

Paint LRV & Metamerism Architectural Field Guide

Physics of Light Reflectance Values & Spectral Kelvin Orientation

Domain: Color Science, Architectural Optics & Photometry
Standard: Light Reflectance Value (LRV 0–100 Scale)

Optical Phenomenon: Metameric Shift & Color Temperature
Core Rule: 4-Orientation Spectral Kelvin Matching

Executive Color Science Summary

- The Swatch Metamerism Trap:** Paint colors selected under 4000K store fluorescent lights shift drastically when illuminated by natural daylight or 2700K home incandescent lamps.
- Light Reflectance Value (LRV) Scale:** LRV measures the percentage of light a paint color reflects (0 = absolute black, 100 = pure white). Spaces with low natural light require LRVs between 62 and 75 to avoid feeling muddy.
- Cardinal Orientation Kelvin Curves:** North-facing rooms receive cool, blue-tinted diffuse light (10,000K) requiring warm yellow/red undertones; South-facing rooms receive warm golden light (3,500K) that amplifies warm paint pigments.

Room Orientation vs. Light Temperature & Paint Undertone Strategy

Cardinal Orientation	Natural Light Character	Color Distortion Risk	Ideal Paint Undertone Strategy
North-Facing Rooms	Cool, bluish, diffuse (10,000K)	Greys turn dingy cold; blues feel freezing	Warm cream, warm taupe, peach undertones (LRV 65-72)
South-Facing Rooms	Warm, golden, intense (3,500K)	Yellows become glaring; whites wash out	Soft greige, neutral white, muted sage (LRV 55-65)
East-Facing Rooms	Warm morning gold; cool afternoon	Shifts from vibrant warm to cold shadow	Balanced neutrals; adapts across diurnal light shift
West-Facing Rooms	Cool dull morning; blazing late sun	Intense afternoon orange flare and glare	Cool undertone whites and desaturated stone hues

Step-by-Step Architectural Color Testing Checklist

- [] **Calculate Room Natural LRV Baseline:** Measure room natural window light. Rooms with small windows or heavy tree cover require an LRV baseline of at least 65.
- [] **The 2x2-Foot Movable Foam Board Test:** Never paint swatches directly on the wall! Paint two coats on 24x24-inch white foam boards, leaving a 2-inch white border.
- [] **The 4-Times-of-Day Inspection:** Move the painted foam board across all 4 walls at 8:00 AM, 12:00 PM, 5:00 PM, and 9:00 PM under artificial night lighting.
- [] **Eliminate Metameric Clash:** Ensure indoor artificial light bulbs match the paint's undertone: specify strictly 2700K or 3000K high-CRI (90+) LED lamps.
- [] **Account for Sheen Light Reflectance:** Remember that eggshell and satin sheens reflect 10% more directional specular light than flat matte paints of the identical pigment code.

Architectural Colorist Rule: The 2-Inch White Border Rule

When you test a paint sample directly onto an existing colored wall, your visual cortex immediately evaluates the new swatch against the old background color (simultaneous contrast). A soft warm white will look dingy next to a beige wall, but crisp next to pure white. Always leave a 2-inch border of pure white paper around your sample board to isolate the true pigment.