

LIGHTOLIER

by  Signify

The right light brings colors to life

**AccuRender
Technology**

Downlights, Cylinders,
Track Heads &
Recessed Multiples





Define and differentiate

As the WELL Building Standard indicates, “Color quality impacts visual appeal and can either contribute to or detract from occupant comfort. Poor color quality can reduce visual acuity and the accurate rendering of illuminated objects. For instance, foods, human skin tones and plants may appear dull or unsaturated under lights that have low color quality metrics.”¹

Our new AccuRender technology helps ensure colors are rendered more accurately and consistently, while doing so as efficiently as CRI 80 products.

Standard CRI 80



Good color rendering
and high efficacy

Standard CRI 90



Better color rendering
and low efficacy

AccuRender



Best color rendering,
color preference and high efficacy



See the difference

Most lighting today has a CRI level of 80, so the shift to higher color rendering marks a change in lighting quality, which is of critical importance to office, healthcare, retail, hospitality, and education facilities, where light quality and well rendered colors can be vital for task effectiveness.

AccuRender technology takes color rendering to a new level and will soon be standard across our entire portfolio with almost no sacrifice to luminaire efficacy.

Full range of indoor architectural LED luminaires with new Accurender technology

Downlights & Cylinders

Calculite
Downlights



Calculite
Cylinders



LyteProfile
Downlights



EasyLyte
Downlights



OmniSpot

Recessed Multiple Cylinders



Alcyon Vertical

Recessed Multiple Cylinders



LyteCaster

Downlights



Track Lighting

OmniSpot

Track Heads



Alcyon Vertical

Track Heads



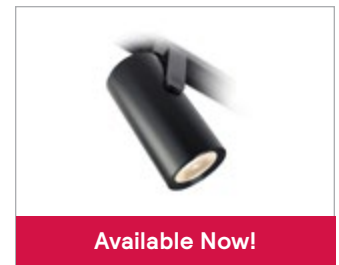
BoldFlood

Track Heads



CorePro

Track Heads



* Please contact your Signify rep for full release schedule.



Retail
BoldFlood Track Heads



Lobby
Calculite Downlights & Cylinders



Restaurant
EasyLyte Downlights



Sacrifice no more

No more giving up high efficacy to get high color rendering
 No more wasted energy and higher electric bills
 No more inconsistent light color output

	Standard 80 CRI	Standard 90 CRI	AccuRender by Lightolier
Efficacy	Varies	~20-25% efficacy loss compared to 80 CRI	≤5% efficacy loss compared to CRI 80
SDCM	3 SDCM	3 SDCM	≤2 SDCM
Spectral Data (SPD)	Not readily available	Not readily available	Data available upon request
TM-30	Not readily available	Not readily available	R _f up to 92, R _{f,h1} up to 91, R _g up to 100, and R _{cs,h1} up to -5% Published in spec sheets/photometry.
MDER	Not readily available	Not readily available	Up to 0.80 Published in spec sheets/photometry.
R ₉	> 0	> 50	> 50 Published in spec sheets/photometry.
Title 24	Does not contribute	Does not contribute	Contributes
WELL Building Standard	Does not contribute	Contributes	Contributes



With Lightolier the benefits are **endless**

1. Based on comparison of published spec sheet data, most competitor offerings reflect a 15 to 25% efficacy loss for CRI 90 compared to CRI 80, while Lightolier AccuRender results in only $\leq 5\%$ drop compared to CRI 80.

2. Czeisler, 1999; Dijk & Archer, 2009; Lucas 2012, 2019

3. Partonen 2000

4. Viola 2008, Smolders 2012; Geerdink 2017

5. Fernandez 2018; Rupp, 2019

6. Veitch, Jennifer & Stokkermans, Mariska & R. Newsham, Guy. (2013). Linking Lighting Appraisals to Work Behaviors. Environment and Behavior. 45. 198-214. 10.1177/0013916511420560.

Enjoy design flexibility

Full range of products and options:

- Available soon in across Lightolier portfolio for application flexibility
- Multiple CCTs and lumen packages offered

Promote savings

High efficacy, with no penalty:

- Energy efficacy compares well to conventional CRI80
- Up to 25% more energy savings vs competitor CRI90¹
- Helps you meet Title 24 requirements

Bolster wellbeing

High MDER:

- AccuRender has a Melanopic Daylight Efficacy Ratio up to 0.80
- Helps support Circadian Rhythm²
- Earns points towards WELL Building Standard

Contribute to productivity

High MDER:

- Supports daytime vitality³ and alertness⁴
- Supports mood, thermo-regulation, and learning centers in the brain⁵
- May positively influence work engagement by helping make the environment more attractive⁶

Show your true colors

High color rendering:

- **CRI:**
R_a up to 94, R₉ up to 67, G_a up to 99, C₉ up to 94
- **TM-30:**
R_f up to 92, R_{f,h1} up to 91, R_g up to 100, R_{cs,h1} up to -5%
- **True to life colors** to help energize your environment and render better flesh tones critical for Healthcare, Hospitality and Retail

Achieve color balance

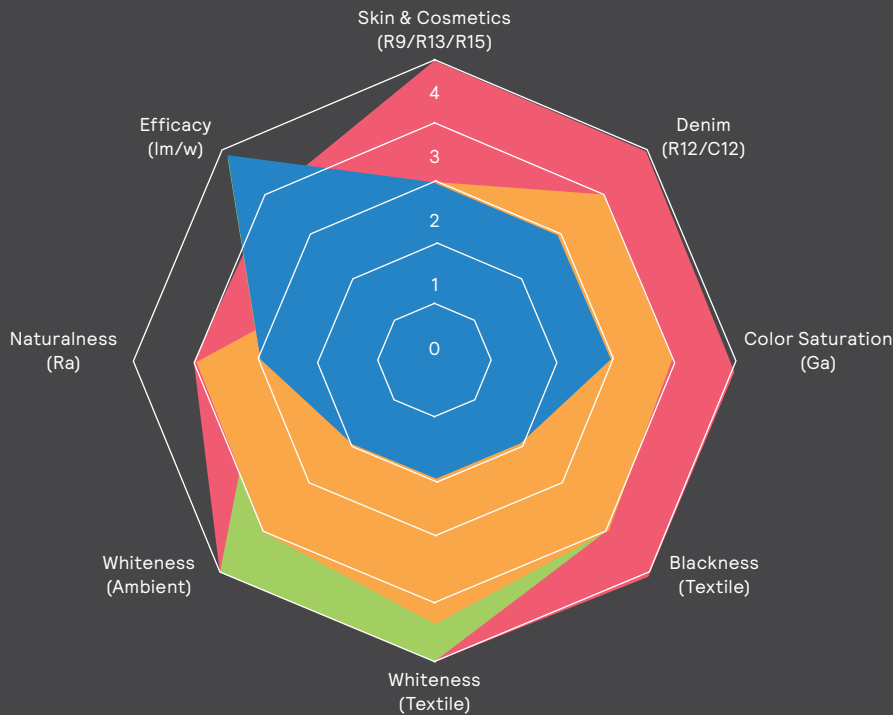
Best in class color consistency:

- ≤ 2 SDCM promotes aesthetic harmony in your space

Find your fit



LED Color Recipes (90CRI/3000K)



Crisp White

Dial-up the drama of your display. Highlight the variances in white tones, add contrast to blacks and create a real pleasing sparkle effect while retaining warm skin tones.



Premium White

The new benchmark for retail fashion. Delivering stronger and brighter whites via the best lighting technology on the market with minimal compromise to energy savings.



Premium Color

Enhance the contrast between colors and whites to achieve new depths of color rendering for a vibrant saturated fashion-forward visual experience that won't affect the atmosphere and will have a positive effect on energy efficiency.



Standard Color

Standard CRI 90



Commercial
Calculite Downlights & Cylinders



Single Family Residential
SlimSurface



Retail
Alcyon Recessed Multiple Cylinders

Technical terms explained

CRI

Color Rendering Index R_a is calculated in accordance with CIE 013.3 1995, Method of Measuring and Specifying Color Rendering Properties of Light Sources. Eight pastel test colors (R_1 - R_8) are used to determine the color shifts and hence the Specific Color Rendering Indices for a test illuminant. R_a is the average of the Specific Color Rendering Indices of these first eight test colors and is usually referred to simply as CRI. Six additional colors (R_9 - R_{14}) can be used for special purposes, R_9 being the indicator of Strong Red which is important for the high quality rendering of textiles, foods and skin tones.

The Global Lighting Association provides calculation procedures for associated CRI-based color rendition properties include a Color Gamut Index (G_a), Chroma Indices (C_i). G_a and C_9 (being the Red chroma Index) have been calculated for luminaires with AccuRender and are presented on spec sheets and photometry reports.

Color Rendering Index (CRI) is a scale from 0 to 100 percent indicating how accurate a "given" light source is at rendering color when compared to a "reference" light source. The higher the CRI, the better the color rendering ability. Light sources with a $CRI \geq 80$ and $R_9 \geq 0$ are considered good and those with a $CRI \geq 90$ and $R_9 \geq 50$ are considered excellent at color rendering.

AccuRender delivers

CRI $R_a \geq 90$, $R_9 \geq 50$, G_a up to 99, and C_9 up to 94.

TM-30

TM-30 is a method to describe the color quality of the light source. It utilizes four metrics: R_f is the metric to describe color fidelity color fidelity. Higher is better fidelity i.e. Colors appear as you would expect. $R_{f,ht}$ describes the red fidelity index. Higher numbers indicate a higher degree of saturation of the reds (critical for rendering complexions well). R_g is the metric to describe the saturation of (all) colors. Higher number indicate higher degree of Vividness. $R_{cs,ht}$ is the metric to describe the red chroma shift. Values closer to 0% indicate less relative shift in chroma. IES TM-30 Annex E Gives us a new tool to dial in the color quality to match the project requirements by selecting a Preference Priority.

AccuRender provides

R_f up to 92, $R_{f,ht}$ up to 91, R_g up to 100 and $R_{cs,ht}$ up to -5%.

Meets P2 and F2 recommended

specification criteria TM-30 Annex E.

Standard Deviation Color Matching (SDCM)

Also known as a "MacAdam ellipse", a 1-step MacAdam ellipse defines a zone in the CIE 1931 2 deg (xy) color space within which the human eye cannot discern color difference.

Typical industry color consistency is 3 SDCM.

AccuRender delivers a tightly binned luminaire to luminaire color consistency of ≤ 2 SDCM across the entire Lightolier portfolio.

Melanopic Daylight Efficacy Ratio (Melanopic DER, or MDER)

Bright light during the day (with spectral content peaking in the cyan) stimulates the ipRGC cells in our eyes, which suppresses the production of the night-time hormone melatonin and stimulates circadian rhythm. Melanopic DER as defined in the International Standard CIE S 026 2018 is a measure that indicates whether the spectrum of a light source has an equal, larger or smaller (melanopsin) stimulation, compared to standard daylight (D65), which has an MDER value of 1. Luminaires with an MDER value close to 1 can help support biorhythm and sleep and may contribute to better health and well-being¹.

AccuRender delivers high MDER values of up to .80 without sacrificing lumen output, efficacy or color quality.

WELL Building Standard

The WELL Building Standard is an evidence based, voluntary building rating system focused on health and well-being. The International WELL Building Institute (IWBI), a public benefit company, develops and maintains the standard and administers project certification. Certification is based on data driven environmental assessments and onsite performance verification.

AccuRender contributes to Lighting Features, LO3, LO7.

Title 24

2019 Building Energy Efficiency Standards, CAT24 Part 6 is the building code applied to nonresidential buildings in California. Its requirements are among the most stringent in the US.

AccuRender can help a project team meet the lighting and power requirements in non-residential spaces and comply with the 2019 Building Energy Efficiency Standards, CA Title 24 Part 6. Section 150. requiring high efficacy light sources

AccuRender with SpaceWise or POE also contributes to lighting control requirements in Section 130.1 and 130.2.

AccuRender contributes to meeting color quality requirements in Section JA8.3.4: for low rise residential buildings: . (b) Color Rendering Index (CRI) of 90 or higher and color rendering R9 value of 50 or higher and (c) All light sources shall be capable of providing a nominal Correlated Color Temperature (CCT) of 4000 Kelvin or less.

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6961531/>



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