IALD + LIRC GUIDELINES FOR WELL RATING SYSTEMS

INTERNATIONAL ASSOCIATION OF LIGHTING DESIGNERS

IALD

“ GOOD LIGHTING DOESN’T JUST HAPPEN. IT’S DESIGNED. ”

PREFACE

The International Association of Lighting Designers (IALD) is the leading global association of architectural lighting designers and strives to set the international standard for lighting design excellence. Lighting designers are a tremendous resource for innovative, practical and economically viable lighting solutions. They understand the role of lighting in the built-environment while relying on their extensive experience and knowledge of lighting equipment and systems to enhance and strengthen design.

Over the years, the IALD has supported the continued evolution of the WELL Building Standard by participating in review processes through the International WELL Building Institute (IWBI). Delivered by IWBI, WELL is the standard for buildings, interior spaces and communities seeking to advance human health and wellness. The WELL system consists of features that include lighting strategies, integrating daylight and electric light to focus on user needs.

The IALD and the IALD Lighting Industry Resource Council (LIRC), a council that brings together lighting designers, manufacturers and component suppliers, present these materials. These guidelines outline how lighting manufactures can create standardized information to help lighting designers determine if their designs will meet the WELL Building Standard criteria.

IALD | IALD LIRC | INTERNATIONAL WELL BUILDING INSTITUTE™

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SECTION I: OVERVIEW OF IALD + LIRC GUIDELINES FOR WELL RATING SYSTEMS

IALD + LIRC are pleased to present Guidelines for WELL Building Standard v2. These recommendations help lighting manufacturers create standardized information to help lighting designers determine if their designs will meet the WELL Building Standard criteria.

BACKGROUND ON THE WELL BUILDING STANDARD

In 2018, a second version of the WELL Building Standard (WELL v2) was launched and included a revised section for "light" as one of the 10 concepts covered by the standard. The WELL Light concept promotes exposure to light and aims to create lighting environments that are optimal for visual, mental and biological health. Eight features (L01-L08) comprise the Light concept of the Standard that define specific technical requirements. Some of these concepts require documentation and validation from lighting manufacturers to assist lighting specifiers in determining if their designs will meet the criteria.

IALD + LIRC GUIDELINES

The IALD + LIRC offer four recommendations for the sections with required documentation that provide guidelines for best practices for lighting manufacturers. Through these guidelines, lighting designers working on WELL projects will be able to easily identify the relevant data from manufacturers and make comparisons based on standardized formatting. This will allow lighting designers to more easily determine if their designs will meet the WELL Building Standard criteria.

The IALD + LIRC have helped define a standard method for lighting manufacturers to communicate technical specifications for the following lighting features that are defined in the WELL Building Standard v2 pilot:

1. Melanopic Ratio (L03 Circadian Lighting Design)
2. Glare (L04 Glare Control)
3. Color Rendering (L07 Electric Light Quality – Part 1 Ensure Color Rendering Quality)
4. Flicker (L07 Electric Light Quality – Part 2 Manage Flicker)

HOW TO USE THIS GUIDE

Manufacturers should refer to two types of guidelines, required and recommended, to be included in manufacturer documentation. These guidelines define a general format for communicating specifications on manufacturers' specification documents, data sheets or "cut sheets" as well as the supporting documentation required to validate the published values.

REQUIRED: Minimum required manufacturer documentation which must be included in specifications or supplementary technical documentation for each product.

RECOMMENDED: Recommended practice may include additional documentation or information that will assist lighting designers to demonstrate compliance with the WELL Building Standard v2 pilot.

SECTION II: MELANOPIC RATIO GUIDELINES FOR WELL BUILDING STANDARD V2 PILOT

WELL CONCEPT / LIGHT / FEATURE L03

CIRCADIAN LIGHTING DESIGN

FOR ALL SPACES | 3 PT MAX

The WELL feature L03 Circadian Lighting Design requires projects to provide users with appropriate exposure to light for maintaining circadian health and aligning the circadian rhythm with the day-night cycle.

REQUIREMENTS FOR THIS FEATURE:

Electric lighting is used to achieve light levels shown in the table below as measured on the vertical plane at eye level of the occupant. The light levels are achieved at least between the hours of 9 A.M. and 1 P.M. and may be lowered after 8 P.M.

The project meets the following requirements in regularly occupied spaces:

ELECTRIC LIGHT ONLY		ELECTRIC LIGHT AND DAYLIGHT	PTS
At least 150 EML [136 melanopic equivalent daylight D65]	or	The project achieves at least 120 EML [109 melanopic equivalent daylight D65] with electric light and at least 2 points in Feature L05: Enhanced Daylight Access.	1
At least 240 EML [218 melanopic equivalent daylight D65]	or	The project achieves at least 180 EML [163 melanopic equivalent daylight D65] with electric light and at least 2 points in Feature L05: Enhanced Daylight Access.	3

EML stands for Equivalent Melanopic Lux, and is defined by the photopic lux multiplied by a melanopic ratio, EML = LxR. For more information see "Measuring and Using Light in the Melanopsin Age" by Lucas, RJ et al.

MINIMUM REQUIRED MANUFACTURER DOCUMENTATION:

For each unique light spectrum (CCT, CRI, LED source, etc.), manufacturers must provide a value for the melanopic ratio using the IWBI Melanopic Ratio or equivalent tool.

Example:

	2700K		3000K		3500K		4000K	
	80+	90+	80+	90+	80+	90+	80+	90+
Luminous Flux Multiplier	0.85	0.75	0.90	0.80	0.95	0.85	1.00	0.90
Melanopic Ratio	0.362	0.476	0.411	0.593	0.532	0.602	0.705	0.775

RECOMMENDED PRACTICE:

Provide Spectral Power Distribution (SPD) for each unique light spectrum (CCT, CRI, LED source, etc.) with the following characteristics:

- Radiant power values for wavelengths between 380nm-730nm in 5nm increments
- File type should be .csv or similar to allow simple copy/paste into the calculation tool

SECTION III: GLARE GUIDELINES FOR WELL BUILDING STANDARD V2 PILOT

WELL CONCEPT / LIGHT / FEATURE L04

GLARE CONTROL

FOR ALL SPACES | 3 PT MAX

The WELL feature L04 Glare Control requires projects to manage glare by using a combination of strategies such as calculating of glare, choosing appropriate light fixtures for the space and using shading techniques. Space planning and lighting design can minimize the amount of glare experienced by individuals in the space. For electric lighting, the light source, type of luminaires used and lighting layout can lead to reduced glare.

WELL REQUIREMENTS FOR THIS FEATURE:

Each luminaire meets one of the following requirements for regularly occupied spaces. Wall wash fixtures properly aimed at walls, as specified by manufacturer's data, as well as decorative fixtures may be excluded from meeting these requirements:

- 100% of light is emitted above the horizontal plane
- Unified Glare Rating (UGR) values are met as per the below conditions:
    1. Luminaires installed at a height of 5 m [16 ft] or lower meet UGR of 19 or lower
    2. Luminaires installed at a height greater than 5 m [16 ft] meet UGR of 22 or lower
- Shielding angles are as described in the below table:

LUMINANCE	SHIELDING ANGLE, α (α = 90 - CUTOFF ANGLE)
< 20,000 cd/m² (Include reflected sources)	No shielding required
20,000 cd/m² to 50,000 cd/m²	15°
50,000 cd/m² to 500,000 cd/m²	20°
> 500,000 cd/m²	30°

- Fixtures have a luminance of less than 10,000 cd/m2 between 45 and 90 degrees from nadir, and/or an intensity of less than 1,000 candela between 45 and 90 degrees from nadir

MINIMUM REQUIRED MANUFACTURER DOCUMENTATION:

For each luminaire type, manufacturers must provide a statement of compliance for one of the four methods or exclusion from the standard, plus supporting values as defined in the compliance category.

Example of all options:

L04 GLARE CONTROL CRITERIA	COMPLIANT	VALUE
a. Indirect (100% emission above horizontal)	✓	100%
b. Unified Glare Rating (UGR)	✓	15 @ 16ft 17 @ 20ft
c. Shielding Angle	✓	17° @ 35,000 cd/m²
d. Max. Luminance / Max. Intensity (45°–90°)	✓	1500 cd/m²
e. Not Applicable	✓	Decorative

Example Luminaire A

L04 GLARE CONTROL CRITERIA	COMPLIANT	VALUE
a. Indirect (100% emission above horizontal)	✓	100%
b. Unified Glare Rating (UGR)		
c. Shielding Angle		
d. Max. Luminance / Max. Intensity (45°–90°)		
e. Not Applicable		

Example Luminaire B

L04 GLARE CONTROL CRITERIA	COMPLIANT	VALUE
a. Indirect (100% emission above horizontal)		
b. Unified Glare Rating (UGR)		
c. Shielding Angle		
d. Max. Luminance / Max. Intensity (45°–90°)		
e. Not Applicable	✓	Decorative

SECTION IV: COLOR RENDERING GUIDELINES FOR WELL BUILDING STANDARD V2 PILOT

WELL CONCEPTS / LIGHT / FEATURE L07

ELECTRIC LIGHT QUALITY – PART 1 ENSURE COLOR RENDERING QUALITY

FOR ALL SPACES EXCEPT CIRCULATION AREAS | 1 PT MAX

The WELL feature L07 Electric Light Quality requires projects to consider characteristics of electric light used in the space such as color rendering, color quality and flicker.

Humans have evolved to depend on the sun as the main and ideal source of light and are tuned to the color rendering provided by daylight and recognize colors in association with daylight. Color can impact peoples' cognition and behavior. Using electric light with high color rendering can improve people's perception of a space, while low color rendering can impact the ability to differentiate between objects and perceive the surroundings accurately.

WELL REQUIREMENTS FOR THIS FEATURE – PART 1:

Electric lighting meets at least one of the following color rendering requirements. (Decorative fixtures, emergency lights and other special-purpose lighting may be excluded from these requirements.)

METRIC	THRESHOLD
CRI	CRI > 90
CRI, R9	CRI > 80 with R9 > 50
IES TM-30-18	IES $R_f \geq 78$, IES $R_g \geq 100$, -1% ≤ IES $R_{cs,h1} \leq 15\%$

Note: CRI = Ra

MINIMUM REQUIRED MANUFACTURER DOCUMENTATION:

For each unique light spectrum (CCT, CRI, LED source, etc.), manufacturers must provide a statement of compliance plus supporting values, including R9 where the second criterion is applicable.

Example:

L07 ELECTRIC LIGHT QUALITY PART 1 ENSURE COLOR RENDERING QUALITY	COMPLIANT	VALUE
CRI > 90		
CRI > 80 with R9 > 50	✓	CRI = 84 R9 = 60
IES Rf ≥ 78, IES Rg ≥ 100, -1% ≤ IES Rcs, h1 ≤ 15%		
Not Applicable (decorative, emergency, other)		

SECTION V: FLICKER GUIDELINES FOR WELL BUILDING STANDARD V2 PILOT

WELL CONCEPTS / LIGHT / FEATURE L07

ELECTRIC LIGHT QUALITY – PART 2 MANAGE FLICKER

FOR ALL SPACES | 1 PT MAX

The WELL feature L07 Electric Light Quality requires projects to consider characteristics of electric light used in the space such as color rendering, color quality and flicker.

Electric lighting used indoors can have low frequencies of flicker that are not present in daylight. Flicker has been associated with eye strain, headaches, migraines and epileptic seizures. Identifying and utilizing lighting fixtures that emit a high quality of light and do not display signs of flicker contributes to a comfortable and healthy space.

WELL REQUIREMENTS FOR THIS FEATURE – PART 2:

All electric lights (except decorative lights, emergency lights and other special-purpose lighting) used in regularly occupied spaces meet at least one of the following requirements for flicker:

- A minimum frequency of 90 Hz at all 10% light output intervals from 10% to 100% light output.
- LED products with a "low risk" level of flicker (light modulation) of less than 5%, especially below 90 Hz operation as defined by IEEE standard 1789-2015 LED.

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ELECTRIC LIGHT QUALITY – PART 2 MANAGE FLICKER (CONTINUED)

MINIMUM REQUIRED MANUFACTURER DOCUMENTATION:

Non-LED Luminaires

For each ballast/light source combination available, manufacturers must provide a statement of compliance plus a supporting value for minimum frequency in the output range of 10%-100% full light output.

Example:

L07 ELECTRIC LIGHT QUALITY PART 2 MANAGE FLICKER	COMPLIANT	VALUE
Minimum frequency of 90 Hz within the range of 10% to 100% light output	✓	400 Hz

LED Luminaires

For each driver/light source combination available, manufacturers must provide a statement of compliance with IEEE Standard 1789-2015 with supporting values for full light output. At a minimum, this includes publishing the numerical values.

Example:

L07 ELECTRIC LIGHT QUALITY PART 2 MANAGE FLICKER	COMPLIANT	VALUE
Meets IEEE 1789-2015 Standard Recommended Practice	✓	Modulation = 1% Frequency = 80 Hz

RECOMMENDED PRACTICE:

It is strongly recommended that manufacturers provide the supporting data using the Modulation (%) vs Frequency (Hz) chart that is included in the IEEE standard (Figure 20 – Recommended Practice).

Example: Modulation vs Frequency from Section 8.1 of IEEE 1789-2015*

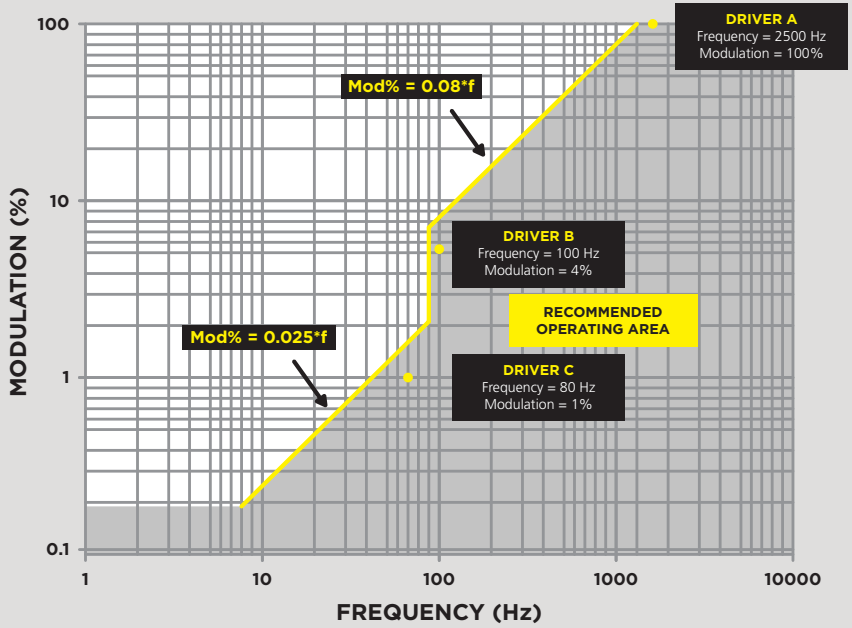

Figure 20—Recommended practices summary

Limitations:

- Values provided are for 100% light output
- Values provided are for static white operation at a single CCT

Optional:
Manufacturers may provide modulation vs frequency values for dynamic driver/light source combinations (for example, CCT tuning, dimming levels, etc.)

RECOMMENDED PRACTICE:

- Publish modulation % vs frequency for dimming levels
- Publish Flicker Index: provides a familiar metric for comparison of traditional and LED sources
- Publish Flicker Percentage: simple to calculate and provides an indication of flicker behavior

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ABOUT THE INTERNATIONAL ASSOCIATION OF LIGHTING DESIGNERS (IALD)

The International Association of Lighting Designers (IALD), established in 1969, is an international organization supporting a network of more than 1,450 lighting design professionals in over 60 countries around the world who satisfy its rigorous qualification process. IALD strives to set the global standard for lighting design excellence by promoting the advancement and recognition of professional lighting designers, cultivating the universal acknowledgement and appreciation of the **Power of Light** in human life.

Visit these pages for more information:

- IALD's focus on advocacy: **iald.org/advocacy**
- IALD LIRC: **iald.org/council**
- WELL v2 pilot: **https://v2.wellcertified.com/v/en/light**

WELL content provided in this document have been directly sourced from WELL Standard v2 pilot.

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