UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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-- End of Section Table of Contents --

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USACE / NAVFAC / AFCEC / NASA	**UFGS-26 56 36.00 40 (May 2020)**

Preparing Activity: NASA	**Superseding**
	UFGS-26 56 36.00 40 (February 2013)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021

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SECTION 26 56 36.00 40

FLOOD LIGHTING
05/20

****

NOTE: This guide specification covers the requirements for floodlighting fixtures and energy efficient lamps.

Show a three-dimensional detail of each fixture on the drawings, with letter designation keyed to the drawings and electrical symbols describing the type, style, class, kind, and size of fixture as follows:

Floodlighting fixtures, including luminaries for NEMA Type 2, 3, 4, 5, 6, and 7 beam-spread distribution patterns.

On all fixture drawings indicate the materials and finishes for reflectors, refractors, diffusers, and shielding; fixture mounting details; the number, size, and description of lamps; and electrical characteristics of branch-circuit or feeder connections.

Use Section 26 09 23.00 40 LIGHTING CONTROL DEVICES for control devices (includes tailoring for exterior lighting).

Use Section 26 56 13.00 40 LIGHTING POLES AND STANDARDS for pole or standard, including mounting and base accessories of exterior fixtures.

Use Section 26 56 19.00 40 ROADWAY LIGHTING for roadway and street lighting.

Use Section 26 55 53.00 40 SECURITY LIGHTING for security and CCTV area lighting.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert

appropriate information.

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

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
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NOTE: TO DOWNLOAD UFGS GRAPHICS

Go to
http://www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/for
****

****
NOTE: 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. 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.

Sketch No.	Title
XL-08	HID Apron/Large Sports Field Luminaire
XL-09	HID Sports Field Luminaire
XL-21	LED Flood Luminaire
XL-22	HID/Induction Flood Luminaire

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, auxiliary lamps, and house side shields;

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 Reference Identifier (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 E2129	(2018) Standard Practice for Data Collection for Sustainability Assessment of Building Products

ILLUMINATING ENGINEERING SOCIETY (IES)

IES HB-10	(2011; Errata 2015) IES Lighting Handbook
IES LM-79	(2008) Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80	(2019) Measuring Lumen Maintenance of LED Light Sources
IES RP-16	(2017) Nomenclature and Definitions for Illuminating Engineering

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C2	(2017; Errata 1-2 2017; INT 1 2017) National Electrical Safety Code

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI ANSLG C78.41	(2016) Electric Lamps--Guidelines for Low-Pressure Sodium Lamps
ANSI ANSLG C78.42	(2009; R 2016) For Electric Lamps: High-Pressure Sodium Lamps
ANSI C78.379	(2006; R 2015) American National Standard for Electric Lamps--Classification of the Beam Patterns of Reflector Lamps
ANSI C78.389	(2004; R 2009) American National Standard for Electric Lamps - High Intensity Discharge (HID) - Methods of Measuring Characteristics
ANSI C82.4	(2017) Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps
ANSI NEMA ANSLG C78.390	(2006; R 2015) Method of Designation for Electric Lamps, -Miniature and Sealed-Beam Incandescent Lamps
NEMA 250	(2018) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ANSLG C82.9	(2010) American National Standard for Lamp Ballasts— High-Intensity Discharge and

	Low-Pressure Sodium Lamps— Definitions
NEMA ICS 6	(1993; R 2016) Industrial Control and Systems: Enclosures
NEMA LSD 71	(2014) Best Practices for Metal Halide Lighting Systems Relative to Lamp Rupture Risk

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

U.S. DEPARTMENT OF ENERGY (DOE)

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

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

21 CFR 1040	Performance Standards for Light-Emitting Products

UNDERWRITERS LABORATORIES (UL)

UL 1029	(1994; Reprint May 2017) UL Standard for Safety High-Intensity-Discharge Lamp Ballasts
UL 1598	(2008; Reprint Oct 2012) Luminaires

1.2 DEFINITIONS

****
NOTE: Delete definitions that are not applicable to project.
****

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings are as defined in IEEE 100 and IES RP-16.

[b. For HID, fluorescent, and induction luminaire light sources, "Average Rated Life" is the time after which 50 percent of a large group of light sources will have failed and 50 percent will have survived under normal operating conditions.]

[c. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in IES LM-80.]

1.3 SUBMITTALS

****
NOTE: Review Submittal Description (SD) definitions

in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Local/Regional Materials

Energy Efficiency

Environmental Data

Photometric Plan; G

SD-02 Shop Drawings

Installation Drawings; G[, [____]]

Luminaire Drawings; G[, [____]]

SD-03 Product Data

Equipment and Performance Data; G[, [____]]

Sample Warranty; G[, [____]]

Floodlighting Luminaires; G[, [____]]

Series Circuit Transformers; G[, [____]]

Lamp Ballasts; G[, [____]]

SD-04 Samples

Luminaires; G[, [____]]

SD-05 Design Data

Design Data For Luminaires; G[, [____]]

SD-06 Test Reports

Operational Tests; G[, [____]]

SD-07 Certificates

Certificates of Compliance

SD-10 Operation and Maintenance Data

Operational Service

SD-11 Closeout Submittals

Energy Efficiency; S

Environmental Data; S

Warranty

1.4 QUALITY CONTROL

1.4.1 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Ensure equipment, materials, installation, and workmanship are in accordance with the mandatory and advisory provisions of NFPA 70, IEEE C2 unless more stringent requirements are specified or indicated.

Submit certificates of compliance for the following requirements:

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

b. Structural, electrical, and photometric requirements.

1.4.2 Qualifications

[Provide materials and equipment, conforming to IEEE C2, that are products of manufacturers regularly engaged in the production of such products, which have been in satisfactory commercial or industrial use for 2-years prior to bid opening. 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.

][Products having less than a 2-year field service record are 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.]

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

1.5 WARRANTY

Provide a [five][_____] year Limited Warranty on entire system, including finish.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

[Provide Floodlighting fixtures conforming to IES HB-10.]

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

2.1.1 Design Requirements

Provide floodlighting luminaires that are enclosed and gasketed vaportight fixtures in accordance with IES HB-10 and UL 1029.

Submit manufacturer's catalog data for the following:

a. Floodlighting Luminaires

[b. Series Circuit Transformers

][c. Lamp Ballasts

] d. Sample Warranty

2.1.1.1 Photometric Plan

For all luminaires, include computer-generated photometric analysis of the "designed to" values for the "end of useful life" of the luminaire installation using a light loss factor of [0.7] [_____]. Provide analysis with the following:

Horizontal illuminance measurements at finished grade, taken at a maximum of every 3 meters 10 feet.

Minimum and maximum lux footcandle levels.

Average maintained lux footcandle level.

Maximum to minimum ratio.

[2.1.1.2 Sample Requirements

****
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 - 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 for installation in the project work.

][2.1.1.3 Sustainable Design Requirements

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.

2.1.1.3.1 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 [800][_____] kilometer [500][_____]-mile radius from the project site, if available from a minimum of three sources.

2.1.1.3.2 Environmental Data

****
NOTE: ASTM E2129 provides 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 E2129 for the following products: [_____].]

2.1.1.3.3 Energy Efficiency

****
NOTE: Use Energy Star requirements for all lighting. Design according to IES 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.

]2.1.1.4 Luminaire Drawings

Include dimensions, effective projected area, 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.

2.1.1.5 Design Data for Luminaires

****

NOTE: Depending on the ambient brightness of the site surroundings and each lamp's initial lumens, provide luminaires with IES full or semi cutoff designation. Ensure maximum initial horizontal illumination at ground level adheres to the most current IES Lighting Handbook recommendations for exterior luminaires. Design lighting to reduce light pollution contribution to the following LEED credit: SS8.

****

Provide the following:

a. Distribution data according to IES classification type as defined in IES HB-10.

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.

2.1.2 Performance Requirements

Submit equipment and performance data for floodlighting systems consisting of life cycle, testing, system functional flows, safety features, mechanical automated details, automatic interlocks, and such features as electrical system protective device ratings. Concurrently submit:

a. Energy Efficiency documentation

b. Environmental Data

2.2 FABRICATION

****

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.

****

[Ensure a factory painting is applied to electrical equipment enclosures that meets the requirements of the NEMA 250 corrosion-resistance test.][_____]

2.3 EQUIPMENT

2.3.1 LED Luminaires

Provide luminaires that are UL [and DesignLights Consortium (DLC)]listed and are compliant with IES LM-79 and IES LM-80 with the following attributes:

a. Provide minimum IP 65 type housing. Provide LED light engines constructed of heavy-duty, die-cast aluminum, with external heat radiating fins.

b. Provide a driver housing constructed of extruded aluminum, with cast aluminum end covers and stainless steel fasteners; for easy access to the LED driver(s); allowing for cooler operation and longer driver life. Use one-piece gasketing throughout the fixture for weather-tight operation.

2.3.1.1 Thermal Management

****

NOTE: The L70 test determines the point in a LED's life when it reaches 70 percent of its initial output.

****

Provide LEDs that are determined to last a minimum of 75,000 hours in 25 degree C 77 degree F environments when driven at 530 mA.

2.3.1.2 Correlated Color Temperature

****

NOTE: Due to wildlife concerns, amber type luminaires may be requested for exterior applications. Phosphor converted amber technology provides greater lumen output and color rendition as it has a wide spectrum which contains blue light. Amber color with a wavelength higher than 560 nm, or "true chip amber", has a very narrow spectrum of light centered at 560 nm which outputs a dark orange, amber color at a lower lumen output and lower color rendition. For critical applications such as security gates or locations with hazardous operations, use phosphor converted amber. For all other locations with wildlife concerns, use true chip amber. For locations without wildlife concerns,

use a non-amber color temperature.
****

Provide LED light engines that output [3000K] [4000K] [5000K] [Phosphor converted amber] [Amber color with a wavelength higher than 560 nm].

2.3.1.3 Mounting

[[An adjustable knuckle slip that fits over a 6 centimeter 2-3/8 inch Tenon, and allows for up to 90 degrees of vertical adjustment in 10 degree increments (minimum) from horizontal, as well as full side to side adjustment with the knuckle mount.][A round extruded aluminum, Bolt-On Arm with an in-pole nut plate. A Round Pole Plate Adaptor is required for mounting to round poles.]

][_____]

[2.3.1.4 Options

a. Photocell and Receptacle

[_____]

b. Photo receptacle

[_____]

c. Round pole plate adaptor

[_____]

][2.3.2 Fluorescent Floodlights, Exterior

Provide special type [_____] fluorescent floodlight fixtures suitable for outdoor installations that 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 fixtures with spring loaded spring sockets, pocket type with silver-plated contacts and neoprene boots. Provide fixtures 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 fixtures with a mounting hub assembly at each end. Provide the fixtures with a thermally protected, weatherproof, high power factor ballast, not integral with the fixture, for remote mounting. Ballasts are to be rated for minus 29 degrees C 20 degrees F for cold weather starting.

][2.3.3 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.

2.3.3.1 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.

2.3.3.2 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.

][2.3.4 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.

2.3.4.1 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.

][2.3.5 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.

2.3.5.1 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 that 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.

2.3.5.2 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.

2.3.5.3 Wiring

Conceal wiring in lighting standards and luminaires.

]2.4 COMPONENTS

2.4.1 Luminaire [Power Supply Units (Drivers)] [and] [Ballasts]

2.4.1.1 Power Supply Units (Drivers)

The LED drivers accept [120v thru 277v] [120v] [208v] [240v] [277v] [347v] [480], 50 Hz to 60 Hz input. Power factor of [greater than 90] [95] [_____] percent. Rated for [minus 40 C] [minus 40 F] [minus 18 thru 4 C] [0 thru 40 F] degrees operations.[Built-in 10 kV surge protector (minimum).]

[2.4.1.2 Ballasts

Provide lamp ballasts that 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 HID and Low-Pressure Sodium Lamps (Multiple-Supply Type) conforming to ANSI 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.

][2.4.2 Lamps

[2.4.2.1 HID Lamps

Provide automatically self-extinguishing HID lamps conforming to 21 CFR 1040, Section 30, ANSI C78.379, and ANSI C78.389 when used in a populated area.

][2.4.2.2 Low-Pressure Sodium

Provide Low-Pressure Sodium lamps conforming to ANSI ANSLG C78.41.

][2.4.2.3 High-Pressure Sodium

Provide High-Pressure Sodium lamps conforming to ANSI ANSLG C78.42.

][2.4.2.4 Metal Halide

Provide Metal Halide lamps conforming to NEMA LSD 71.

][2.4.2.5 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 ANSI 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.

]][2.4.3 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 ANSLG C82.9.

Design primary winding of the transformer for connection to [6.6] [20]-ampere constant-current street-lighting circuits. 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.

]PART 3 EXECUTION

3.1 INSTALLATION

Submit installation drawings for floodlighting systems. Indicate on drawings overall physical features, dimensions, ratings, service requirements, and weights of equipment.

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.

3.1.1 Equipment Identification

3.1.1.1 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 is not acceptable.

3.1.1.2 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.

****

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.

3.2 FIELD QUALITY CONTROL

Demonstrate that floodlighting fixtures installations operate satisfactorily[in the presence of the Contracting Officer].

Perform operational tests in accordance with referenced standards in this section.

3.3 CLOSEOUT ACTIVITIES

No less than [30] days prior to project close out, submit final Warranty to the Contracting Officer.

3.4 MAINTENANCE

Submit operational service 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.

Provide support for the equipment items by service organizations that is 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.

-- End of Section --