONS SHALL BE RATED FOR 75° C COPPER CONDUCTORS.

PART 3 – EXECUTION

3.1 PANELBOARDS

A. PANELBOARDS SHALL BE LABELED IN ACCORDANCE WITH SECTION 260500, GENERAL REQUIREMENTS FOR ELECTRICAL WORK.

B. PANELBOARD COVERS ARE REQUIRED TO HAVE 2 LABELS. THE FIRST, AN ARC FLASH WARNING LABEL AND THE SECOND, AN OSHA LABEL REQUIRING 3 FEET, (3 FEET 6 INCHES OR 4 FEET AS APPLICABLE), CLEARANCE IN FRONT OF THE PANEL.

END OF SECTION 262416

SECTION 265100

LIGHTING FIXTURES

PART 1 – GENERAL

1.1 GENERAL

A. PROVISIONS OF SECTION 260500, GENERAL REQUIREMENTS FOR ELECTRICAL WORK AND SECTION 260560, INSTALLATION OF WIRE AND CABLE 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:

CBM LABELS	CERTIFIED BALLAST MANUFACTURERS ASSOC.
NEC ART. 410	NATIONAL ELECTRICAL CODE
FCC, PART 18	RFI AND EMI
ANSI C62.41	LINE TRANSIENT PROTECTION
UL 1570	FLUORESCENT LIGHTING FIXTURES
UL 924	EMERGENCY LIGHTING AND POWER EQUIPMENT
UL 1088	TEMPORARY LIGHTING

1.3 SUBMITTALS

A. SUBMIT MANUFACTURER'S PRODUCT DATA, PHOTOMETRICS, AND INSTALLATION INSTRUCTIONS FOR EACH TYPE OF LIGHT FIXTURE SPECIFIED. FIXTURE SUBMITTALS SHALL BE IN BOOKLET FORM WITH SEPARATE SHEET FOR EACH FIXTURE ASSEMBLED IN "LUMINAIRE TYPE" ALPHABETICAL ORDER, WITH PROPOSED FIXTURE AND ACCESSORIES CLEARLY INDICATED ON EACH SHEET.

B. SUBMIT ON A SEPARATE SHEET FOR EACH FLUORESCENT FIXTURE TYPE SPECIFIED, THE BALLAST MANUFACTURER, TYPE AND TECHNICAL DATA FOR THAT BALLAST.

C. SUBMIT ON A SEPARATE SHEET FOR EACH LIGHT FIXTURE SPECIFIED, THE PROPOSED LAMP AND MANUFACTURERS DATA FOR THAT LAMP.

1.4 MANUFACTURERS

A. PROVIDE PRODUCTS OF THE MANUFACTURERS SPECIFIED ON THE CONTRACT DRAWINGS AND AS LISTED UNDER PART 2 OF THIS SECTION, OR APPROVED EQUAL.

PART 2 – PRODUCTS

2.1 GENERAL

A. LIGHT FIXTURES SHALL BE PROVIDED WITH HOUSINGS, TRIMS, GASKETS, BALLASTS, LAMP HOLDERS, SOCKETS, REFLECTORS, WIRING AND OTHER COMPONENTS REQUIRED, AS A FACTORY–ASSEMBLED UNIT FOR A COMPLETE INSTALLATION.

B. PROVIDE ELECTRICAL WIRING WITHIN LIGHT FIXTURES SUITABLE FOR CONNECTING TO BRANCH CIRCUIT WIRING IN ACCORDANCE WITH N.E.C. ARTICLE 410, PARAGRAPH 52.

C. DELIVER INTERIOR LIGHTING FIXTURES IN FACTORY FABRICATED CONTAINERS AND WRAPPING, WHICH PROPERLY PROTECT FIXTURES FROM DAMAGE.

D. STORE INTERIOR LIGHTING FIXTURES IN ORIGINAL PACKAGING. STORE INSIDE WELL–VENTILATED AREA PROTECTED FROM WEATHER, MOISTURE, SOILING, HUMIDITY, EXTREME TEMPERATURES, LAID FLAT AND ON SKIDS TO KEEP OFF FLOORS AND GROUND.

E. FIXTURES INSTALLED IN CEILINGS, SUSPENDED FROM CEILINGS OR ON WALLS SHALL HAVE A PLASTIC FILM COVERING PROTECTING LENS, LOUVER AND LAMPS FROM DUST, DIRT AND DEBRIS. PLASTIC FILM SHALL NOT BE REMOVED UNTIL CONSTRUCTION IS COMPLETED.

F. PROVIDE CLASS 100000 CLEAN ROOM FIXTURES.

2.2 FLUORESCENT FIXTURES

A. GENERAL: PROVIDE FLUORESCENT FIXTURES OF SIZES, TYPES AND RATINGS INDICATED AND SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE ON THE CONTRACT DRAWINGS.

B. INDOOR FLUORESCENT FIXTURES CONTAINING DOUBLE–ENDED T8 LAMPS SHALL BE PROVIDED WITH AN INTERNAL DISCONNECTING MEANS TO DISCONNECT POWER TO THE FIXTURE.

C. FLUORESCENT–LAMP BALLASTS: PROVIDE LOW–ENERGY SOLID STATE FLUORESCENT LAMP BALLASTS, OPERATING LAMPS WITH A FREQUENCY OF >20KHZ AND CAPABLE OF OPERATING LAMP TYPES INDICATED. BALLASTS SHALL BE HIGH POWER FACTOR >0.90, CLASS A SOUND RATING. BALLASTS SHALL HAVE LAMP CURRENT CREST FACTOR OF 1.7 OR LESS AND TOTAL HARMONIC DISTORTION LESS THAN 20%. BALLASTS SHALL BE UL LISTED, CLASS P, AND MEET FCC 47CFR PART 18 NON–CONSUMER AND MEET APPLICABLE ANSI STANDARD.

1. BALLASTS THAT OPERATE T8 LAMPS SHALL HAVE THE FOLLOWING REQUIREMENTS:

A. NORMAL BALLAST FACTOR (0.88–1.03)
B. BALLAST SHALL BE PROGRAMMED START TYPE
C. BALLAST MUST BE CAPABLE OF 0°F STARTING.
B. BALLAST SHALL BE ONE OF THE FOLLOWING:
1. SYLVANIA QUICKTRONIC PROSTART PSN SERIES.
2. GENERAL ELECTRIC ULTRAMAX SERIES.
3. ADVANCE OPTANIUM IOP SERIES.

2.3 LAMPS

A. PROVIDE FLUORESCENT LAMPS OF TYPES AS INDICATED ON THE CONTRACT DRAWINGS.

B. T8 LAMP TYPE:

1. ALL LAMPS SHALL HAVE A MINIMUM 85 CRI AND AN AVERAGE RATED LIFE OF 30,000 HOURS BASED ON 3HRS/START WHEN USED WITH A PROGRAMMED RAPID START BALLAST. A 32 WATT LAMP SHALL BE MINIMUM 2950 LUMENS.

2. LAMP COLOR TEMPERATURE SHALL BE COOL WHITE, 3500K UNLESS OTHERWISE NOTED.

3. LAMPS SHALL BE ONE OF THE FOLLOWING:
A. SYLVANIA OCTRON 800XPS SERIES.
B. GENERAL ELECTRIC ECOLUX STARCOAT T8 SERIES.
C. PHILIPS 800 ALTO T8 SERIES.

PART 3 – EXECUTION

3.1 GENERAL

A. EXAMINE ALL AREAS AND CONDITIONS UNDER WHICH LIGHTING FIXTURES ARE TO BE INSTALLED AND STRUCTURE WHICH WILL SUPPORT LIGHTING FIXTURES. NOTIFY THE GENERAL CONTRACTOR IN WRITING OF ANY CONDITIONS WHICH ARE DETRIMENTAL TO PROPER INSTALLATION AND COMPLETION OF THE WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN A MANNER ACCEPTABLE TO THE INSTALLER.

B. COORDINATE LIGHT FIXTURE INSTALLATIONS WITH OTHER TRADES. FLUORESCENT LIGHT FIXTURES SHOULD BE INSTALLED AT LEAST TWO FEET AWAY FROM SMOKE DETECTORS. COORDINATE ALL LIGHTING FIXTURES WITH MECHANICAL PIPING AND DUCTWORK TO ALLOW FOR PROPER CLEARANCE.

3.2 INSTALLATION

A. INSTALL ALL LIGHTING FIXTURES AT LOCATIONS AND HEIGHTS INDICATED, IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.

B. PROVIDE FIXTURES AND/OR FIXTURE OUTLET BOXES WITH HANGERS, CHANNEL OR OTHER METHOD OF FASTENING AND SUPPORTING FIXTURES REQUIRED FOR PROPER INSTALLATION.

C. LUMINAIRES INSTALLED IN SUSPENDED CEILINGS SHALL BE INDEPENDENTLY SUPPORTED, DIRECTLY FROM THE BUILDING STRUCTURE. EACH LUMINAIRE SHALL BE SUPPORTED AT EACH END.

D. TIGHTEN CONNECTORS AND TERMINALS, INCLUDING SCREWS AND BOLTS IN ACCORDANCE WITH EQUIPMENT MANUFACTURER'S PUBLISHED TORQUE TIGHTENING VALUES FOR EQUIPMENT CONNECTORS. ALL SCREWS AND BOLTS SHALL HAVE WASHERS.

3.3 SPLICES AND TERMINATIONS

A. TWIST ON WIRE CONNECTORS SHALL BE INSTALLED WHICH UTILIZE SQUARE_WIRE SPRING GRIPS AND THERMO PLASTIC SHELLS. INSTALL CONNECTORS TO MEET THE MANUFACTURER'S TORQUING REQUIREMENTS. INSTALL WIRE CONNECTORS OF SIZE REQUIRED AS NOT TO EXCEED THE MANUFACTURERS UL–LISTED CSA RECOGNIZED WIRE COMBINATIONS.

3.4 FIELD QUALITY CONTROL

A. AT DATE OF SUBSTANTIAL COMPLETION, ALL LAMPS THAT ARE NOT FUNCTIONING, HAVE COLOR DEFICIENCIES, OR ARE NOTICEABLY DIMMED SHALL BE REPLACED WITH NEW LAMPS AS DETERMINED BY THE ENGINEER.

B. ALL LAMPS USED FOR TEMPORARY LIGHTING IN NEW LIGHT FIXTURES SHALL BE REPLACED WITH NEW LAMPS.

C. ALL LIGHT FIXTURES SHALL BE CLEANED OF DIRT AND DEBRIS UPON COMPLETION OF CONSTRUCTION. ALL FINGER PRINTS AND SMUDGES SHALL BE CLEANED.

D. ALL INSTALLED FIXTURES DURING REMAINDER OF CONSTRUCTION SHALL BE PROTECTED IN ACCORDANCE WITH SECTION 2.1 PARAGRAPH E OF THIS SPECIFICATION SECTION.

E. ALL LIGHT FIXTURES SHALL BE GROUNDED IN ACCORDANCE WITH ARTICLE 250 AND 410 OF THE NEC. TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUES SPECIFIED IN UL 486A TO ASSURE PERMANENT AND EFFECTIVE GROUNDS.

F. ALL LIGHT FIXTURES DAMAGED IN SHIPPING OR DURING INSTALLATION SHALL BE REPLACED WITH NEW FIXTURES AT NO COST TO THE OWNER.

END OF SECTION 265100

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