**SECTION 26 5134**

**LUMINAIRES, LAMPS, AND ACCESSORIES - KETRA**

This section includes tunable LED luminaires/lamps and accessory controls/interfaces featuring products from Ketra.

Although a separate schedule is commonly used to specify individual luminaire types, either on the drawings or attached to the section, the article "Luminaire Types" in Part 2 may be used for this purpose. This may be particularly useful when setting up an office master for project types with standard luminaires that will be commonly used.

It is recommended that the specification and drawings be closely coordinated with consultation from the lighting controls basis of design manufacturer. If products of other manufacturers are listed or considered for substitution, the specifier should conduct a thorough evaluation to ensure that the products provide equivalent performance and that other related products will interface properly.

SECTION 26 5134 (16514) - LUMINAIRES, LAMPS, AND ACCESSORIES - KETRA, Copyright 2018, Building Systems Design, Inc.

1. **GENERAL**
	1. **SECTION INCLUDES**
		1. Tunable LED luminaires.
		2. Tunable LED lamps.
		3. Accessory controls and interfaces.
	2. **RELATED REQUIREMENTS**
		1. Section ***26 0533.16 - Boxes for Electrical Systems***.
		2. Section ***26 0923 - Lighting Control Devices - Lutron***: Devices for interface with controls specified in this section, including ***<<occupancy sensors; daylighting controls; and \_\_\_\_\_\_\_\_\_\_>>***.

--THE FOLLOWING SECTION INCLUDES COMPATIBLE LIGHTING CONTROL SYSTEM (MUST SPECIFY KETRA RESIDENTIAL PRODUCT LINE – HW SERIES AND REQUIRES KETRA QUALIFIED SUPPLIER/INSTALLER)--

* + 1. Section ***26 0943 – Network Lighting Controls – Lutron HomeWorks QS***
		2. Section ***26 2726 - Wiring Devices - Lutron***: Finish requirements for wall controls specified in this section.
	1. **REFERENCE STANDARDS**
		1. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
		2. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
		3. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
		4. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.
		5. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
		6. UL 1598 - Luminaires; Current Edition, Including All Revisions.
		7. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.
	2. **ADMINISTRATIVE REQUIREMENTS**
		1. Coordination:
			1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
			2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
			3. Notify Architectof any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
	3. **SUBMITTALS**
		1. See Section ***01 3000 - Administrative Requirements***, for submittal procedures.
		2. Shop Drawings:
			1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
			2. Provide photometric calculations where luminaires are proposed for substitution***<< upon request>>***.
		3. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, and installed accessories; include model number nomenclature clearly marked with all proposed features.
		4. Samples:
			1. Provide ***<<one; or \_\_\_\_\_\_\_\_\_\_>>*** sample(s) of each***<< specified; or \_\_\_\_\_\_\_\_\_\_>>*** luminaire***<< where indicated; upon request; or \_\_\_\_\_\_\_\_\_\_>>***.
			2. Provide ***<<one; or \_\_\_\_\_\_\_\_\_\_>>*** sample(s) of each luminaire proposed for substitution***<<upon request; or \_\_\_\_\_\_\_\_\_\_>>***.
			3. Provide ***<<one; or \_\_\_\_\_\_\_\_\_\_>>*** sample(s) of each product finish illustrating color and texture***<< upon request; where indicated; for each product proposed for substitution; or \_\_\_\_\_\_\_\_\_\_>>***.
			4. Luminaires: Include information on photometric performance and ceiling compatibility. Request certified data if desired. Manufacturers may have their labs accredited by the NVLAP in order to self-certify data. Edit the paragraph to indicate whether or not data certified by these labs is acceptable.
				1. Provide electronic files of photometric data***<< certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency; certified by an independent testing agency; or \_\_\_\_\_\_\_\_\_\_>>*** in IESNA LM-63 standard format***<< upon request; where indicated; for proposed substitutions; or \_\_\_\_\_\_\_\_\_\_>>***.
			5. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
		5. Field Quality Control Reports.
		6. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
		7. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
		8. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.
		9. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
			1. See Section ***01 6000 - Product Requirements***, for additional provisions.
			2. Extra Lenses and Louvers: ***<<Two; or \_\_\_\_\_\_\_\_\_\_>>*** percent of total quantity installed for each type, but not less than ***<<one; or \_\_\_\_\_\_\_\_\_\_>>*** of each type.
			3. ***<<\_\_\_\_\_\_\_\_\_\_>>***.
		10. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.
	4. **QUALITY ASSURANCE**
		1. Conform to requirements of NFPA 70.
		2. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
		3. Manufacturer Qualifications:
			1. Company with not less than tenyears of experience as the manufacturer of lighting control systems of similar complexity to specified system.
			2. Registered to ISO 9001, including in-house engineering for product design activities.
			3. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.
			4. Maintains technical support available 24 hours per day, 7 days per week, excluding manufacturer holidays.

--THE FOLLOWING PARAGRAPH IS FOR RESIDENTIAL PRODUCT LINE – HW SERIES ONLY--

* + 1. Installer Qualifications, Residential Product Line: Manufacturer's authorized installer.
	1. **DELIVERY, STORAGE, AND PROTECTION**
		1. Receive, handle, and store products according to NECA/IESNA 500 and manufacturer's written instructions.
		2. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
	2. **FIELD CONDITIONS**
		1. Maintain field conditions within manufacturer's required service conditions during and after installation.
			1. Required Service Conditions ***- Lutron***, Unless Otherwise Indicated:
				1. Ambient Temperature:

Recessed Downlights & Wireless Keypads: Between 32 and 104 degrees F (0 and 40 degrees C).

Lamps, Track Heads, and Linears, Except Those Listed Below: Between 32 and 122 degrees F (0 and 50 degrees C).

Power/Control Interfaces for LED Linear Luminaires: Between -4 and 140 degrees F (-20 and 50 degrees C).

Wireless Hubs: Between -4 and 104 degrees F (-20 and 40 degrees C)

* + - * 1. Relative Humidity: Less than 95 percent, non-condensing.
	1. **WARRANTY**
		1. See Section ***01 7800 - Closeout Submittals***, for additional warranty requirements.
		2. Tunable LED Luminaires and Lamps: Five years from date of shipment; 100 percent parts coverage, no manufacturer labor coverage.
1. **PRODUCTS**
	1. **MANUFACTURERS**

--CHOOSE EITHER COMMERCIAL – CM SERIES OR RESIDENTIAL – HW SERIES (HOMEWORKS COMPATIBLE) PRODUCT LINE IN THE FOLLOWING PARAGRAPH. RESIDENTIAL PRODUCT LINE REQUIRES KETRA QUALIFIED SUPPLIER/INSTALLER--

* + 1. Tunable LED Luminaires/Lamps and Accessory Controls/Interfaces - Basis of Design: **Ketra; <<****Commercial Product Line – CM Series; Residential Product Line – HW Series (Lutron Homeworks compatible)>>; www.ketra.com/#sle**.
		2. Other Acceptable Manufacturers:
			1. ***<<\_\_\_\_\_\_\_\_\_\_>>***.
			2. ***<<\_\_\_\_\_\_\_\_\_\_>>***.
			3. Products by listed manufacturers are subject to compliance with specified requirements**<< and prior approval of Architect or \_\_\_\_\_\_\_\_\_>>**.
		3. Substitutions: **<<See Section 01 6000 - Product Requirements; Not permitted; or \_\_\_\_\_\_\_\_\_\_>>**.
			1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by Architecta minimum of **<<10; or \_\_\_\_\_>>** working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
			2. Any proposed substitutions to be reviewed by Architect at Contractor's expense**<< at a rate of $200 per hour; at a rate of \_\_\_\_\_\_\_\_\_; or \_\_\_\_\_\_\_\_\_\_>>**.
			3. By using pre-approved substitutions, Contractor accepts responsibility and associated costs for all required modifications to related equipment and wiring. Provide complete engineered shop drawings (including power wiring) with deviations from the original design highlighted in an alternate color for review and approval by Architect prior to rough-in.
		4. Source Limitations: Where possible, provide LED luminaires, tunable lamps, and accessory controls/interfaces produced by a single manufacturer.

--THE FOLLOWING PARAGRAPH IS FOR RESIDENTIAL PRODUCT LINE – HW SERIES ONLY--

* + 1. Suppliers, Residential Product Line: Manufacturer's authorized supplier.
	1. **LUMINAIRE TYPES**
		1. The following article may be used to specify luminaire types as an alternative to including a separate luminaire schedule on the drawings or attached to the section.
		2. Furnish products as specified below.
		3. Substitutions: ***<<See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted; Not Permitted; or \_\_\_\_\_\_\_\_\_\_>>***.

KETRA; D3 DOWNLIGHT FAMILY----->

* + 1. ***<<Type \_\_\_\_\_: >>***Recessed fixed round flanged LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Fixed Round Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Round shallow bevel; Round deep bevel; Round shallow pinhole; or Round deep pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed fixed round flangeless LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

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* + - 1. Basis of Design: ***Ketra D3 Fixed Round Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Round shallow flangeless bevel; Round deep flangeless bevel; Round shallow flangeless pinhole; or Round deep flangeless pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed fixed square flanged LED downlight.

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* + - 1. Basis of Design: ***Ketra D3 Fixed Square Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Square shallow bevel; Square deep bevel; Square shallow pinhole; or Square deep pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed fixed square flangeless LED downlight.

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* + - 1. Basis of Design: ***Ketra D3 Fixed Square Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Square shallow flangeless bevel; Square deep flangeless bevel; Square shallow flangeless pinhole; or Square deep flangeless pinhole>>***.
			4. 4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed adjustable round flanged LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Adjustable Round Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Round adjustable bevel; or Round adjustable pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed adjustable round flangeless LED downlight.

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* + - 1. Basis of Design: ***Ketra D3 Adjustable Round Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Round adjustable flangeless bevel; or Round adjustable flangeless pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed adjustable square flanged LED downlight.

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* + - 1. Basis of Design: ***Ketra D3 Adjustable Square Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Square adjustable flanged bevel; or Square adjustable flanged pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed adjustable square flangeless LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Adjustable Square Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: ***<<Square adjustable flangeless bevel; or Square adjustable flangeless pinhole>>***.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: ***<<None; Solite lens; wet location rated; or Frost lens; wet location rated>>***.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: ***<<Spot (15 degrees) low glare; Flood (25 degrees) low glare; Wide flood (40 degrees) low glare; Very wide flood (60 degrees) low glare; Spot (15 degrees) high output; Flood (25 degrees) high output; Wide flood (40 degrees) high output; or Very wide flood (60 degrees) high output>>***.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Optic Accessory: ***<<None; Solite; Frost lens; or Hex louver>>***.
			2. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed wall wash round flanged LED downlight.

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* + - 1. Basis of Design: ***Ketra D3 Wall Wash Round Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: Round wall wash.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: Wall wash.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: Wall wash.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.
			7. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed wall wash round flangeless LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Wall Wash Round Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: Round flangeless wall wash.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: Wall wash.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: Wall wash.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.
			7. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed wall wash square flanged LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Wall Wash Square Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: Square wall wash.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: Wall wash.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: Wall wash.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.
			7. Mounting: Butterfly brackets or 24 inch hanger bars.
		1. ***<<Type \_\_\_\_\_: >>***Recessed wall wash square flangeless LED downlight.

Ketra's [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) includes fixed, adjustable, and wall-wash downlights.

Every model features low-profile housing, wireless communication, and field replaceable optics and electronics. With a wealth of trim and optic accessories, the [D3 Downlight Family](https://www.ketra.com/products/luminaires/d3downlight) is ideal for a large variety of applications. It uses a fully-tunable spectrum capable of delivering high quality white 1,400K-10,000K, saturated, and pastel light.

* + - 1. Basis of Design: ***Ketra D3 Wall Wash Square Mud-in Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Trim: Square flangeless wall wash.
			4. Trim Color: ***<<White; or Black>>***.

Downlight is wet location rated when trim is installed with lens.

Either an optic accessory or a trim accessory may be selected, both may not be used simultaneously.

* + - 1. Trim Accessory: Wall wash.
			2. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			3. Platform and Control: Wide gamut, tunable.
			4. Beam Angle: Wall wash.
			5. Voltage: ***<<120 VAC; or 277 VAC>>***.
			6. Housing Type: New construction, IC/airtight.
			7. Mounting: Butterfly brackets or 24 inch hanger bars.

KETRA; D4R RETROFIT DOWNLIGHT----->

* + 1. ***<<Type \_\_\_\_\_: >>***Recessed fixed round retrofit LED downlight.

Ketra’s [D4R Retrofit Downlight](https://www.ketra.com/products/luminaires/D4RRetrofitDownlight) is a cost-effective downlight solution with a 4” aperture. Featuring field-adjustable regress and IC-rated housing, the D4R supports a variety of ceiling types including 2x6 joints. The fixture can render 90+ CRI white light, saturated colors, and pastels. Each unit responds to wireless control and is individually-addressable through Ketra’s accompanying software.

\* Integrated appearance with 4" aperture

\* Adjustable regress depth

\* Supports multiple ceiling types

\* Fully-tunable spectrum delivers white light, pastels and saturated color

\* Lifetime color-point maintenance to within 1 MacAdam ellipse

* + - 1. Basis of Design: ***Ketra D4R Retrofit Downlight<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Fixture Style/Shape: Fixed, round.
			4. Regress Depth: ***<<Flush (0 inch); no baffle; Half inch; One inch; or Two inch>>***.
			5. Baffle: ***<<No baffle; White baffle; or Black baffle>>***.
			6. Wattage: ***<<9 W; 13 W; or 18 W>>***.
			7. Platform and Control: Wide gamut, tunable.
			8. Beam Angle: ***<<Spot (15 degrees); Flood (25 degrees); Wide flood (40 degrees); Very wide flood (60 degrees); or Extra wide flood (90 degrees)>>***.
			9. Voltage: 120 VAC.
			10. Trim Color: ***<<White; or Black>>***.
			11. Power/Housing Rating: ***<<13W, plenum (non-IC rated), air tight; or 8.5W, IC rated, air tight>>***.

KETRA; G2 HIGH OUTPUT LINEAR ACCENT----->

* + 1. ***<<Type \_\_\_\_\_: >>***LED linear accent.

Ketra’s high-output linear accent luminaires are ideally suited for cove, wall-wash and grazing applications. Utilizing Ketra’s superior optical design, the [G2 High Output Linear](https://www.ketra.com/products/luminaires/G2Linear) delivers exquisite beam quality, resulting in uniform color and intensity across walls and ceilings. Our fully tunable spectrum enables one product to be used in a variety of applications, and complements the existing lighting in any space. The G2 family of luminaires provides Ketra’s unparalleled quality of light and can be configured and managed on Ketra’s network.

\* High performance cove, graze, and wall wash applications

\* Excellent near-field color mixing

\* Fully tunable spectrum delivers white light, pastels, and saturated color

\* Active control system maintains consistent color point

\* Full digital control and performance

\* Seamless integration with existing controls

\* Wirelessly control color point and dimming to 0.1%

* + - 1. Basis of Design: ***Ketra G2 High Output Linear Accent<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Nominal Length: 12 inches.
			4. Lumens: ***<<1000; 700; or 400>>***.
			5. Platform and Control: Wide gamut, tunable.
			6. Beam Angle: ***<<Graze (10 by 60 degrees); Narrow flood (30 by 45 degrees); Flood (60 by 60 degrees); or Wide flood (120 by 120 degrees)>>***.
			7. Voltage: ***<<120 VAC; or 277 VAC>>***.
			8. Interface: Leader cable.
			9. Housing Color: ***<<White; or Black>>***.
			10. Include the following accessories:
				1. Leaders/jumpers; length as required; ***<<color to match housing; white; black; or \_\_\_\_\_\_\_\_>>***.
				2. ***<<Hex louver 45 degrees; or Hex louver 65 degrees>>***; selected according to beam angle; ***<<color to match housing; white; black; or \_\_\_\_\_\_\_\_>>***.
				3. Alignment track.

KETRA; L3I LINEAR PENDANT----->

* + 1. ***<<Type \_\_\_\_\_: >>***LED linear pendant.

Ketra’s [L3I indirect pendant](https://www.ketra.com/products/luminaires/L3IIndirectLinearPendant) offers intimate up-lighting for commercial and hospitality applications. With a fully-tunable spectrum and 0.1% dimming, the pendant provides an accent or complement to any space. It comes in several housing colors and fixture lengths, guaranteeing versatility. Control requires a wired connection to a Ketra [N3 satellite](https://www.ketra.com/products/controls/N3).

\* Indirect linear fixture

\* Uniformity across lens

\* 4-12 ft (to nearest 2 feet)

\* White, black, and metallic silver

\* 1000 lumens per foot max

* + - 1. Basis of Design: ***Ketra L3I Linear Pendant<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Lumens Per Foot: ***<<400; 600; 800; or 1000>>***.
			4. Platform and Control: Wide gamut, tunable.
			5. Lens: Dust lens.
			6. Voltage: ***<<120 VAC; or 277 VAC>>***.
			7. Mounting: ***<<Hard ceiling; or T-Bar>>***.
			8. Fixture Color: ***<<White; Black; Metallic silver (white cable); Metallic silver (black cable); White fixture, white cable, black canopy; White fixture, black cable, black canopy; White fixture, black cable, white canopy; Black fixture, black cable, white canopy; or Black fixture, white cable, white canopy>>***.
			9. Provide power/segment configuration as required.
			10. Length: ***<<As indicated on drawings; 3 feet; 4 feet; 6 feet; 8 feet; 10 feet; 12 feet; or \_\_\_\_\_\_\_\_>>***.
			11. Canopy for Non-Powered Points: ***<<5 inch (standard, same as for powered points); or 2 inch>>***.
			12. Aircraft Cable Length: ***<<36 inches (standard); or 72 inches>>***.

KETRA; L4R LINEAR RECESSED----->

* + 1. ***<<Type \_\_\_\_\_: >>***LED linear recessed fixture.

Ketra’s [L4R recessed linear](https://www.ketra.com/products/luminaires/L4RRecessedLinear) enables continuous lines of light with seamless end-to-end connections. The L4R uses Ketra’s fully-tunable spectrum to deliver high-quality white, saturated, and pastel light from a 4-inch aperture. Featuring a variety of mounting and finish styles as well as customizable lengths, the L4R integrates easily into any space. Control requires a wired connection to a Ketra [N3 satellite](https://www.ketra.com/products/controls/N3).

\* End to end connections for straight continuous lines of light

\* 4" wide aperture

\* Customizable length to the nearest foot

\* 1000 lm/ft max

\* Supports multiple ceiling types

* + - 1. Basis of Design: ***Ketra L4R Linear Recessed<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Lumens Per Foot: ***<<400; 600; 800; or 1000>>***.
			4. Platform and Control: Wide gamut, tunable.
			5. Lens: Flush opal lens.
			6. Voltage: ***<<120 VAC; or 277 VAC>>***.
			7. Hanging Style: ***<<Flanged, T-grid; Flanged, threaded rod; Flangeless, aircraft cable; Flangeless, threaded rod; or Flangeless, external mounting bracket>>***.
			8. Housing Color: ***<<White; or Black>>***.
			9. Provide power/segment configuration as required.
			10. Length: ***<<As indicated on drawings; 2 feet; 3 feet; 4 feet; 6 feet; 8 feet; 10 feet; 12 feet; or \_\_\_\_\_\_\_\_>>***.

KETRA; P4 4 INCH WIDE PENDANT----->

* + 1. ***<<Type \_\_\_\_\_: >>***LED pendant.

Ketra’s [P4 Linear Pendant](https://www.ketra.com/products/luminaires/P4DirectLinearPendant) offers intimate overhead lighting in commercial and hospitality applications. It delivers 90+ CRI whites, pastels, and saturated colors at any intensity, and is guaranteed to hold those color-points over time. Featuring a fully-tunable spectrum, 0.1% dimming, and a variety of finish styles, the pendant can accent or complement any space. Control requires a wired connection to a Ketra [N3 satellite](https://www.ketra.com/products/controls/N3).

\* High-performance standalone pendant

\* Tunable-spectrum produces wide range of white, pastels, and saturated colors

\* Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and temperature

\* Programmable digital dimming to 0.1%

\* Consistent appearance and guaranteed compatibility across LED technology generations

* + - 1. Basis of Design: ***Ketra P4 4 Inch Wide Pendant<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Length: ***<<As indicated on drawings; 48 inches; 72 inches; 96 inches; or \_\_\_\_\_\_\_\_>>***.
			4. Lumens Per Foot: ***<<400; 600; or 800>>***.
			5. Platform and Control: Wide gamut, tunable.
			6. Lens: ***<<Flush opal; or Alzak louver>>***.
			7. Voltage: ***<<120 VAC; or 277 VAC>>***.
			8. Housing Color: ***<<Matte white; or Matte black>>***.
			9. Mounting: ***<<Hard ceiling; or T-bar>>***.
			10. Aircraft Cable Length: ***<<36 inches; or 72 inches>>***.
			11. Provide cabling input/output configuration as required.
			12. Cable Color: ***<<Match housing color; White; Black; or \_\_\_\_\_\_\_\_>>***.
			13. Canopy Color: ***<<Match housing color; White; Black; or \_\_\_\_\_\_\_\_>>***.
			14. Canopy for Non-Powered Points: ***<<5 inch (same as for powered points); or 2 inch>>***.

KETRA; S30/S38 TRACK LUMINAIRES----->

* + 1. ***<<Type \_\_\_\_\_: >>***LED track fixture.

The [S30 Track Luminaire](https://www.ketra.com/products/luminaires/S30TrackLuminaire) enables a simple plug and play luminaire solution for integrating Ketra’s [S30 lamps](https://www.ketra.com/products/lamps/S30) into retrofit and new construction projects. The industrial design of the product follows that of [S30 lamps](https://www.ketra.com/products/lamps/S30) such that they complement each other and form a single luminaire. Simply specify the lamp parameters and track luminaire type to order as a complete unit. The product is offered with a variety of track types and includes a conduit mount version for permanent installations.

\* Leverage the full feature set of Ketra’s S30 LED Lamp

\* Constant torque hinge provides 90° of tilt aiming at any increment, without the need for a mechanical lock

\* 365° of rotation eliminates any aiming shadows

\* Configurable with industry standard track systems and conduit mount option

* + - 1. Basis of Design: ***Ketra S30 Track Luminaire<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Lumens: ***<<800; or 1000>>***; includes tunable lamp.
			4. Platform and Control: Wide gamut, tunable.
			5. Beam Angle: ***<<Spot (15 degrees); Flood (25 degrees); Wide flood (40 degrees); Very wide flood (60 degrees); or Extra wide flood (90 degrees BR style)>>***.
			6. Voltage: 120 VAC.
			7. Base Type: GU24.
			8. Adapter Type: ***<<"H-type" compatible; or 1/2 inch NPT canopy mount>>***.
			9. Housing Color: ***<<White; or Black>>***.
			10. Accessory Type: ***<<Short snoot, 55 degree cutoff; Tall snoot, 30 degree cutoff; Hex louver, 45 degree cutoff, includes short snoot; Baffle, 15 degree cutoff, includes tall snoot; or No accessory>>***.
		1. ***<<Type \_\_\_\_\_: >>***LED track fixture.

The [S38 Track Luminaire](https://www.ketra.com/products/luminaires/S38TrackLuminaire) enables a simple plug and play luminaire solution for integrating Ketra’s [S38 lamps](https://www.ketra.com/products/lamps/S38) into retrofit and new construction projects. The industrial design of the product follows that of the [S38 lamps](https://www.ketra.com/products/lamps/S38) such that they complement each other and form a single luminaire. Simply specify the lamp parameters and track luminaire type to order as a complete unit. The product is offered with a variety of track types and includes a conduit mount version for permanent installations.

\* Leverage the full feature set of Ketra’s S38 LED Lamp

\* Constant torque hinge provides 90° of tilt aiming at any increment, without the need for a mechanical lock

\* 365° of rotation eliminates any aiming shadows

\* Configurable with industry standard track systems and conduit mount option

* + - 1. Basis of Design: ***Ketra S38 Track Luminaire<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Lumens: ***<<900; or 1100>>***; includes tunable lamp.
			4. Platform and Control: Wide gamut, tunable.
			5. Beam Angle: ***<<Spot (10 degrees); Flood (25 degrees); Wide flood (40 degrees); or Very wide flood (60 degrees)>>***.
			6. Voltage: 120 VAC.
			7. Base Type: GU24.
			8. Adapter Type: ***<<"H-type" compatible; or 1/2 inch NPT canopy mount>>***.
			9. Housing Color: ***<<White; or Black>>***.
			10. Accessory Type: ***<<Short snoot, 55 degree cutoff; Tall snoot, 30 degree cutoff; Hex louver, 45 degree cutoff, includes short snoot; Baffle, 15 degree cutoff, includes tall snoot; or No accessory>>***.
	1. **TUNABLE LED PERFORMANCE REQUIREMENTS**
		1. Employ single source multi-dye emitter consisting of both monochromatic and phosphor converted blue LED dye.
		2. Color Rendering Index (CRI): Capable of CRI greater than 90 at any point along the Black Body Curve from 2,700K to 5,000K.
		3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
		4. Color Spatial Uniformity: Precision control optics that yield less than two-step MacAdam ellipses over the field angle with beam angles down to 10 degrees.
		5. Color Point Maintenance: Employ closed loop optical and thermal feedback capable of maintaining color point accuracy of less than one-step MacAdam ellipse over product lifetime.
		6. Color Point Range: Single light source capable of producing 16.7 million colors and white from 1,400K to 10,000K Correlated Color Temperature (CCT)
		7. Dimming Range: Dimmable from 100 to 0.1 percent measured luminous flux.
		8. Lighting system capable of all of the following dimming functionality:
			1. Automatically mimicking natural daylight by shifting Correlated Color Temperature (CCT) and intensity based on time-of-day.
			2. Shifting from high CCT at high intensity to low CCT at low intensity, mimicking dimming curve of an incandescent lamp.
			3. Changing intensity while maintaining full color spectrum or CCT.
			4. Changing full color spectrum or CCT while maintaining intensity.
		9. Lighting system capable of manipulating the Spectral Power Distribution (SPD) by

automatically adjusting distributions of color intensity while maintaining the same Correlated Color Temperature (CCT).

* 1. **LUMINAIRES - GENERAL REQUIREMENTS**
		1. Provide products that comply with requirements of NFPA 70.
		2. Provide products that are listed and labeled as complying with UL 1598, where applicable.
		3. Provide products listed and classified by Underwriters Laboratories Inc.as suitable for the purpose indicated.
		4. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts/drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
		5. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
		6. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
		7. Recessed Luminaires:
			1. Ceiling Compatibility: Comply with NEMA LE 4.
			2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
		8. LED Luminaire Components: UL 8750 recognized or listed as applicable.
	2. **TUNABLE LED LAMPS**
		1. General Requirements:
			1. Furnished with integral thermal protection.
			2. Sealed; damp location rated.
			3. Suitable for use in fully enclosed luminaires.
			4. Furnished with integral wireless control.
		2. Tunable LED A20 Lamp***<< Type \_\_\_\_\_>>***:

Ketra's [A20 lamp](https://www.ketra.com/products/lamps/A20) is a fully tunable, calibrated light source that delivers high CRI white, pastels and saturated colors from an omnidirectional beam pattern. The product includes wireless control thus simplifying retrofit applications. Each lamp is individually addressable, configurable and controllable via Ketra’s suite of control and software products. The [A20 lamp](https://www.ketra.com/products/lamps/A20) completes the decorative layer of design by enabling Ketra’s advanced tunable spectrum capabilities to be deployed in applications such as wall sconces, pendants and table lamps.

\* Fully tunable spectrum delivers white light, pastels and saturated color

\* Low glare, single point source

\* Clean industrial design

\* Active optical and thermal management maintains color point to less than 1 MacAdam ellipse over lifetime and operating temperature range

\* Wireless control of color point and dimming to 0.1%

* + - 1. Basis of Design: ***Ketra A20 Tunable Lamp<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.
			3. Lumens/Beam Angle: ***<<600; omni-directional; or 800; semi-directional>>***.
			4. Platform and Control: Wide gamut, tunable.
			5. Voltage: 120 VAC.
			6. Base Type: ***<<E26; or GU24>>***.
			7. Housing Color: ***<<White; or Black>>***.
		1. Tunable LED PAR30 Lamp***<< Type \_\_\_\_\_>>***:

Ketra’s [S30 lamp](https://www.ketra.com/products/lamps/S30) is an all-encompassing LED solution with the ability to render 90+ CRI white light, saturated colors and pastels from a fully mixed, single point source. Ketra’s custom driver chip and optics incorporate closed-loop thermal and optical feedback, maintaining a factory-calibrated color point to one MacAdam ellipse over the product’s lifetime. Each lamp is wirelessly controlled and individually addressable through Ketra’s accompanying software.

\* Fully tunable spectrum single point source produces wide range of 90+ CRI white, pastels and saturated colors

\* Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and full operating temperature range

\* Integrated temperature protection maintains product within safe operating conditions

\* Wireless dimmable to 0.1%

* + - 1. Basis of Design: ***Ketra S30 Tunable Lamp<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.

1050 lumen lamp (10) not available for sale in California

* + - 1. Lumens: ***<<800; or 1050>>***.
			2. Platform and Control: Wide gamut, tunable.
			3. Beam Angle: ***<<Spot (15 degrees); Flood (25 degrees); Wide flood (40 degrees); Very wide flood (60 degrees); or Extra wide flood (90 degrees BR style)>>***.
			4. Voltage: 120 VAC.
			5. Base Type: ***<<E26; or GU24>>***.
			6. Housing Color: ***<<White; or Black>>***.
		1. Tunable LED PAR38 Lamp***<< Type \_\_\_\_\_>>***:

Ketra’s [S38 lamp](https://www.ketra.com/products/lamps/S38) is an all-encompassing LED solution with the ability to render 90+ CRI white light, saturated colors and pastels from a fully mixed, single point source. Ketra’s custom driver chip and optics incorporate closed-loop thermal and optical feedback, maintaining a factory-calibrated color point to one MacAdam ellipse over the product’s lifetime. Each lamp is wirelessly controlled and individually addressable through Ketra’s accompanying software.

\* Fully tunable spectrum single point source produces wide range of 90+ CRI white, pastels and saturated colors

\* Closed-loop color point maintenance to <1 MacAdam ellipse over lifetime and full operating temperature range

\* Integrated temperature protection maintains product within safe operating conditions

\* Wireless dimmable to 0.1%

* + - 1. Basis of Design: ***Ketra S38 Tunable Lamp<<; Model \_\_\_\_\_\_\_\_\_\_>>***; www.ketra.com/#sle.
			2. Substitutions: ***<<See Section 01 6000 - Product Requirements; or Not Permitted>>***.

1110 lumen lamp (11) not available for sale in California

* + - 1. Lumens: ***<<900; or 1100>>***.
			2. Platform and Control: Wide gamut, tunable.
			3. Beam Angle: ***<<Spot (10 degrees); Flood (25 degrees); Wide flood (40 degrees); or Very wide flood (60 degrees)>>***.
			4. Voltage: 120 VAC.
			5. Base Type: ***<<E26; or GU24>>***.
			6. Housing Color: ***<<White; or Black>>***.
		1. Provide the following PAR lamp accessories where indicated:
			1. ***<<Type \_\_\_\_\_: >>***Short snoot, 55 degree cutoff.
			2. ***<<Type \_\_\_\_\_: >>***Tall snoot, 30 degree cutoff.
			3. ***<<Type \_\_\_\_\_: >>***Hex louver, 45 degree cutoff, includes short snoot.
			4. ***<<Type \_\_\_\_\_: >>***Baffle, 15 degree cutoff, includes tall snoot.
	1. **ACCESSORY CONTROLS AND INTERFACES**

--THE FOLLOWING PARAGRAPH IS FOR COMMERCIAL PRODUCT LINE – CM SERIES ONLY--

* + 1. Wireless Keypads:

Ketra’s [X2 keypad](https://www.ketra.com/products/controls/X2Keypad) is a specification grade, fully programmable and customizable interface between the Ketra lighting system and its users. With its classic button-style interface and ability to recall stored settings, the X2 makes it easy to control Ketra devices on the control network. X2’s come in two models: a wireless KetraNet Mesh controller and a wireless KetraNet Mesh controller with onboard 600W incandescent dimmer. The latter is ideal for spaces where both Ketra and traditional lighting sources need to be controlled. The X2 is perfect for retrofit installations as well as new construction, fitting within a standard wall box and either Decora or Claro wall plates.

• Classic keypad interface for Ketra’s lighting system

• Multiple layout styles

• Custom button engraving available

• KetraNet wireless connection to control network

• 600W Incandescent Dimmer + KetraNet wireless control version available

• Black, White, Almond colors

* + - 1. Basis of Design: ***Ketra X2 Series Keypads***; www.ketra.com/#sle.
			2. Enables control of any compatible ***Ketra*** tunable LED luminaire/lamp or interfaced third-party product on ***KetraNet*** wireless network.
			3. Enables selection of preset scenes and shows.

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

* + - 1. Keypad Color: Match finishes for wiring devices in Section **26 2726**, unless otherwise indicated.
			2. Keypad Color: ***<<As indicated on drawings; White; Black; Almond; To be selected by Architect; or \_\_\_\_\_\_\_\_\_\_>>***.

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

* + - 1. Keypad Configuration: As indicated or as required to control the loads as indicated.
			2. Keypad Configuration:
				1. ***<<Type \_\_\_\_\_: >>***Wireless control; 100-277 VAC.
				2. ***<<Type \_\_\_\_\_: >>***Wireless control and integral 600W forward phase dimmer for incandescent loads; 100-120 VAC.

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

* + - 1. Keypad Button Layout/Labeling: ***<<As indicated on drawings; To be selected by Architect; or \_\_\_\_\_\_\_\_\_\_>>***.
			2. Keypad***<< Type \_\_\_\_\_>>*** Button Layout/Labeling:
				1. Button Layout: ***<<Blank Wall Plate (B00); 5 Button + Intensity (B01); Dimmer Paddle (B02); Double Tall + Blank + 2 Button + Intensity (B03); Double Tall + 3 Button + Intensity (B04); 1 Button + Blank + 3 Button + Intensity (B05); 2 Button + Blank + 2 Button + Intensity (B06); or 3 Double Tall (B07)>>***.
				2. Button Label: ***<<Residential - Whole House (0401); requires B04 Button Layout; Residential - Living/Media (0402); requires B04 Button Layout; Residential - Kitchen/Dining (0403); requires B04 Button Layout; Residential – Bedroom (0404); requires B04 Button Layout; Residential - Bathroom (0405); requires B04 Button Layout; Residential - Study (0406); requires B04 Button Layout; Residential - Utility/Garage (0407); requires B04 Button Layout; Residential - Closet (0408); requires B04 Button Layout; Residential - Water Closet (0409); requires B04 Button Layout; Office - Private Office (0410); requires B04 Button Layout; Office - Open Office (0701); requires B07 Button Layout; Office - Conference (0411); requires B04 Button Layout; Office - Common Area (0412); requires B04 Button Layout; Office - Meditation (0413); requires B04 Button Layout; Office - Restrooms/Utility (0702); requires B07 Button Layout; Office - Shades 3-Button (0703); requires B07 Button Layout; Office - Shades 5-Button (0110); requires B01 Button Layout; Custom label as directed by Architect; or \_\_\_\_\_\_\_\_>>***.

--THE FOLLOWING PARAGRAPH IS FOR RESIDENTIAL PRODUCT LINE – HW SERIES ONLY--

* + 1. Keypads: See ***26 0943 – Network Lighting Controls – Lutron HomeWorks QS***.
		2. Power/Control Interfaces for LED Linear Luminaires:

Ketra’s [N3 satellite](https://www.ketra.com/products/controls/N3) provides several vital system functions: control of luminaires, integration of third-party control and lighting products, and on-board memory and astronomical time clock functionality. The N3’s wireless connectivity enables its installation in multiple, convenient locations. To simplify the integration of third party control systems, it includes multiple inputs and outputs, including: 0-10V, 0-24V, and DMX; with future releases supporting DALI, TRIAC dimming control, and network backbone connectivity.

• Enables Ketra’s luminaires to join the Ketra control network

• Wireless network for easy installation

• On-board content storage and astronomical time clock

• Multiple control inputs and outputs for integration of third-party control and lighting products

* + - 1. Basis of Design: ***Ketra N3 Satellite***; www.ketra.com/#sle.
			2. Supplies power to and enables wireless control of compatible ***Ketra*** LED linear luminaires.
			3. Furnished with multiple inputs/outputs for integration of third-party controls and lighting products; enables interface with occupancy and daylight sensors.
				1. Four multifunction analog inputs/outputs; each port configurable as:

0-10V input or output.

0-24V input.

Contact closure input or output.

* + - * 1. DMX In and Out/Through.
			1. Furnished with on-board memory and astronomical time clock functionality.
			2. Voltage: 100-277 VAC.
			3. Provide recessed rated or plenum rated housing as required for installation.
		1. Wireless Hubs:

Ketra’s [N4 Hub](https://www.ketra.com/products/controls/N4) forms a bridge between Ketra products and Ketra digital interfaces such as [Design Studio](https://www.ketra.com/products/tech-tools/DesignStudio), [mobile app](https://www.ketra.com/products/controls/MobileApp), and API commands. With multiple N4s, a user can integrate KNets, allowing for seamless installations no matter how large. With an Internet connection, the Hub can connect to Ketra’s cloud servers to enable backup and remote maintenance functions.

• Enables control by Design Studio, the Ketra app, or API commands

• Seamless integration between KNets, allowing for installations with 50+ devices (using multiple N4s)

• Mounting options: tabletop/wall-mounted, conduit-mounted

* + - 1. Basis of Design: ***Ketra N4 Hub***; www.ketra.com/#sle.
			2. Enables wireless control of ***KetraNet*** network devices via ***Ketra Design Studio*** PC configuration software, ***Ketra app*** mobile application, and API commands.
			3. Each ***Ketra N4*** hub supports up to 49 ***Ketra*** wireless devices (at least one device within 50 feetof hub); integration between multiple hubs supports installations with 50 or more devices.
			4. Supports remote backup and maintenance functions with internet connection to ***Ketra*** cloud servers (Ethernet connection required).
			5. Voltage: 100-277 VAC.
			6. Provide table-top/wall-mounted or conduit-mounted housing as required for installation.
		1. Software:
			1. PC Configuration Software:

Ketra’s [Design Studio](https://www.ketra.com/products/tech-tools/DesignStudio) software empower users to find, configure, and program lamps, luminaires, and controls within the network. Included in purchase of any Ketra hardware, the software was designed with ease-of-use in mind and offers a suite of functionality that follows intuitive workflow. Complementary to Design Studio, the Ketra Tech Tool is a technician-oriented programming software tool that enables power-user functions such as updating firmware on lighting and controls products.

• Enables keypads to discretely control rooms, zones, and entire installations

• Sets color and intensity information on all products

• Authors preset scenes and shows

• Content management for your customized library of light settings

• Remote backup and multi-user collaboration via Ketra’s cloud servers

• Local file storage and archiving for project data

• Configuration of I/O ports in controls automation products

* + - * 1. Basis of Design: ***Ketra Design Studio***; www.ketra.com/#sle.
				2. Enables configuration of ***KetraNet*** network devices; supports automatic addressing.
				3. Supports adjustment of color and intensity settings for tunable LED luminaires/ lamps.
				4. Supports configuration of accessory control/interface inputs/outputs and third-party protocols.
				5. Supports creation of fixture groups.
				6. Supports creation of preset scenes and shows.
				7. Microsoft Windows-based; supports local file storage and archiving for project data; requires internet connection and ***Ketra N4*** wireless hub.
				8. Supports remote backup, software updates, and multi-user collaborations with internet connection to ***Ketra*** cloud servers.
			1. Mobile Application:

The [Ketra app](https://www.ketra.com/products/controls/MobileApp) connects keypads to a smartphone or tablet, granting the flexibility of remote control. Thanks to its ability to use virtual keypads created in [Design Studio](https://www.ketra.com/products/tech-tools/DesignStudio), the mobile app can even control rooms with no hardware keypads. The app can access keypads from any local installation, across all user accounts.

Requirements:

• Ketra lighting system with [N4 hub](https://www.ketra.com/products/controls/N4) (hardware keypads not required)

• Wi-Fi connection to Ketra lighting system

• Ketra account with access to desired installations

• iOS 6 and up, or Android 4.4 and up

* + - * 1. Basis of Design: ***Ketra App***; www.ketra.com/#sle.
				2. Enables control of wireless keypads on the ***KetraNet*** wireless network; supports creation of virtual keypads.
				3. Supports multiple hub-based ***Design Studio*** installations.
				4. Supports multiple user accounts.
				5. Available for iOS and Android operating systems.
			1. Supports Amazon Alexa integration.
1. **EXECUTION**
	1. **EXAMINATION**
		1. Verify that field measurements are as indicated on drawings.
		2. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
		3. Verify that suitable support frames are installed where required.
		4. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
		5. Verify that conditions are satisfactory for installation prior to starting work.
	2. **PREPARATION**
		1. Provide extension rings to bring outlet boxes flush with finished surface.
		2. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.
	3. **INSTALLATION**
		1. Coordinate locations of outlet boxes provided under Section ***26 0533.16*** as required for installation of luminaires provided under this section.
		2. Install products according to manufacturer's instructions.
		3. Perform work in accordance with NECA 1 (general workmanship).
		4. Install luminaires in accordance with NECA/IESNA 500 (commercial lighting).
		5. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
		6. Suspended Ceiling Mounted Luminaires:
			1. Do not use ceiling tiles to bear weight of luminaires.
			2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
			3. Secure ***<<surface-mounted; recessed; pendant-mounted; and \_\_\_\_\_\_\_\_>>*** luminaires ***<<to ceiling support channels or framing members; to building structure; or \_\_\_\_\_\_\_\_\_\_>>***.
			4. Secure ***<<surface-mounted; recessed; pendant-mounted; and \_\_\_\_\_\_\_\_\_>>*** luminaires ***<<to ceiling grid system framing members; to building structure; or \_\_\_\_\_\_\_\_\_\_>>***.
			5. Secure lay-in luminaires to ceiling support channels using ***<<listed safety clips; or \_\_\_\_\_\_\_\_\_\_>>*** at ***<<four; two; or \_\_\_\_\_\_\_\_\_\_>>*** corners.
			6. In addition to ceiling support wires, provide ***<<two; or \_\_\_\_\_\_\_\_\_\_>>*** galvanized steel safety wire(s***)<<, minimum 12 gage,;, or \_\_\_\_\_\_\_\_\_\_,>>*** connected from ***<<opposing corners; or \_\_\_\_\_\_\_\_\_\_>>*** of each ***<<recessed luminaire; or \_\_\_\_\_\_\_\_\_\_>>*** to building structure.
			7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
		7. Recessed Luminaires:
			1. Install trims tight to mounting surface with no visible light leakage.
			2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
			3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
		8. Suspended Luminaires:
			1. Unless otherwise indicated, specified mounting heights are to ***<<bottom; center; or \_\_\_\_\_\_\_\_\_\_>>*** of luminaire.
			2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
			3. Install canopies tight to mounting surface.
		9. Install accessories furnished with each luminaire.
		10. Bond products and metal accessories to branch circuit equipment grounding conductor.
		11. Install lamps in each luminaire (where applicable).
	4. **FIELD QUALITY CONTROL**
		1. See Section ***01 4000 - Quality Requirements***, for additional requirements.
		2. Inspect each product for damage and defects.
		3. Operate each luminaire after installation and connection to verify proper operation.
		4. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy luminaires/lamps as determined by Architect.
	5. **ADJUSTING**
		1. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
	6. **CLEANING**
		1. Clean surfaces according to NECA/IESNA 500 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
	7. **CLOSEOUT ACTIVITIES**
		1. See Section ***01 7800 - Closeout Submittals***, for closeout submittals.
		2. See Section ***01 7900 - Demonstration and Training***, for additional requirements.
		3. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.
	8. **PROTECTION**
		1. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**