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UNIFIED FACILITIES GUIDE SPECIFICATIONS

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DIVISION 26 - ELECTRICAL

SECTION 26 56 36.00 40

FLOOD LIGHTING

11/08

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Remove information and requirements not required in respective project, whether or not brackets are present.

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of [technical proponents](#), including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a [Criteria Change Request \(CCR\)](#).

NOTE: TO DOWNLOAD UFGS GRAPHICS

Go to <http://www.wbdg.org/ccb/NAVGRAPH/graphtoc.pdf>.

NOTE: This section contains the following sketches (Graphics) and are available in metric (SI) and U.S. Customary (IP) system dimensions. Sketch titles and style numbers are unchanged for both types. The metric values indicated are a conversion of U.S. Customary (IP) system dimensions.

Do not include list of sketches, or sketches themselves, in project specifications. Use luminaire sketches as details on drawings whenever possible. If special features are required, do not modify sketches, but indicate these changes as notes in fixture schedule. The "XL" style numbers and dates should remain on the drawing details.

<u>Sketch No.</u>	<u>Title</u>
XL-2	Floodlight
XL-3	Floodlight and Sports Light
XL-28	Luminaire Mounting Brackets

NOTE: Do not include this index in project specification.

NOTE: Show the following information on the drawings or specify in the project specifications:

a. Luminaire schedule and indicate pertinent information; i.e., mounting, lamps, ballasts, and voltage.

1. Type of luminaire;
2. Voltage, wattage, and frequency rating required;

3. Accessories required, such as photocell, time switches, and auxiliary lamps;
4. Location of poles or standards;
5. Referenced sketch; and
6. Extent and location of the work to be accomplished and wiring and equipment necessary for a complete installation.

NOTE: Demolition work that involves disposal of fluorescent and HID lamps and ballasts will require the use of Section 02 84 16 HANDLING OF LIGHTING BALLASTS AND LAMPS CONTAINING PCBs AND MERCURY.

PART 1 GENERAL

NOTE: Including building energy performance language within this specification signals a commitment to design, build, and operate a building with superior energy performance-one whose energy use, greenhouse gas emissions, and costs-to-operate are lower than 75 percent of comparable buildings nationwide.

Designers are encouraged to include the latest EPA/DOE "Energy Star" applicable lighting fixtures and lamps in the design, for both existing and new facilities.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM E 2129 (2005) Standard Practice for Data Collection for Sustainability Assessment of Building Products

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)

IESNA HB-9 (2000; Errata 2004; Errata 2005) IES Lighting Handbook

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code

IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250 (2008) Enclosures for Electrical Equipment (1000 Volts Maximum)

NEMA ANSLG C78.390 2006) Method of Designation for Electric Lamps--Miniature and Sealed-Beam Incandescent Lamps

NEMA ANSLG C78.41 (2006) Guidelines for Low-Pressure Sodium Lamps

NEMA ANSLG C78.42 (2007) Standard for High-Pressure Sodium Lamps

NEMA C78.379 (2006) Classification of the Beam Patterns of Reflector Lamps

NEMA C78.389 (2004) Standard for Electric Lamps - High Intensity Discharge - Methods of Measuring Characteristics

NEMA C82.4 (2002) Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)

NEMA C82.5 (1990; R 1995) High-Intensity Discharge and Low-Pressure Sodium Lamps, Reference Ballasts

NEMA C82.9 (1996) American National Standard for High-Intensity Discharge and Low-Pressure Sodium Lamps, Ballasts and Transformers - Definitions

NEMA ICS 6 (1993; R 2006) Standard for Industrial

Controls and Systems Enclosures

NEMA LSD 25 (2004) Best Practices for Metal Halide Lighting Systems, Plus Questions and Answers about Lamp Ruptures in Metal Halide Lighting Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2007; AMD 1 2008) National Electrical Code - 2008 Edition

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

21 CFR 1040 Performance Standards for Light-Emitting Products

UNDERWRITERS LABORATORIES (UL)

UL 1029 (1994; Rev thru Dec 2007) Standard for Safety High-Intensity-Discharge Lamp Ballasts

UL 1598 (2008; Rev thru Feb 2009) Luminaires

1.2 GENERAL REQUIREMENTS

NOTE: If Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS is not included in the project specification, applicable requirements there from should be inserted and the following paragraph deleted.

Section 26 00 00.00 20 BASIC ELECTRICAL MATERIALS AND METHODS applies to work specified in this section.

Submit **Certificates** showing compliance with the following requirements:

Lighting-distribution curves for each type of fixture in accordance with the Illuminating Engineering Society and **NEMA C78.379**.

Certification that **Floodlighting Fixtures** conform to structural, electrical, and photometric requirements.

Submit **Equipment and Performance Data** for floodlighting systems consisting of life, test, system functional flows, safety features, mechanical automated details, automatic interlocks, and such features as electrical system protective device ratings.

1.3 DEFINITIONS

- a. Unless otherwise specified or indicated, electrical and electronics

terms used in these specifications, and on the drawings, are as defined in IEEE Std 100.

- b. Average life is the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

1.4 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Keep submittals to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

[Local/Regional Materials

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.]

Energy Efficiency

[Environmental Data]

Equipment and Performance Data for floodlighting systems in accordance with paragraph entitled, "General Requirements," of this section.

Manufacturer's catalog data for the following Luminaires:

Floodlighting Fixtures
Floodlighting Luminaires
FLUORESCENT FLOODLIGHTS, EXTERIOR
High-Intensity-Discharge (HID) Luminaires
Quartz-Iodine Luminaires
Substation-Yard Lighting Luminaires
Series Circuit Transformers
Lamp Ballasts

SD-02 Shop Drawings

Installation Drawings for the Floodlighting Systems (including luminaire drawings) in accordance with the paragraph entitled "Installation," of this section.

[SD-04 Samples

NOTE: Samples involve additional shipping cost.
Use only for special fixtures or for an item for
which a large quantity is required on a project. If
samples are not essential to the specific
application, delete them.

Luminaires[; G][; G, [____]]

Submit one sample of each luminaire type[, complete with lamp and ballast]. [Submit one sample for each item other than luminaires.] Sample will be returned to the Contractor for installation in the project work.

] SD-05 Design Data

Design Data for luminaires[; G][; G, [____]]

SD-06 Test Reports

Test reports for Operational Tests on incandescent lighting fixtures in accordance with the paragraph entitled, "Field Testing," of this section.

SD-07 Certificates

Certificates in accordance with paragraph entitled, "General Requirements," of this section.

Floodlighting Fixtures

SD-10 Operation and Maintenance Data

Operational Service

Submit documentation that includes contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

1.5 QUALITY ASSURANCE

1.5.1 Drawing Requirements

1.5.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), accessories, and installation and construction details. Accompany shop drawings with photometric data, including zonal lumen data, average and minimum ratio, aiming diagram, and[computerized] candlepower distribution data.

1.5.2 Design Data for Luminaires

NOTE: Depending on the ambient brightness of the site surroundings and each lamp's initial lumens, luminaires shall have IESNA full or semi cutoff designation. Maximum initial horizontal illumination at ground level shall be limited to the most current IESNA Lighting Handbook recommendations for exterior luminaires. Designing lighting to reduce light pollution contributes to the following LEED credit: SS8.

- a. Distribution data according to IESNA classification type as defined in IESNA HB-9.
- b. Computerized horizontal illumination levels in lux footcandles at ground level, taken every [3050][6100][_____] mm [10][20][_____] feet. Include average maintained lux footcandle level and maximum and minimum ratio.
- c. Amount of shielding on luminaires.

1.5.3 Standard Products

Provide materials and equipment, conforming to IEEE C2, that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship, which have been in satisfactory commercial or industrial use for 2 years prior to bid opening under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, provide products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section.

[1.5.3.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

]1.5.3.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site are not allowed, unless specified otherwise.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

NOTE: Using local materials can help minimize transportation impacts, including fossil fuel consumption, air pollution, and labor.

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a [500][_____] mile [800][_____] kilometer radius from the project site, if available from a minimum of three sources.

1.6.2 Environmental Data

NOTE: ASTM E 2129 provides for detailed documentation of the sustainability aspects of products used in the project. This level of detail may be useful to the Contractor, Government, building occupants, or the public in assessing the sustainability of these products.

[Submit Table 1 of ASTM E 2129 for the following products: [____].]

1.6.3 Energy Efficiency

NOTE: Use Energy Star requirements for all lighting. Design according to IESNA Recommended Practice Manual, Lighting for Exterior Environments. Design according to LEED requirements for credit SS8.

NOTE: The Energy Policy Act of 2005 requires new buildings to use 30 percent less energy than the ASHRAE 90.1 level. Efficient lighting equipment contributes to the following LEED credits: EA Prerequisite 2; EA1.

Comply with National Energy Policy Act and Energy Star requirements for lighting products. [Submit documentation for Energy Star qualifications

for equipment provided under this section.]Submit data indicating lumens per watt efficiency and color rendition index of light source.

1.7 WARRANTY

Provide support for the equipment items by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

Products and materials not considered to be lighting equipment or lighting fixture accessories are specified in[Section 33 71 02.00 20 UNDERGROUND ELECTRICAL DISTRIBUTION,] Section 33 71 01 OVERHEAD TRANSMISSION AND DISTRIBUTION,[Section 33 70 02.00 10 ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND.]

2.2 PRODUCT STANDARDS

Floodlighting fixtures shall conform to IESNA HB-9.

Provide floodlighting fixtures complete with wiring, enclosures conforming to NEMA ICS 6, and mounting devices ready for installation at the locations. Equip all fixtures with the proper lamps.

2.3 FLOODLIGHTING LUMINAIRES

Provide floodlighting luminaires which are enclosed and gasketed vaportight fixtures in accordance with IESNA HB-9 and UL 1029.

2.4 FLUORESCENT FLOODLIGHTS, EXTERIOR

Provide special type [_____] fluorescent floodlight fixtures suitable for outdoor installations which use a 2.4 m 96 inch T-12, rapid start, 1.5 ampere lamp, consisting of a highly polished aluminum reflector with specular finish. Furnish fixture with spring loaded spring sockets, pocket type with silver-plated contacts and neoprene boots. Provide fixture with provisions for aiming throughout 360 degrees of rotation with a graduated aiming dial. Provide door assembly consisting of a stainless steel frame, a clear acrylic plastic cover, a sponge neoprene weatherproof gasket, and stainless steel hinges and latches. Provide with [green] [_____] acrylic baked enamel finished housing. Equip the fixture with a mounting hub assembly at each end. Provide the fixture with a thermally protected, weatherproof, high power factor ballast, not integral with the fixture, for remote mounting. Ballasts are to be rated for -29 degrees C -20 degrees F for cold weather starting.

2.5 HIGH-INTENSITY-DISCHARGE (HID) LUMINAIRES

NOTE: Use the following paragraph when low- or
high-pressure sodium or metal halide lamps are used.

Include with HID luminaires, with base-down vertical-lamp burning positions, a housing with glass lens and cover, reflector, lampholder,

ballast compartment, terminal block, fuses, fuseholders, and fixture mounting devices in a completely sealed optical system.

Provide cast aluminum housing with hinged cast-aluminum cover, heat-resistant clear plain glass lens not less than 5 millimeter 3/16-inch thick, gasket, and cover clamps. Include with housing a weatherproof seal against moisture and foreign material, and an integral cast-aluminum ballast compartment with built-in ballast and terminal block.

Provide detachable reflector, formed anodized sheet aluminum with diffuse or specular finish designed for a rectangular wide-beam spread.

2.5.1 Mounting Devices

Include with fixture mounting devices a galvanized-steel trunnion adaptable to pole, wall, pipe, or crossarm mounting as indicated and required, with fixture positioning devices that will permit horizontal and vertical adjustment over a 180-degree range.

2.5.2 Focusing, Fusing, and Connecting

Provide fixture with lamp focusing adjustments, fixture aiming and leveling devices, fuses, and fuseholders accessible from the outside of the fixture, and replaceable lamps from the top or front.

Make electrical connections with Type AFS cord.

2.6 QUARTZ-IODINE LUMINAIRES, SPECIAL PURPOSE

When providing quartz-iodine lamp luminaires, Class HD, with horizontal lamp-burning position, include a housing with glass lens and cover, reflector, lampholders, fuses, fuseholders, lamp, and fixture mounting devices in a completely sealed optical system for pole-top mounting, with concealed wiring in floodlighting luminaires.

2.6.1 Housing, Reflectors, and Lamps

Provide cast aluminum housing with hinged cast-aluminum cover, heat-resistant plain glass lens, gasket, and cover clamps, sealed against moisture and foreign material.

Provide formed anodized sheet aluminum reflectors in a [parabolic] [elliptical] shape with diffuse or specular finish for a rectangular beam spread with narrow, medium, or wide light distribution. Beam spread is not to be less than 10 percent of the maximum illuminance candlepower. Provide fixture with lamp focusing, positioning, and leveling adjustments that permits horizontal and vertical adjustment over a 180-degree range, fixture leveling and aiming devices, and fuses with fuseholders accessible from the outside of the fixture, and replaceable lamp from the front and rear.

Design the fixture to accommodate the appropriate lamp.

[2.7 SUBSTATION-YARD LIGHTING LUMINAIRES

Provide enclosed and gasketed vaportight substation yard lighting fixtures especially designed for substations to illuminate overhead vertical and horizontal surfaces of the substation structure.

2.7.1 Pole Mounting

Include with luminaires cast-aluminum fittings with pole-top slip fitters and supports for lampholder and reflector assemblies. Provide porcelain lampholder with mogul base which supports the lamp in a vertical base-down burning position. Secure the fixture with a slip fitter to the pole with corrosion-resistant steel setscrews. Collar of the reflector assembly is to engage threads in the cast-aluminum fitting with corrosion-resistant steel setscrews that will prevent rotation of the luminaire after beam adjustment.

2.7.2 Reflector Assembly

Include with the reflector assembly a reflector with cast-aluminum threaded collar, refractor, and top access cover. Seal the reflector and refractor at the joint with a clamping band formed from sheet aluminum or corrosion-resistant steel. Seal refractor and access cover with a heat-resistant weatherproof gasket and secure with spring-loaded corrosion-resistant steel latches.

Form reflector and access cover from anodized sheet aluminum, with reflecting surfaces having a specular finish. Provide a molded prismatic heat-resistant borosilicate glass refractor designed to provide not less than 60 percent of the total lamp lumens in the upward direction, with maximum **illuminance candlepower** of the lighting-distribution curve adjustable plus or minus 5 degrees.

2.7.3 Wiring

Conceal wiring in lighting standards and luminaires.

2.8 LAMP BALLASTS

Provide **lamp ballasts** which maintain correct lamp operation over a voltage-input range of plus or minus 13 percent of rated voltage, with capacitors providing a power-factor lamp load of not less than 95 percent. Provide ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type) conforming to **NEMA C82.4**

Provide ballasts voltage rated for operation on [120] [208] [277] [480]-volt, single-phase, 60-hertz lighting-distribution systems.

Design ballasts for a minimum lamp starting temperature of minus **29 degrees C 20 degrees F** and a maximum ambient temperature of **40 degrees C 105 degrees F**.

2.9 SERIES CIRCUIT TRANSFORMERS

Include in series type transformers a two-winding core-and-coil assembly designed for connection to constant-current supply circuits in accordance with **NEMA C82.5** and **NEMA C82.9**.

Design primary winding of the transformer for connection to [6.6] [20]-ampere constant-current street-lighting circuits, and to provide the proper starting voltage and operating current for the appropriate lamp. Design transformers for a maximum ambient temperature of **40 degrees C 105 degrees F**.

2.10 LAMPS

2.10.1 HID Lamps

Provide automatically self-extinguishing High Intensity Discharge (HID) lamps conforming to 21 CFR 1040, Section 30, NEMA C78.379, and NEMA C78.389 when used in a populated area.

2.10.2 Low-Pressure Sodium

Provide Low-Pressure Sodium (LPS) lamps conforming to NEMA ANSLG C78.41.

2.10.3 High-Pressure Sodium

Provide High-Pressure Sodium (HPS) lamps conforming to NEMA ANSLG C78.42.

2.10.4 Metal Halide

Provide Metal Halide lamps conforming to NEMA LSD 25.

2.10.5 Incandescent Lamps

NOTE: Include the bracketed phrase and standard for
energy conserving miniature and sealed beam
incandescent fixtures.

Provide incandescent lamps as follows:

- a. Provide Incandescent Lamps conforming to UL 1598[and NEMA ANSLG C78.390].
- b. Provide general-purpose incandescent lamps up to 300 watts with medium screw bases.
- c. Provide lamps with wattage ratings above 300 watts with mogul screw bases.
- d. Provide special-purpose PAR and R lamps with wall reflector; and R lamps with clear soft-blown-glass bulbs with silver-deposited inner-bulb wall reflector.

Design lamps for operation on 120-volt, 60-hertz circuits.

2.11 EQUIPMENT IDENTIFICATION

2.11.1 Manufacturer's Nameplate

Provide each item of equipment with a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.11.2 Labels

NOTE: Labeling of lighting components is an

inexpensive and effective method for helping facilities personnel properly operate and maintain the lighting systems. Use labels which are easy to read when standing next to the equipment, and durable to match the life of the equipment to which they are attached. Refer to the FEMP guidelines for lighting at:

http://www.eere.energy.gov/femp/technologies/eep_lighting_guidance.cfm.

Provide labeled luminaires in accordance with **UL 1598** requirements, clearly marked for operation of specific lamps and ballasts according to proper lamp type. Note the following lamp characteristics in the format "Use Only [_____]":

- a. Lamp diameter code (T-4, T-5, T-8, T-12), tube configuration (twin, quad, triple), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
- b. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
- c. Start type (preheat, rapid start, instant start) for fluorescent and compact fluorescent luminaires.
- d. ANSI ballast type (M98, M57, etc.) for HID luminaires.
- e. Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

Make markings related to lamp type clear and locate to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. Provide ballasts with clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.

2.12 FACTORY APPLIED FINISH

NOTE: This paragraph covers only the basic painting requirements for most electrical equipment. Include any special finishes for high or low temperatures and corrosive atmospheres.

Factory apply painting system to electrical equipment which as a minimum, meets the requirements of **NEMA 250** corrosion-resistance test.

PART 3 EXECUTION

3.1 INSTALLATION

Install floodlighting fixtures in accordance with **NFPA 70**, with lamps of the proper type, voltage, and wattage in each fixture.

Install new lamps immediately prior to completion of the project. Install lamps with the light center at the focal point in the reflector and in the proper burning position. Aim fixtures at night to provide optimum light coverage.

Submit [Installation Drawings](#) for [Floodlighting Systems](#). Indicate on drawings overall physical features, dimensions, ratings, service requirements, and weights of equipment.

3.2 FIELD TESTING

Demonstrate that floodlighting fixtures installation operates satisfactorily in the presence of the Contracting Officer.

Perform [Operational Tests](#) in accordance with referenced standards in this section. Provide written documentation and point of contact for [operational service](#).

-- End of Section --