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NASA-16512 (June 2004)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SECTION TABLE OF CONTENTS

DIVISION 16 - ELECTRICAL

SECTION 16512

HIGH INTENSITY DISCHARGE (HID) LUMINAIRES

06/04

-- End of Section Table of Contents --

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SECTION 16512

HIGH INTENSITY DISCHARGE (HID) LUMINAIRES

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers metal-halide, mercury-vapor, and high-pressure sodium lighting and lamps. Use of mercury vapor lamps should be avoided because of their high energy consumption.

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

Commercial fixtures, including recessed, surface, and pendant-mounted luminaires for direct, semidirect, direct/indirect, semi-indirect, and indirect lighting distribution

Industrial fixtures, including pendant- and chain-mounted luminaires for direct and semidirect lighting distribution, enclosed and gasketed fixtures, and lowering devices for high-bay lighting fixtures

Industrial HID lighting fixtures include fixtures with domes, deep bowls, symmetrical angles, and medium- and high-bay reflectors for direct and semidirect lighting distribution, as indicated.

Floodlights and street lighting luminaires, including fixtures as specified in Section 16522 FLOOD LIGHTING and Section 16524 ROADWAY LIGHTING.

All fixture drawings should 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. Fixture information should be presented in a fixture schedule.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.
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The publications listed below form a part of this section to the extent referenced:

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C78.388	(1990; R 1994) Electric Lamps - High Pressure Sodium Lamps
ANSI C82.5	(1990; R 1995) Reference Ballasts - High-Intensity-Discharge and Low Pressure Sodium Lamps

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 368	(1995a; R 2000) Standard Specification for Stainless Steel Wire Strand
ASTM A 467/A 467M	(2001) Standard Specification for Machine Coil and Chain
ASTM A 47/A 47M	(1999) Standard Specification for Ferritic Malleable Iron Castings
ASTM B 26/B 26M	(2003) Standard Specification for Aluminum-Alloy Sand Castings

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA C78.1375	(1996) Electric Lamps - 400-Watt, M59 Single-Ended Metal Halide Lamps
NEMA C78.1376	(1996) Electric Lamps - 1000-Watt, M47 Single-Ended Metal Halide Lamps
NEMA C82.4	(2002) For Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type)
NEMA C82.9	(1996; C82.9b) High-Intensity-Discharge and Low-Pressure Sodium Lamps, Ballasts, and Transformers - Definitions

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2002) National Electrical Code

U.S. DEPARTMENT OF ENERGY (DOE)

DOE LT-6	(2000) How to Buy Energy-Efficient Industrial HID Luminaires

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

21 CFR 1040	(1995) Performance Standards for Light-Emitting Products

UNDERWRITERS LABORATORIES (UL)

UL 844	(1999; Rev thru Mar 1999) UL Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified) Locations

1.2 GENERAL REQUIREMENTS

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NOTE: If Section 16003 GENERAL ELECTRICAL PROVISIONS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted.
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Section 16003 GENERAL ELECTRICAL PROVISIONS applies to work specified in this section.

Material, Equipment, and Fixture Lists shall be submitted for HID lighting fixtures including manufacturer's style or catalog numbers, specification and drawing reference numbers, warranty information, and fabrication site information.

1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.
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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Material, Equipment, and Fixture Lists shall be submitted for HID lighting fixtures in accordance with paragraph entitled, "General

Requirements," of this section.

SD-02 Shop Drawings

Installation Drawings shall be submitted for the high intensity lighting fixtures in accordance with the paragraph entitled, "Installation," of this section.

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items:

Commercial Lighting Fixtures
Industrial Lighting Fixtures
Lamp Ballasts
Lamps
Lowering Devices
Lighting-Distribution Systems

SD-06 Test Reports

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

SD-07 Certificates

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NOTE: Specifier should list those requirements desired to satisfy the specific job requirements.
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Certificates shall be submitted showing compliance with the following requirements:

Efficiencies

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

Fixtures in hazardous areas shall conform to UL 844.

Lighting fixtures shall be furnished completely assembled with wiring and mounting devices and ready for installation at the locations indicated. Recessed fixtures in suspended ceilings shall be designed and equipped for installation in the type of ceiling in which the fixture is to be installed. Fixtures shall be designed to be supported independent of the ceiling. Fixtures shall be equipped with the lamps indicated.

2.1.1 Efficiencies

Lighting fixtures shall have efficiencies in accordance with the recommended levels specified in DOE LT-6.

2.2 COMMERCIAL LIGHTING FIXTURES

Commercial HID lighting fixtures shall be of the types and designs

indicated, completely assembled, wired, and ready for connection to the building lighting-distribution system.

2.3 INDUSTRIAL LIGHTING FIXTURES

Fixture assembly shall include a [detachable] [nondetachable] reflector, gaskets, porcelain lampholder, and cast-aluminum flange and capnut, with a threaded pipe fitting suitable for stem mounting. Reflector shall be seamless [aluminum] [porcelain-enameled steel] with beaded bottom edge completely covered by the finish. Porcelain lampholder shall be attached to the flange with mounting screws. Reflector shall be rigidly supported between the threaded lower flange and threaded capnut with gaskets to protect the reflector finish. A threaded, molded, porcelain-lampholder cover shall provide access to the lampholder wiring terminals. Lampholder screw shells shall be designed for the [medium]-[mogul]-base lamp indicated.

2.4 LAMP BALLASTS

2.4.1 Multiple-Circuit Ballasts

Multiple-circuit ballast shall include a two-winding core-and-coil assembly with a saturated-iron regulating element and capacitors impregnated with an insulating material in accordance with NEMA C82.4, ANSI C82.5, and NEMA C82.9.

Ballast shall maintain correct lamp operation over a voltage-input range of plus or minus [13] [_____] percent of rated voltage. Capacitors shall provide a power-factor lamp load not less than [95] [_____] percent.

Ballasts shall be voltage rated for operation on [120] [277] [480]-volt, single-phase, 60-hertz lighting-distribution systems, as indicated.

Ballasts shall be designed for a minimum lamp starting temperature of minus [20] [_____] degrees F [29] [_____] degrees C and a maximum ambient temperature of [105] [_____] degrees F [40] [_____] degrees C.

[Solid state ballasts shall be used when indicated.]

2.4.2 Series Circuit Transformers

Series circuit transformers shall include a two-winding core-and-coil assembly designed for connection to constant-current supply circuits in accordance with ANSI C82.5 and NEMA C82.9.

Primary winding of the transformer shall be designed for connection to [6.6] [20]-ampere constant-current street-lighting circuits. Transformer shall provide the proper starting voltage and operating current for the lamp indicated.

Transformers shall be designed for a maximum ambient temperature of [105] [_____] degrees F [40] [_____] degrees C.

2.5 LAMPS

[Lamps shall be certified to be automatically self-extinguishing and in conformance with 21 CFR 1040, Section 30, when HID lamps are used in a populated area.]

[HID lamps shall be low-pressure sodium, conforming to NEMA C82.9.]

[HID lamps shall be high-pressure sodium conforming to ANSI C78.388.]

[HID lamps shall be metal halide conforming to [NEMA C78.1375] [NEMA C78.1376].]

2.6 LOWERING DEVICES FOR HIGH-BAY LIGHTING FIXTURES

[Lowering devices for high-bay lighting fixtures shall consist of a hand-operated mechanism that will connect, disconnect, raise, and lower the lighting fixture and permit the servicing and maintenance of fixtures and equipment at floor level. Lowering device shall include hangers, pulleys, beam clamps or suspension fittings, operating cable, hand chain, and cable and chain fittings as indicated and specified.

Hanger shall consist of a two-piece latching spring-loaded mechanism with an upper and lower separable contact assembly and stem and guide assembly, with cast-aluminum protective housings. Contacts shall be two-pole for single 2-wire circuits and four-pole for 3- and 4-wire circuits rated 15 amperes at 600 volts and 30 amperes at 250 volts ac.

Upper contact assembly shall include an integrally mounted corner pulley with threaded hub for electrical-circuit connections and top flange with lugs or ears for mounting to an overhead truss or supporting structural member with bead clamps or suspension fittings.

Lower contact assembly shall include fixture adapters and swivel end fittings for anchoring operating cable in the stem of the hanger. Fixture adapters shall be hot-dip galvanized malleable iron.

Pulleys shall be open face with cast-aluminum-alloy housings and deep-grooved pulley wheels closely shrouded to prevent lines from becoming wedged between wheel and housing. Pulleys shall be straight through for top mounted and bottom mounted operating cables and corner type as required. Top mounted pulleys shall be hinged, with mounting lugs. Bottom mounted pulleys shall be fixed, with mounting lugs. All pulleys shall be bolted to the supporting structure. Horizontal runs of operating cable shall be supported with pulleys located not more than [35] [_____]-feet [11] [_____] meter apart.

Terminal fittings shall include an enclosed lock box with hub tapped for [3/4] [_____] inch [20] [_____] millimeter conduit, flared conduit end fitting, pulley wheel, locking hooks, and hinged cover with provisions for padlocking.

Lock box and cover shall be [cast-aluminum alloy] [_____], and the flared conduit end fitting shall be [hot-dip galvanized malleable iron] [_____].

Lock box shall be wall-mounted not less than [42] [_____] inches and not more than [54] [_____] inches [1100] [_____] millimeter and not more than [1400] [_____] millimeter above the floor at the operating level. Pulley shall permit horizontal pull operation of the lowering device at the operating level.

Operating cable shall be [1/8] [_____] inch [3] [_____] millimeter diameter, [7 by 19] [_____] stranded corrosion-resistant steel aircraft-grade cable with link, cable loops, and serving sleeves. Cable shall be preformed with detachable fittings designed for connection to the terminal fittings. Operating cable shall conform to ASTM A 368.

Hand chains shall be separate detachable hand lines to provide means for disconnecting, lowering, raising, and reconnecting fixtures after servicing and maintenance work has been completed. Length of the hand chain shall be equal to the mounting height of the fixture and shall be equipped with a snap hook for connection to the terminal end of the operating cable. Hand chains shall be size [4] [_____], hot-dip galvanized steel, conforming to ASTM A 467/A 467M, Class MS machine, straight link, steel chain.

Cast-aluminum-alloy housings shall conform to ASTM B 26/B 26M.

Malleable-iron fittings shall conform to ASTM A 47/A 47M. Hot-dip galvanized coatings shall conform to ASTM A 123/A 123M.]

PART 3 EXECUTION

3.1 INSTALLATION

Installation shall be performed in accordance with NFPA 70.

HID fixtures shall be installed at each outlet indicated, and lamps of the proper type, voltage, and wattage shall be installed in each fixture.

New lamps shall be installed immediately prior to completion of the project. Lamps shall be installed with the light center at the focal point of the reflector and in the proper burning position.

High-bay fixtures shall be so installed that they clear obstructions such as crane rails, piping, and bracing that could impede operation of lowering devices.

Installation Drawings shall be submitted for the high intensity lighting fixtures. Drawings shall indicate overall physical features, dimensions, ratings, service requirements, and weights of equipment.

3.2 FIELD TESTING

HID lighting fixtures and their accessories, including lowering devices, shall be demonstrated to operate satisfactorily in the presence of the Contracting Officer.

Operational tests shall be performed in accordance with referenced standards in this section.

-- End of Section --