

RESTREPO INNOVATIONS



THE RESTREPO LIGHTING SPEC GUIDE

A Field Reference for Luxury Residential Lighting

CCT / CRI / R9 / TM-30 • Protocol Comparison • Fixture Reference • Scoping Checklist

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Why Lighting Matters More Than Any Other Finish

The Invisible Finish

Lighting is the finish that controls all other finishes. The marble countertop, the hand-applied plaster, the custom millwork — none of them look as intended under poorly specified light. A \$30,000 kitchen renovation photographed under flat fluorescent lighting looks like an apartment renovation. The same kitchen under properly layered 90+ CRI warm light looks like an architectural magazine editorial.

What This Guide Covers

This reference covers the six dimensions of lighting specification that matter most for luxury residential projects: color quality metrics (CCT, CRI, R9, TM-30), dimming protocols (0-10V, DALI, DMX, Art-Net), fixture types (cove, recessed, linear, pendant, sconce, monopoint), outdoor specification (Coastal Source dealer guidance), and the 10-question scoping checklist our team uses on every project consultation.

Who We Are

Restrepo Innovations is an Elite Pro Crestron Dealer and HTA Luxury Certified integrator serving luxury residences across New Jersey, New York, and Connecticut. We are an authorized Coastal Source dealer for outdoor lighting. Our team has designed and installed lighting systems for some of the most demanding residential projects in the tri-state area over 20+ years.

Glossary of Key Lighting Terms

CCT — Correlated Color Temperature

Measured in Kelvin (K). Describes the "warmth" or "coolness" of a light source. Lower numbers (2200K) are warm/amber; higher numbers (6500K) are cool/daylight. Luxury residential specification range: 2700K–3000K for living and sleeping areas. Task areas: 3500K–4000K.

CRI — Color Rendering Index

A 0–100 scale measuring how accurately a light source renders a set of 8 standardized test colors compared to a reference illuminant. Luxury residential minimum: CRI 90. Critical spaces (galleries, kitchens, master bathrooms): CRI 95+. Note: CRI does not include R9 (saturated red).

R9 — Saturated Red Rendering

The Color Rendering Index score for the saturated-red test sample (R9), which is excluded from the standard CRI average. Minimum for luxury residential: $R9 > 50$. For fine art, wine display, dining rooms: $R9 > 80$. Negative R9 values indicate active distortion of red hues.

TM-30 — IES Color Rendition Method

Published by the Illuminating Engineering Society. Uses 99 color samples to produce two scores: Rf (Fidelity, analogous to CRI) and Rg (Gamut, measuring color saturation vs. reference). Target: Rf 90+, Rg 100–107 for residential accent lighting.

Lumens (lm)

The unit of total luminous flux — the total quantity of light emitted by a source in all directions. A 60W incandescent emits approximately 800 lumens. Used to compare fixture output independent of beam angle or beam distribution.

Foot-candles (fc)

The unit of illuminance — the amount of light falling on a surface. 1 foot-candle = 1 lumen per square foot. Target ranges: 20–50 fc for ambient residential; 50–100 fc for task surfaces; 300–500 fc for accent-to-ambient ratios of 5:1.

Dim-to-Warm

LED technology that shifts color temperature as output decreases — from approximately 3000K at full output to 1800K at minimum. Replicates incandescent behavior. Critical specification for dining rooms, master bedrooms, and any space where incandescent lamp feel is required. Distinct from standard LED which maintains constant CCT when dimmed.

Melanopic Lux (m-EDI)

A metric weighting light output according to the sensitivity of melanopsin-containing retinal cells (the photoreceptors responsible for circadian entrainment). 5000K light at 300 lux produces dramatically more melanopic stimulus than 2700K light at the same lux level. Use for circadian lighting specification alongside photopic lux.

IP Rating

Ingress Protection rating — two-digit code (e.g., IP65, IP67) defining resistance to solids (first digit) and water (second digit). IP65: dust-tight, water jet resistant. IP67: dust-tight, temporary immersion. IP68: dust-tight, continuous immersion. Outdoor fixtures must be rated for their application; coastal and pool locations require IP67 minimum.

PWM Dimming Frequency

Pulse Width Modulation — the rapid switching technique used by LED drivers to control output level. At low frequencies (below 1000 Hz), PWM dimming creates visible flicker in video and photography. Specify minimum 2000 Hz (or "flicker-free") PWM dimming for luxury residential applications.

Dimming Protocol Comparison

Protocol selection is driven by fixture type and control objective — not preference. This table covers all major protocols encountered in luxury residential and high-end commercial lighting.

Protocol	Signal	Range	Bidirectional	Best For
0-10V	Analog DC 0–10V	~10%–100%	No	General LED drivers; panels; strips
TRIAC	Phase-cut AC (leading edge)	1%–100%	No	Residential incandescent; halogen loads
ELV	Phase-cut AC (trailing edge)	1%–100%	No	Electronic transformer LED fixtures
MLV	Leading-edge phase-cut AC	~10%–100%	No	Magnetic transformer loads (legacy)
DALI	Digital serial (IEC 62386)	0.1%–100%	Yes	Large projects; fault detection; individual addressing
DMX512	Digital serial RS-485	0–255 per ch.	No	RGBW/RGBWW; entertainment; color-changing
Art-Net	DMX over Ethernet UDP	32,768 universes	No	Large multi-universe DMX over network
sACN	DMX over Ethernet multicast	63,999 universes	No	Very large installations; network-optimized

Source: IEC 62386 (DALI), EIA-485 (DMX512), ANSI E1.31 (sACN), Art-Net 4 specification (Artistic Licence).
restrepoinnovations.com/services/lighting-design.html

Fixture Type Reference Cards

Cove / Indirect

Layer: Ambient

LED strip in architectural trough or ledge; light directed upward to bounce off ceiling.

Best for: Living rooms, master bedrooms, dining rooms, hallways.

Notes: Requires 9ft+ ceiling for effective indirect distribution. Cove geometry determines uniformity.

Recessed Downlight

Layer: Ambient / Task / Accent

Ceiling-mounted fixture with downward beam distribution; 15–90 degree beam spread options.

Best for: General ambient fill, kitchen task, adjustable accent with monopoint head.

Notes: Never use as sole source. Always layer with cove and accent fixtures.

Linear / Strip LED

Layer: Task / Indirect

Continuous flexible or rigid LED array in aluminum extrusion channel; diffuser lens available.

Best for: Under-cabinet task, cove fill, stair treads, millwork highlighting, outdoor path.

Notes: Specify 140+ LEDs/meter (no dot pattern), CRI 90+, R9 50+, 2000+ Hz PWM driver.

Pendant

Layer: Task / Decorative

Suspended fixture at intermediate height; task or ambient function + design focal point.

Best for: Kitchen island (30–36" above counter), dining table (30–36" above table surface), entryways.

Notes: Verify dimmer compatibility with integrated LED driver. Scale pendant height to ceiling height.

Sconce

Layer: Ambient / Accent

Wall-mounted fixture; up/down or diffuse distribution; mid-height illumination source.

Best for: Hallways, bedrooms (bedside), bathrooms, stair landings, exterior walls.

Notes: Adds wall brightness that recessed-only schemes lack. Check extension from wall for clearance.

Monopoint

Layer: Accent

Single ceiling-mounted adjustable directional fixture; wide aiming range.

Best for: Artwork accent, sculpture, architectural feature, display highlight.

Notes: Aim at 30 degrees from vertical for artwork. Specify anti-glare baffle for exposed positions.

10-Question Lighting Scoping Checklist

Use this checklist in your initial consultation with any lighting designer or integrator. A qualified team should have clear answers to all 10. Vague or avoided answers indicate gaps in expertise.

1. Will this be a layered lighting system?

The answer should be "yes" for every occupied space. If the designer leads with recessed downlight layouts without discussing cove, accent, and decorative layers, the system will look like an office.

2. What CCT will you specify, and will it shift during the day?

Confirm CCT range (2700K–3000K for residential) and whether the system supports circadian scheduling. Confirm CCT at multiple dim levels — some fixtures shift color temperature when dimmed.

3. What CRI and R9 do the specified fixtures achieve?

Minimum CRI 90. Request R9 data explicitly — it is not included in standard CRI ratings. For dining rooms, art display, and master bathrooms, specify R9 > 80.

4. What dimming protocol is used for each fixture type?

The answer should reference specific protocols (0-10V, ELV, TRIAC, DALI, DMX) matched to specific fixture categories. "Whatever works" is not a specification.

5. How does the outdoor system integrate with interior lighting?

Outdoor zones should be controllable from the same control system as interior lighting. Confirm that outdoor transformer inputs accept Crestron relay control.

6. Are Coastal Source or equivalent marine-grade fixtures specified outdoors?

For coastal environments and estate properties, marine-grade fixture specification is not optional. Ask for the material data sheet on proposed outdoor fixtures.

7. How are lighting zones defined and what controls each zone independently?

Each zone should have an independent control path. Zones mixed on a single circuit cannot be independently dimmed or scheduled.

8. How does the lighting system integrate with the home automation system?

If you are using Crestron, all lighting zones should be programmable within Crestron scene logic. This requires protocol-compatible dimmer hardware and, for DALI and DMX, dedicated gateway modules.

9. What is the plan for artwork accent lighting?

Art accent requires adjustable-aim fixtures aimed at 30 degrees from vertical with an appropriate beam angle for the artwork dimensions. Recessed downlights directly above artwork produce veiling glare, not accent.

10. What does the post-commissioning support program include?

Lighting preferences change. Confirm that scene adjustment, fixture aim correction, and system expansion are available after commissioning and at what cost.

Coastal Source Outdoor Lighting

Restrepo Innovations is an Authorized Coastal Source Dealer

Why Coastal Source?

Coastal Source was engineered specifically for the harshest outdoor environments: salt air, UV exposure, standing water, and 15+ year service lives without refinishing. Fixture bodies are cast from LM6 marine-grade aluminum with 316L stainless steel hardware — the same grade used in marine deck fittings. Multi-stage powder coating with chromate conversion pretreatment produces a bond that resists delamination, chalking, and UV degradation where standard outdoor fixtures require refinishing within 5 years.

The Integrated System

Coastal Source products operate as an integrated low-voltage system: transformers are engineered specifically for their fixture line, with output voltage taps matched to cable run lengths and fixture loads. Transformer capacity ranges from 150W to 900W. 12-gauge direct burial cable maintains voltage within specification at longer run lengths than the 14-gauge cable used by competitors.

Zone Design Strategy

Every Coastal Source installation by Restrepo Innovations is designed in five zones: (1) Architectural/curb appeal — timed sunset to midnight; (2) Safety/wayfinding — always-on at 25% output; (3) Security — motion-triggered at full intensity; (4) Entertainment/pool — scene-activated; (5) Landscape feature — timed sunset to 11 PM. Each zone has a dedicated transformer and Crestron relay control input.

Crestron Integration

Coastal Source transformers include accessory inputs that accept 12V relay signals from Crestron automation modules. This integration allows outdoor zones to participate in whole-home scene logic alongside interior lighting. A "Good Night" scene simultaneously dims interior lighting, reduces architectural uplighting to 30%, maintains pathway safety lighting, and arms security motion detection.

Authorized Dealer Advantage

Coastal Source honors manufacturer warranties only for authorized dealer installations. Restrepo Innovations provides factory-backed installation and warranty coverage for all Coastal Source products. DIY and non-authorized installation voids manufacturer coverage. Contact us at 201.405.2022 for a Coastal Source estimate for your outdoor lighting project.

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Concierge AV & Automation for Luxury Residences

Ready to design your lighting system? Our team serves luxury residences across New Jersey, New York, and Connecticut.

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Call for a complimentary consultation	Or book at calendly.com/restrepoinnovations/consultation	By appointment

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Source references: IES TM-30 (IES Method for Evaluating Light Source Color Rendition), IEC 62386 (DALI standard), ANSI E1.31 (sACN), Coastal Source product specifications. This guide is provided for educational purposes. Specifications should be verified against current manufacturer data for each project.