

26 05 13 MEDIUM VOLTAGE CABLE

PART 1: GENERAL

- A. Copper only – no aluminum
- B. 4/0, Coppershield, rated at 15kV minimum.

26 05 19 LOW VOLTAGE ELECTRICAL POWER CABLE/CONDUCTORS

PART 1: GENERAL

- A. Stranded Copper only – no aluminum
- B. No MC or BC cable
- C. 600V rated, minimum.

26 20 00 LOW VOLTAGE

PART 1: PRODUCTS

1.01 Wiring Devices

A. Electrical Requirements

- 1. Minimum 20 ampere rated switches shall be used for lighting and power loads. In cases where wall dimmers are used, the dimmer shall be solid-state design with flicker noise control. Minimum accepted manufacturer and quality – Lutron Nova T Series.
- 2. Outlet

1.02 Disconnect Switches

- A. Use heavy duty type fused and non-fused, enclosed switches only.

1.03 Metal Enclosed Distribution Switchgear

- A. Preferred use ANSI C37.15/UL1066, draw out mounted, power circuit breakers in the switchgear.

B. Metering:

- 1. Coordinate location of sub-metering & requirements with SHSU, Electro Industries 100-series Shark Meter preferred, as applicable.

1.04 Panel boards

- A. All panel boards shall have door locks. The front cover shall be a door in door arrangement with the inner door hinged to allow breaker handle access.

PART 1: PRODUCTS

1.01 General Requirements

- A. Acceptable manufacturers and models:
ABB ACH550 is preferred.

1.02 Communications

- A. EIA-485 and EIA-232 ports as standard.
- B. Communicate with PLC's, DDC's, BACnet, and other communication protocols. Components included for interface with the selected Building Automation System.
- C. Serial port to download drive parameters and fault logs.
- D. Programmable inputs and outputs.

26 30 00 POWER GENERATING EQUIPMENT

PART 1: GENERAL

1.03 Emergency System

1. Fire pumps shall be connected to the emergency system per applicable codes.
2. Generator shall and or enclosure shall be manufactured to provide sound attenuation to 85 dB at 10 Ft.
3. Natural gas preferred
4. Where diesel generators are used PSP shall provide a design where by refueling can be accomplished at street level.

PART 2: PRODUCTS

2.01 Engine Generators

- A. The generator set shall be a natural gas, four-stroke engine, and rated for emergency service at 480Y/277 Volts, grounded-wye, 60 Hz. Diesel generators are acceptable where natural gas is not available. Fuel supply must be capable of supporting operation for a minimum 72 hours without a refuel.
- B. The natural gas fired engine-generator set shall be rated not less than specified kW/kVA at 0.8 power factor on an emergency basis. The AC synchronous generator shall be rated 60 Hz, 4 pole, revolving field, 1800 RPM for use with a 208Y/120 or 480Y/277 VAC, 3 phase, 4 wire electrical

system. The alternator shall be oversized and rated for at least 125% of the specified kW/kVA at 80 degree rise for non-linear load considerations.

- C. The engine-generator set shall be capable of picking up a minimum of 100% nameplate and connected kW and power factor, less applicable de-rating factors, in one step with the unit at operating temperature.
- D. The engine-generator set shall have a motor starting or surge KVA capability of three times the rated KVA based upon a recovered sustained RMS voltage drop of no more than 10% of no load voltage with the specified load kVA at or near zero power factor. Maximum instantaneous voltage dip shall not exceed 30% at this load and power factor level. If associated with serving a fire pump, the maximum dip shall not exceed 15%.
- E. Acceptable manufacturers:
 - 1. Kohler Power Generation
 - 2. Owner approved equivalent

26 50 00 LIGHTING

PART 1: GENERAL

1.01 LUMINAIRES

- A. All luminaires are preferred to be listed on the Design Lighting Consortium.
- B. Do not use low pressure sodium or standard incandescent lamps.
- C. Utilize LED fixtures for all specialty lighting, under counter and exterior lighting.
- D. No custom design lighting
- E. LED Approved Manufacturers FOR INTERIOR & EXTERIOR lighting
 - a. CREE or approved equal 2 x 2 & 2 x 4 fixtures
University standard 2X4 lay-in LED fixture – CREE CR2440L40K10V and ZR2440L40K10V.
 - b. CREE 2X2 - CR2240L40K10V and ZR2240L40K10V fixtures are acceptable.
 - c. Both fixtures are dimmable 0-10V, 44W, Color 4000K.
- F. 2'x2' FLOURESCENT fixtures are not accepted by SHSU
- E. Lighting control system shall be integrated into BAS.

2.01 INTERIOR LUMINAIRES

Fluorescent Lighting

A. Linear & Compact Lamps

1. All linear fluorescent lamps installed within conditioned spaces shall be 4-foot straight tube, F28T8, 28-watt, high lumen output.
2. All fluorescent lamps installed in unconditioned or refrigerated spaces shall be 4-foot straight tube, F32T8, 32-watt, high lumen output type.
3. CCT of 5,000K and CRI ≥ 80
4. Use combination of 4-foot lengths for 8 foot fixtures.
5. Preferred, All Edison or medium base lamps to be LED. Interior shall be 4000K minimum, Exterior shall 4700K, 100/277V.
6. Alternate, Screw and plug-in compact type fluorescent lamps installed within conditioned spaces shall operate by an electronic ballast with a power factor $\geq 60\%$ for screw-in, $\geq 95\%$ for plug-in, have a minimum rated lamp life of 10,000 hours at 3 hours/start, CCT of 5000K and CRI ≥ 80 . CFLs installed in unconditioned spaces will have the additional requirement of being operated by an electronic ballast designed for unconditioned spaces.

A. Ballasts for linear lamps.

1. Fluorescent ballasts shall be high frequency (see item 12 below), U.L. approved, CBM certified to operate as specified one, two or three T8 lamps
2. Shall be program start and classified as NEMA premium efficiency rapid start only.
3. Shall be designed to accommodate multiple voltage input, have built in anti-striation technology and utilize parallel lamp operation circuitry

B. Prismatic acrylic diffusers for fluorescent fixtures shall be A12 pattern and at least 1/8" thick. Do not use styrene lenses.

HID Lighting

- A. Mercury vapor and high & low pressure sodium lamps/luminaires are not allowed, only metal halide.
- B. "Open type" fixtures should not be used indoors due to safety concerns.

C. PULSE Start Lamps

1. CCT of 4000K and CRI \geq 80

LED Lighting

A. Screw-in retrofit lamps

1. Shall meet DOE's Energy Star or Design Light Consortium performance criteria for qualified screw-in or pin-based LED lamps.
2. Shall have Lamp CCTs conforming to ANSI C78.377A color binning and utilize a 4 step MacAdam Ellipse Algorithm binning process (Philips Optibin or equal) within each retrofit lamp for greater CCT consistency.
3. The CCT shall be 5000K unless otherwise approved by the University. The CRI shall be \geq 80.
4. Shall be tested in accordance with LM-80 lumen depreciation test. Provide to the University, test results of each unique lamp. The L70 rated life result shall be a minimum of 25,000 hours for MR11, 16 and candelabra lamps; 40,000 hours for PAR 20, 30, 38 and BR30 lamps.

B. Power Supplies

1. Dimmable power supplies shall allow the light output to be maintained at the lowest control setting (prior to off) without dropping out.

C. Exit Signs

1. Fixtures shall be LEC or LED, hard wired, perimeter lit and red on clear background type.
2. If a back-up circuit is not available, then exit sign must be a battery back-up type with self-diagnostics that shall perform both 30-day and annual 90-minute tests with LED indication.

2.02 EXTERIOR LUMINAIRES

A. The performance criteria is the same as interior luminaires plus the additional or "in lieu of" criteria below:

1. Lamp CRI shall be \geq 70 for metal halide and LED light sources.
2. Shall be durable, corrosion resistant fixtures that are readily maintainable and have minimal luminaire O&M costs

B. The following luminaire descriptions are to establish design intent and to set a standard of quality.
All luminaires shall be UL listed for wet or damp locations depending on the application.

1. Area and Parking Lot Luminaires: (NO EXCEPTIONS without prior approval)

CREE - BETA LED Area Lighting Fixture: LED Area Lighting “The Edge” Type V-short
Model #: Beta LED# ARE-EDG-5S-R3-24-E-UL-BZ-350
Spec: LED minimum Type V short 6000k 263ci Lumens voltage 120-270 wet listed
Color: Dark Bronze

Parking Lot Pole:

United Lighting Standards 30’
Model # SSHP-30-6-7-T2-TMB
Specs: 6” Square hinged steel pole, height 30’

2. Pedestrian Walk, Plaza Light Standard (NO EXCEPTIONS without prior approval)

CREE - BETA LED Fixture: The edge Round Luminaire
Model# BLD-EDR-5M-R5-06-E-UL-BZ-350
Spec: LED, minimum 5,250 lumens voltage 120-270, wet listed
Color: Dark Bronze

Walkway Pole:

United Lighting Standards 12’ Aluminum Pole
Model # RSHA-1521-T2-DB
Specs: Round hinged Aluminum pole, height 12’, shaft OD 5”
Color: Dark Bronze

3. Wall Packs:

CREE – BETA LED Fixture: The Edge LED Wall Pack
Model # SEC-EDG-3M-WM-04-D-UL-BZ-350-40K
Spec: LED, minimum 3,343 lumens, voltage 120-277, wet listed
Color: Dark Bronze

4. Parking Garage:

COOPER LIGHTING – LUMARK
Model# QDCAST18

5. **ENERGY TECH - LED Low Profile Canopy Light**

Model # CP-VE-15/30W-45/60K-MV-BK
Spec: LED, total watts (15 or 30), Light output (867 or 1699 lumens),
Lumens per watt (60), CRI: >70, CCT 4500K (Neutral)
Or 6000K Day Light, Voltage: Multi 100-277v 60Hz. PF > 0.989

3.01 INTERIOR LIGHTING

- A. Applications other than standard general purpose lighting (T8 lamps), require presentation to the University. Use of specialty lamps requires prior University approval. Minimize the number of different lamp types used.

- B. Outlet boxes for lighting shall be 4” square or 4” octagon boxes mounted to the structure. These boxes may feed up to 4 light fixtures individually so that each fixture can be taken out of service without affecting the remainder of a circuit. Do not daisy chain light fixtures.

- C. Stairwell light fixtures shall be located such that they may be reached safely with no more than an 8-foot ladder.

3.02 EXTERIOR LIGHTING

- A. Exterior lighting should be accomplished using lighting standards and wall packs.
- B. Alternate lighting solutions shall be considered when standard light methods are not adequate. All such instances shall be approved by SHSU Electrical Services.