

**SECTION 26 55 71
MEDICAL AND SURGICAL LIGHTING FIXTURES**

SPEC WRITER NOTES:

1. Delete between // ---- // if not applicable to project. Also, delete any other item or paragraph not applicable in the section and renumber the paragraphs.
2. The A/E should coordinate with the Architect, Structural Engineer, and Mechanical Engineer to ensure that the ceiling, structure, and ceiling cavity are suitable and free of obstructions for surgical light installation.
3. The A/E shall verify with VHA the fixture type(s) desired for the operating room(s) affected by the project.
4. The A/E should determine the need for spare conduits for future addition of arm-mounted video cameras or monitors.
5. The A/E shall verify that the supporting system can accommodate future cameras and/or monitors.

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of medical and surgical lighting fixtures. The terms "lighting fixtures", "fixture" and "luminaire" are used interchangeably.

1.2 RELATED WORK

- //A. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic supports and lateral bracing for light fixtures.//
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

- A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:

- a. Submit the following information for each type of lighting fixture designated on the LIGHTING FIXTURE SCHEDULE, arranged in order of lighting fixture designation.
- b. Material and construction details, include information on housing and optics system.
- c. Physical dimensions and description.
- d. Wiring schematic and connection diagram.
- e. Installation and mounting details.
- f. Energy efficiency data.
- g. Photometric data based on laboratory tests complying with IES Lighting Measurements testing and calculation guides.
- h. Lamp data including lumen output (initial and mean), color rendition index (CRI), rated life (hours), and color temperature (degrees Kelvin).
- i. For LED lighting fixtures, submit IES L70 rated life.

2. Manuals:

- a. Submit, simultaneously with the shop drawings, complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
- b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.

3. Certifications: Two weeks prior to final inspection, submit the following.

- a. Certification by the Contractor that the luminaires have been properly installed and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. Illuminating Engineering Society of North America (IESNA):

RP-29-20.....Lighting for Hospitals and Health Care
Facilities

C. National Fire Protection Association (NFPA):

70-23.....National Electrical Code (NEC)

99-21.....Health Care Facilities

D. Underwriters Laboratories, Inc. (UL):

60601-1-03.....Medical Electrical Equipment, Part 1: General
Requirements for Safety

1598-21.....Standard for Safety Luminaires

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Luminaires shall be in accordance with IESNA, NFPA, UL, and as shown on the drawings.
- B. Luminaires shall be complete, grounded, fungi-proof, adequately enclosed for asepsis, and designed for use in human operating rooms by a manufacturer that regularly produces such fixtures.
- C. Luminaires shall be supplied complete with suspension systems, lightheads, transformers, and controls. Components shall be products of a single manufacturer.
- D. Suspension components shall not flex during normal use. Articulation of the suspension to any position in its range shall maintain the lighthead at that point without drift.
- E. All exposed surfaces shall be free of burrs and sharp edges. Finishes on all exposed surfaces shall be specifically designed to resist scuffing and deleterious effects of the use of hospital cleaning materials.
- F. Except for finished aluminum, stainless steel, chrome, nickel and brass surfaces, all metal surfaces shall be thoroughly cleaned and painted at the factory with a corrosion-resistant primer and not fewer than two coats of lacquer or baked enamel finish and provided with an anti-microbial finish.
- G. Maximum leakage current of each lighthead and its respective control shall not exceed 100 microamperes as measured in accordance with UL 60601-1-03.

SPEC WRITER NOTE: Select type(s)
appropriate for the project.

2.2 SURGICAL LIGHTING FIXTURE TYPES

- A. Single Lighthead and Pivot Arm, Single Point Suspension (Type A):
 Shall be a surgical light system of the single point suspension type with a single lighthead unit, mounted from a pivotal arm assembly. Lighthead shall rotate within a clearance circle of 3624 mm (142.67 inches) to 6544 mm (257.63 inches), depending on lighthead site horizontal arm selection. Center of lighthead adjusted vertically from 1190 mm (46.85 inches) to 2250 mm (88.58 inches) above the floor.
- B. Dual Lightheads and Pivot Arms, Single Point Suspension (Type B):
 Shall be a complete light system incorporating two identical lighthead units, each mounted on an independent arm assembly. The arm assemblies shall pivot around the same axis. Lighthead shall rotate within a clearance circle of 3624 mm (142.67 inches) to 6544 mm (257.63 inches), depending on light head site horizontal arm selection. Center of lighthead adjusted vertically from 1190 mm (46.85 inches) to 2250 mm (88.58 inches) above the floor.

SPEC WRITER NOTE: Types C and D shall only be used in the animal operating rooms in animal research service facilities. Edit cross-referencing and update paragraph as required.

- C. Single Lighthead and Pivot Arm, Track Suspension (Type C): Shall be the same as specified in Paragraph (A), except that in lieu of single point mounting, the pivotal arm assembly shall be mounted on a movable carriage to a track //2700 mm (106.3 inches) long //, except where otherwise indicated on the drawings, at the ceiling.
- D. Dual Lightheads and Pivot Arms, Track Suspension (Type D): Shall be the same as specified in Paragraph (C), except that it shall be an installation of two track and lighthead assemblies.

SPEC WRITER NOTE: Select light source from choices below.

2.3 SURGICAL LIGHTHEAD

- A. Lighthead Housing: The lighthead housing shall be not greater than 760 mm (30 inches) in diameter.
- B. Light Source:
1. Light source shall be //tungsten halogen// //light-emitting diode (LED)//. //Tungsten halogen may consist of a single primary lamp with normally de-energized secondary lamp that illuminates within 0.5 second of primary lamp failure, or a minimum of five

simultaneously energized lamps.// //Light-emitting diodes consist of multiple LEDs within a single head.//

2. Light source shall have the following characteristics and shall comply with IESNA RP-29:
 - a. Minimum illuminance of 10,000 foot-candles, measured at 1016 mm (40 inches) from the light source.
 - b. Correlated Color Temperature (CCT) of between 4000 and 4500 degrees Kelvin.
 - c. Color Rendering Index (CRI) shall be a minimum of 92, as measured on the ASTM E308 chromaticity diagram.
 - //d. Tungsten halogen lamp life shall rated for 1000 hours.//
//Light-emitting diode life shall be rated at a minimum of 25,000 hours for L70.//
- C. Focus and pattern size shall be adjustable either by raising and lowering the unit, and/or through operation of focus controls which change the pattern size without movement of the unit. The smallest pattern size in the focal range shall be not greater than 200 mm (8 inches) in diameter.
- D. Shadow Reduction: The unit shall provide minimum of 10% of its intended illumination inside and at the bottom of a tube 50 mm (2 inches) in diameter and 75 mm (3 inches) long, finished flat black inside from a distance of 1000 mm (39 inches) when the beam is obstructed by a disc 250 mm (10 inches) in diameter, 580 mm (23 inches) above the operating table and normal to the axis of the tube.
- E. Control Handle: The control handle shall be located beneath each lighthead and shall be easily removable for sterilization. Handle shall accommodate third-party disposable handle adapters.

2.4 SURGICAL LIGHT CONTROLS

- A. Provide a wall-mounted intensity control unit for each lighthead and the required backbox for the intensity control unit as required by the manufacturer.
- B. The control unit shall provide either a continuously variable range from the maximum foot-candle rating of the light source down to no greater than 5% of this value, or shall be adjustable within this range with a minimum of five discrete steps. //LED dimming range shall be a minimum of 30% to 100%.//
- C. The minimum wall control box functions shall include an on-off switch, intensity adjustment, and endoscopic light actuation located outside

the sterile field. Controls shall move in a free, smooth, and silent manner without drifting, regardless of position.

- D. The controls shall have adequate radio frequency suppression appropriate for applications where sensitive electronic medical equipment is used.
- E. Each unit shall be readily removable from its wall box for servicing or replacement, utilizing electrical plug connections.
- F. In the event of a control unit fault, the unit shall default to maximum intensity of illumination.
- G. Where light source is a single primary lamp with automatic secondary lamp, controls shall include a "reserve lamp in use" indicator or similar.

2.5 SURGICAL LIGHT SUSPENSION

- A. Vertical arm members and suspension tubes: Shall be constructed of high-strength steel or heavy-gauge aluminum for rigidity. Coordinate vertical lengths with the ceiling height of the room where each fixture will be installed to provide the proper positioning of the lighthouse or lighthouse arm assembly within the unit's range of vertical mobility as recommended by the manufacturer. Attach the suspension to structure with bolts and metal inserts (power-set fasteners will not be accepted) as required by the manufacturer and/or structural calculations.
- B. Horizontal Arm Assemblies:
 - 1. Each lighthouse shall be mounted from a two-section, essentially horizontal, counter-balanced arm assembly which pivots in either direction 360 degrees continuously about the ceiling attachment tube axis, and a minimum of 350 degrees about its midpoint, permitting positioning of the lighthouse assembly approximately under the ceiling axis or outside of the sterile area. In systems with multiple arms attached to the same mount, each individual arm and lighthouse shall operate independently and be mounted such that they can be positioned outside the sterile area, bypass each other, and be raised, lowered, and rotated. In the multi-arm installation, at least one of the lighthouses shall be positionable directly under the ceiling axis.
 - 2. The lower arm member shall pivot vertically to permit raising and lowering the lighthouse. It shall be possible to limit the travel such that the electrical components of the lamp assembly (or assemblies) will not adjust below 1500 mm (59 inches) from the

finished floor. When maintained in the horizontal position, the lighthouse shall be raisable to a minimum of 2200 mm (86.61 inches) above the finished floor, as measured to the lowest point of the optical assembly (lens or reflector) from which the final light beam is emitted. The component parts of the joint between the upper and lower support arms shall be at least 2000 mm (80 inches) above the floor.

3. The lighthouse shall be attached to the lower arm assembly through a dual-bow pivot system that allows lighthouse rotation in all directions without the need to rotate the suspension arms.
4. The clearance circle of each lighthouse about its pivot center shall be at least 3550 mm (140 inches) in diameter.

C. Ceiling Mount Assembly, Single Point Suspension (Types A and B): The mounting assembly shall support the complete fixture unit by attachment to the structural ceiling. Vertical portions of the mount assembly between the structural ceiling and a suspended ceiling shall be cross-braced as part of the installation to prevent lateral movement. The exposed portions of the attachment assembly, or the hole where the ceiling mount tube passes through the false ceiling, shall be covered by a gasketed spun aluminum or sturdy plastic trim canopy designed to make a tight seal with the ceiling. The mount assembly shall be installed in accordance with the manufacturer's recommendations, with required fasteners for a stable and rigid system. The assembly shall be capable of supporting the weight of the entire unit plus the weight of additional lighthouse assemblies in the future, as calculated by standard manufacturer's modification.

D. Ceiling Mount Assembly, Track, and Carriage Suspension (Types C and D):

1. One piece, heavy-duty track, designed to provide rigid support and mobility for the fixture.
2. Sliding, non-sparking, electrical contacts and current-conducting components within the track.
3. Attach the track to the overhead slab or ribs with bolts and metal inserts (power-set fasteners shall not be accepted) as required by the manufacturer and/or structural calculations, so the tracks will not move or flex during movements of the fixture.
4. Seal the track tightly at the ceiling line with a one-piece, snug-fitting neoprene gasket to minimize dust dispersal within the sterile area.

5. Carriage shall be suspended on rollers located inside the track.
6. Carriage shall permit smooth, effortless movements and positioning at any point along the track.

SPEC WRITER NOTES:

1. A/E shall include the following section for recessed mounted general exam lights if these devices are in the scope of project.
2. Edit to for type, lamping quantity and wattage and control unit type for remote controllable type.

//2.6 RECESSED EXAM LIGHTS

A. Remote Controllable Type:

1. Recessed //round//square// motorized exam light with adjustable tilt //, rotation// and intensity.
2. All components shall be contained with rustproof metal housing designed to dissipate heat across its entire surface and accessible for servicing from below the ceiling. All electrical components shall be provided with modular plug-in connections. Unit will have a tempered glass lens protecting the lamp.
3. Lights shall be provided with motorized lamp assembly permitting 0 to 35 degrees tilt// and 360 degree rotational// adjustment.
- //4. Lamps shall be tungsten / halogen with rated lamp life of 1000 hours, Correlated Color Temperature (CCT) of 2700-4000 degrees Kelvin and Color Rendering Index (CRI) of 90-100.//
- //5. Lamps shall be LED with rated lamp life of 50000 hours, Correlated Color Temperature (CCT) of 2700-4000 degrees Kelvin and Color Rendering Index (CRI) of 90-100.//
6. Exam light control unit shall be //wall mounted// and / or //remote infrared control// type providing on /off, tilt, //rotation// and intensity adjustment. //Wall control units shall be provided with flush tactile-membrane surface with smooth finish for easy cleaning mounted in an UL listed back box//. //Remote control unit shall be infrared type with unique frequency to not interfere with other equipment and provided with a tactile-membrane surface with smooth easy to clean finish. Unit shall be battery operated.

B. Manual Type:

1. Recessed //round//square// exam light with //fixed //straight lamp // diagonal lamp//with adjustable tilt and rotation//.

2. All components shall be contained with rustproof metal housing designed to dissipate heat across its entire surface and accessible for servicing from below the ceiling. All electrical components shall be provided with modular plug in connections. Unit will have a tempered glass lens protecting the lamp.
3. Lights shall be provided with gimbel ring type lamp and socket assembly. //Unit shall be provided with a fixed downward orientation//Unit shall be provided with a fixed diagonal orientation//Unit shall be provided with adjustable lamping permitting 0 to 35 degrees tilt and 360 degree rotational adjustment.
- //4. Lamps shall be tungsten / halogen with rated lamp life of 1000 hours, Correlated Color Temperature (CCT) of 2700-4000 degrees Kelvin and Color Rendering Index (CRI) of 90-100.//
- //5. Lamps shall be LED with rated lamp life of 50000 hours, Correlated Color Temperature (CCT) of 2700-4000 degrees Kelvin and Color Rendering Index (CRI) of 90-100.//

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with NEC, as shown on the drawings, and in accordance with the manufacturer's recommendations.
- B. Coordinate the components electrically and mechanically with the ceiling heights and plenum depths and with other equipment, such as radiology equipment, ductwork, service drops, and like items, in the room where each fixture will be installed.
- C. Mount the controls with the bottom of the control 15 mm (59 inches) above the finished floor.
- D. For remote transformer installation, ensure that the wiring distance is not more than that allowed by the manufacturer.
- E. Upon completion of the installation, conduct an operating test in the presence of the // Resident Engineer // or // COR// to demonstrate that each surgical lighting fixture meets the requirements of this specification. Perform all of manufacturer's recommended visual and physical performance checks.

3.2 SPARE LAMPS AND STERILIZABLE HANDLES

- A. If tungsten halogen is furnished, provide the Resident Engineer or COR with three new spare lamps in new condition.

- B. Provide the Resident Engineer or COR with three new spare sterilizable handles for each surgical light unit.

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