LIGHTING DESIGN GUIDE



THE TRANSFORMATIVE
POWER OF LIGHT



Bola Disc by Pablo Designs

Set the Tone

When lighting is right, it's brilliant. When it's wrong, there's little else you can focus on. Nothing transforms an environment like lighting, and nowhere is that more important than the social and high-impression spaces that draw people in and reflect your brand. Here are trends, considerations, and inspiration for well-lit spaces.

HAWORTH Collection

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LIGHTING

BASICS

THE FUTURE IS BRIGHT

Nine Trends to Watch

The way we work and live is constantly changing. We're here to help you keep up with how lighting affects space design—from trends to research and design recommendations. Here are some advances in lighting to keep your eye on for the future.



HUMAN-CENTRIC

The impacts of lighting on wellbeing are starting to be documented and will remain the focus of studies. Experiments continue on the effects of lights on mood, energy level, health, sleep quality, and comfort.



INTELLIGENT

Given every lighting fixture has access to power, we'll see how sensors, Light Emitting Diode (LED) technology, and connectivity will continue to change the way we interact with spaces. Early adopters will choose connected lighting control systems as the infrastructure that enables future applications.



ACOUSTIC

Demand for lighting fixtures that combine noise minimization with highly efficient LED technology will remain a sustainable solution for open-plan and social spaces—with low planning and installation costs combined with innovative design.



OVERSCALE

With ceilings gaining more importance in design—painted colors that pop and wallpaper applications—overscale lights overhead will continue to make a bold statement.



ENERGY CONSUMPTION & CODE COMPLIANCE

Energy consumption continues to influence many lighting design decisions as codes get updated, such as the constraints of California's Title 24 Building Energy Efficiency Standards, but leading experts believe code stipulations won't deter good lighting design.



DAYLIGHT HARVESTING

With the emphasis on simplicity of installation, expect to address daylight harvesting (collecting daylight to reduce energy) with new lighting control systems that bring more natural light into a space, meet code, and reap the energy savings.



LAYERED

Traditional approaches for applying lighting throughout a space are being replaced with the continued demand for layered lighting, determined by the architecture, and supported by LED and intelligent controls.



COLOR TUNING

Interest in tunable lighting and controls will continue as people recognize the value of lighting on employee well-being and user control. Expect programming to support circadian lighting strategies and promote alertness—in addition to matching color quality of daylight.



ART FORM

Lighting will be viewed more as a statement piece in the overall design of a space, with fixtures considered an art form. Look for more natural silhouettes and organic forms.

SHEDDING LIGHT ON GOOD PLANNING

Determine Purpose

DESIGN BY METRICS	DESIGN BY OBJECTIVE
The purpose of lighting is to enable visual tasks to be performed efficiently and accurately.	The purpose of lighting is to meet or exceed expectations for how lighting influences the appearance of people's surroundings and how it makes them feel.
Light the task, then the space.	Light the space, then the task.
Select the lighting fixture, calculate the requirements, then work the layout.	Specify the objectives, plan the layout, and then calculate lighting fixture requirements.

The lighting profession is divided between those who use illumination metrics to specify, measure, and predict lighting to engineer floorplate light levels that meet standards, and those who rely on out-of-the-box thinking to achieve innovative design. Prescriptions and creativity can co-exist.





Questions to Ask

Determine Objectives

- What will the space be used for?
- Which areas need to be highlighted?
- Who will use this space?
- What is the overall mood or ambience desired?

DO YOU NEED TO:

- Enhance visibility of visual tasks or influence the appearance of surroundings?
- Guide people in a desired direction?
- Reveal the detail of art or architectural features?
- Draw attention to displays or warning signs?

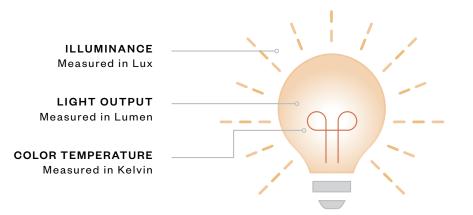
DID YOU KNOW? The older we get, the more light we need to see. Research indicates that the visual performance of those in their 20s is about eight times better than those in their 60s.



LIGHTING LINGO

Specifications

Whether you need task, accent, or ambient (general) light, it's important to understand the principles so that you can make the best comparisons for your lighting plan.



CERTIFICATIONS

To meet stringent industry requirements, lighting products typically require certification by a Nationally Recognized Testing Laboratory (NRTL). The two most common certifications in North America are UL (Underwriters Laboratories, Inc.) and ETL (Intertek Testing Services Inc.).





COLOR TEMPERATURE

A measure of how "warm" or "cool" the light emitted by a source is. Comparable to the sunlight from sunrise to sunset, expressed in Kelvin (K).



COLOR RENDITION INDEX (CRI)

A measure of how "realistic" or "natural" an object's color appears under a light source.



LUMINOSITY

The quantity of visible light emitted by a source expressed in lumens (lm). Simply put: the brightness of the bulb. We use lumens to compare the total amount of light output from a light emitter.



LUMINAIRE EFFICACY

The ratio of light output to the electrical power consumed, expressed in lumens/watt. Think of it like miles per gallon for a vehicle—the higher the value, the more efficient



ILLUMINANCE

The quantity of light output falling on a surface, expressed in lux (lx). In other words, light intensity. Lux is used to measure the amount of light output in a given area, where one lux is equal to one lumen per square meter.



POWER CONSUMPTION

A measurement of energy, expressed in watts

Color Temperature

GEEK ALERT

Understanding
Kelvin (K), the unit
of measurement for
color temperature,
is helpful since it's
used to indicate the
comparative color
appearance of a
light source.

Color temperatures over 5,000K are called cool colors (bluish-white), while lower color temperatures (2,700–3,000K) are called warm colors (yellowish-white through red). For example, incandescent lamps range from 2,700–3,000K and cast a warmer, more golden light. Fluorescent light sources range from 300–7,500K and higher and cast a bluish-white light.

One advantage of LED, in addition to its long life and low maintenance, is its ability to render colors in the object it illuminates better than incandescent or fluorescent lamps. An LED source may look slightly different in color than its equivalent incandescent Kelvin rating.

MELLOW YELLOW

In general, a yellow toned light hue is easier on the eyes.

TIP

Use lamps of a single color temperature, and—ideally—from the same manufacturer. People may not notice specifics, but they'll sense haphazardness.

THEORY TO APPLICATION

9,000K	8,000K Fog Daylight	7,000K Overcast Daylight	6,500K	5,000K Natural Daylight	4,000K Bright White Light	3,000K Typical Bulb Temperature	2,000K Vintage Filament Bulb Temperature	1,000K Candlelight
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To warm up a room's color, look for a bulb that has a temperature close to 2,700–3,000K. LEDs are a good choice, but all types of bulbs are available in warmer ratings.

To cool down a room's color, choose a bulb with a temperature close to 4,000K. Standard CFLs will generally cool down a room, but always double check.

To most accurately replicate natural light, remember that mid-day sunlight is around 5,000-6,000K.



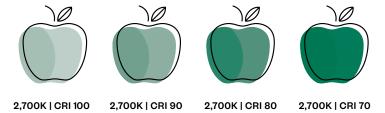
DID YOU KNOW? The Kelvin is named after Sir William Thompson (b. 1824), the Belfast-born engineer and physicist who recognized the need for an absolute thermodynamic temperature scale. He was knighted and raised to the title of 1st Baron Kelvin in 1892 for his extensive work on the transatlantic telegraph.

Color Rendition Index

CRI is a numerical scale (0 to 100) to indicate how a light source will make the color of an object appear to human eyes. The higher the number, the better the color rendering ability. In many cases, this difference is not important. For certain applications, such as illuminating art or comparing fabrics, CRI can make all the difference.

Typically, light sources with a CRI of 80 to 90 are considered "good" and those with a CRI of 90+ are "excellent." Remember: CRI is independent of color temperature.

DID YOU KNOW? Most LED lights score 80 to 90, which results in a brighter room, but with a much more natural, accurate output of light.



Luminosity

LUMENS PER SQUARE FOOT 30 LUMENS PER SQUARE FOOT

While there are no hard-and-fast rules, these recommendations inform planning:

FLOORS

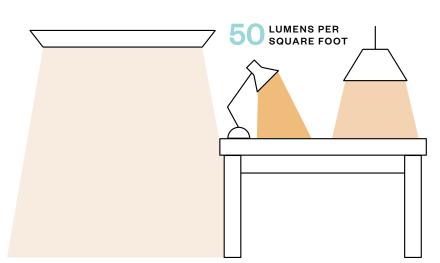
20 lumens per square foot

TABLES & RAISED SURFACES

30 lumens per square foot

DESK & TASK LIGHTING

50 lumens per square foot



Illuminance

Illumination Categories & Recommended Values

DECORATIVE/ACCENT LIGHTING

· Public spaces with dark surroundings

20-30-50 lux

• Simple orientation for short visits

50-75-100 lux

FUNCTIONAL LIGHTING

• Working spaces where visual tasks are performed

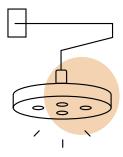
100-150-200 lux

 Performance of visual tasks of low contrast or very small size (detailed work)

1,000-1,500-2,000 lux

• Performance of very prolonged and exacting visual tasks

5,000-7,500-10,000 lux



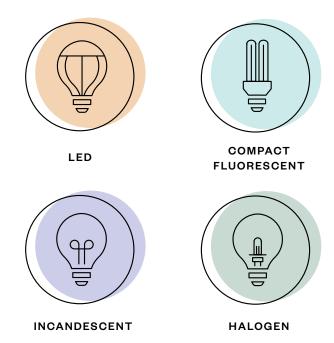
DID YOU KNOW?

Most surgery lights in an operating suite are 100,000 lux.

Smart Lighting

Besides contributing to well-being design principles, modern light controls are also effective in saving on energy use. Just in the last 15 years, vast technological leaps have produced brighter, more efficient LED light sources—up to 90% more efficient than incandescent lamps.

LEDs are the best right? Refer to your lamp's manual to make sure your bulb type is compatible.



BRIGHTNESS COMPARISON CHART

BULBS & BRIGHTNESS	450 lumens	800 lumens	1,100 lumens	1,600 lumens	2,600 lumens	5,800 lumens
LED	6W	9-10W	13W	16-18W	24W special high wa	45W attage lamps
COMPACT FLUORESCENT	8-9W	13-14W	18-19W	23W	40W	85W
INCANDESCENT	40W	60W	75W	100W	150W	300W
HALOGEN	29W	43W	53W	72W	150W	300W

LIGHT BULB COMPARISON CHART

LAMP (A19) BULB TECHNOLOGY	LED (60-WATT EQUIV.)	COMPACT FLUORESCENT (60-WATT EQUIV.)	INCANDESCENT 60-WATT	HALOGEN (60-WATT EQUIV.)
PRICE PER BULB (EST.)	\$1.50+	\$1.50 - \$7.00	\$0.41-\$1.00	\$1.00-\$2.75
LIFESPAN* (HOURS AT 3 HRS/DAY)	15,000-25,000	8,000-12,000	1,000-2,000	985-1,250
WATTS*	9-12	13-15	60	43
LUMENS*	570-830	740-840	630-860	565-750

^{*} varies by manufacturer

DID YOU KNOW? Research shows that energy usage for lighting is as much as 40% of a building's total energy consumption. By upgrading to LED technology and an automated lighting control system, save as much as 70% on lighting electricity costs.

70%
SAVED ON COSTS

GOOD LIGHT, HAPPY PEOPLE

Lighting and Well-Being

Lighting strategies can address the intersection of people's needs—physical, cognitive, and emotional—to achieve desired outcomes. In a Haworth research study, workspace characteristics, including lighting, influenced perceptions of inspiration. When people are inspired, they are more creative and generate ideas. When they're more creative and productive, they're happier at work.

A thoughtful lighting design has many positive benefits, including influencing personal well-being and improving human performance.



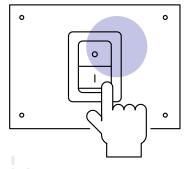
68%

OF EMPLOYEES
COMPLAIN ABOUT THE
LIGHTING SITUATION
IN THEIR OFFICES.

Personal Control

We expect more from our work environments than ever before. In addition, control over our personal workspace is empowering, which can lead to a happy and engaged workforce. In a research study, those with control of their lighting source spent more time on difficult tasks and were more accurate on those that required sustained attention.

Something as simple as light control can enhance the user experience by enabling variation of brightness (through dimming ability) and position (through arm adjustment).

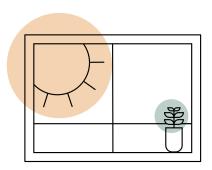


Don't locate fixtures and switches in hard-to-reach locations. If it's hard to get to or not intuitive, it probably won't be used.

Natural Light

Think about how many hours we spend indoors—for many of us, it's 90 percent of our time. Research confirms the importance of natural light and its positive effects on well-being. It aids our circadian rhythms (our own built-in clocks) to be in sync with our local environments. A properly lit workplace with both natural and artificial light is essential for optimal effect.

Natural light is proven to provide energy, vitamins, and a more regular sleep cycle—and that's not all. Access to natural light has one of the largest impacts on how valued employees feel at work.

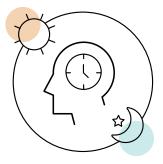


DID YOU KNOW? Natural light improves mental health, helps lower stress, and lifts moods. The ideal option is to use a window or skylight in combination with artificial light.

People Performance

Circadian rhythms are regulated by environmental signals, most importantly, the 24-hour, light-dark cycle. Patterns of light and dark promote synchronization of the body's "biological clock" with the local time on Earth.

Without this synchronization, research has shown that people may experience negative long-term effects that impact neurobehavioral performance and sleep, and are at a higher risk for cardiovascular disease, diabetes, and certain forms of cancer.



OPTIMUM LIGHTING CAN IMPROVE PRODUCTIVITY
BY UP TO 20%

Light and Sound

Part of the equation to happy and healthy workspaces involves finding the right lighting and creating the right balance of acoustics. Acoustic lighting is growing in popularity because it is based on science. When creating lightscapes, consider the data behind lighting solutions that reduce noise and absorb sound.

Depending on what's happening in the space, look for acoustic light fixtures that perform well, based on the type of tone(s) in the space. To create a better acoustical environment and reduce reverberation time in a room, lighting products can address the following tones and noise distractions in a space:



LOW TONE

Long wave - Low frequency (50-250 Hz)

E.g., heating systems, ventilation, elevators, copy machines





MID TONE

Mid length wave - Speech frequency (250-2,500 Hz)

E.g., speech, vowels, consonants





HIGH TONE

Short wave - High frequency (2,500-12,000 Hz)

E.g., ringtones, typing sounds, clicking sounds, kids





ABSORPTION

Sound waves are absorbed by any "acoustically soft" material they encounter. Sound is energy and, in order to stop this energy from propagating, absorptive panels will be used to convert it into heat through friction. The absorption coefficient of a product will determine the level and quality of absorption. Absorption applies to fixed wall or ceiling elements.



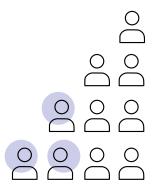
DIFFUSION

Sound energy is spread evenly in a given space. Wavelengths that cannot be absorbed through acoustic treatment will scatter evenly back into the room, ensuring a better spread while maintaining a live, vivid sound. This property can be obtained by alternating different depths of absorptive material and 3D shapes.



ATTENUATION

Reducing the sound transfer within a room. To reduce the sound transfer between different spaces, vertical elements will be applied to cut down sound energy. Those can come in different shapes such as sound blocks, vertical ceiling panels, room dividers, and desk screens. Attenuation or sound dampening has a positive impact on speech intelligibility and clarity.



DID YOU KNOW?

A UK study found that 3 in 10 employees frequently lost their concentration due to chatter and buzz in their workspace.



APPLICATION AND

IN GOOD LIGHT

Fixture Type

Whether you're supporting individual tasks or group interactions, lighting has the potential to enhance the user experience. In the following eight applications, you'll see a combination of three types of lighting fixtures—table, floor, and pendant, each with its specific role in space design. Each was created with user comfort in mind, to bring a space to life.

While you get inspired by these applications and their lighting elements, take into consideration matte or dark finishes on trims, baffles, and housings to minimize glare.





TABLE

Used on most table surfaces, table lights are available in freestanding, clamp mount, grommet mount, or magnetic. Typical activities requiring table lamps include heads-down or high-focused work.



FLOOR

Appropriate for both open and private spaces, floor lights provide illumination in collaborative areas that bring people together, such as lounge, lobby, and waiting spaces. For individual work areas, they offer direct light in enclosed touchdown spaces and private offices.



PENDANT

Suspended overhead and typically used in conference and social spaces, pendant lights offer direct or indirect lighting. Use them to light up a collaborative table for group work or hang them from the ceiling in a cozy lounge.

Café

A multipurpose social hub with access to refreshments encourages interaction and relaxation. A brightly lit café has potential to spur more energy and buzz, while a low-lit café creates a more tranquil environment. Pendants help ground communal surfaces or individual dining tables. Consider the acoustical properties of lighting fixtures to help control noise in dining areas with high levels of activity.

HELPFUL TIPS

- For general illumination in a café, functional lighting should provide 5–20 lumens per square foot.
- When hanging pendants, the bottom of the fixture should be 28–39" above the table.
- The length of a single pendant should be at least 1 ft. shorter than the length of the table.

To determine spacing between multiple pendants:

- A general rule of thumb to establish the maximum width of lighting fixtures is to measure the length of the table, then subtract by 12".
- Space pendants 24-36" apart based on the scale of the fixtures.



2,700 - 3,000K Color temperature should be warm to neutral.





Individual Workstation

To enhance individual performance and privacy needs, a workstation supports the focused work people require to get the job done. Highly-adjustable and dimmable table lights deliver illumination for a range of activities and give users personal control of lighting levels. Acoustical properties of lighting fixtures help control noise and support individual well-being in open floorplans.

HELPFUL TIPS

- Provide 50-100 lumens per sq. ft. at the worksurface for general tasks.
- LED lamps offer the highest efficiency and best sustainability.
- Consider task lights that offer features such as power or USB access.
- A table lamp provides user control and complements overhead lighting sources.



2,700 - 3,500K Color temperature should be warm to neutral.





Conference Room

For meeting and brainstorming activities among small or large groups, the conference room requires lighting that keeps the space versatile—and people energized. Continuous lighting sources achieve optimal illumination for viewing work on tackable surfaces or markerboards. Programmed lighting with preset controls take the guesswork out of lighting levels to illuminate the room appropriately (e.g., the entire room versus dimming the room during a videoconference).

HELPFUL TIPS

- For glare-free illumination, provide 15-20 lumens per sq. ft.
- At least 30 lumens per sq. ft. should be allotted at the worksurface for general tasks.
- Aim for 20–70 lumens per sq. ft. for shadow-free illumination of the screen during videoconferencing.
- Consider the acoustical properties of lighting fixtures to help control noise within the room.



3,000 - 3,500K Color temperature should be warm to neutral.





Lobby

The space where first impressions are made should be warm, welcoming, and memorable—setting the tone for brand and culture. Lighting contributes to the brand attributes experienced by customers and guests as they enter the space—and what they will remember as they exit. A series of pendants hung overhead support wayfinding by illuminating a path. Pendants also help delineate space to define specific areas within the lobby, such as waiting or reception.

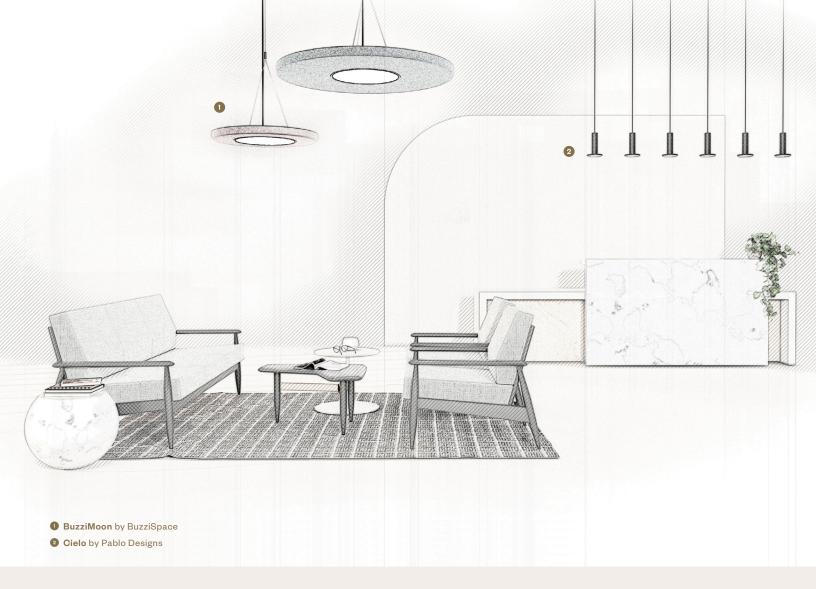
HELPFUL TIPS

- For general illumination, functional lighting should provide 10-20 lumens per sq. ft.
- Consider the acoustical properties of lighting fixtures to help control noise in these potentially high-traffic areas.
- In seated areas, ensure pendants don't obstruct eye-to-eye contact.
- Allow 7 ft. above finish floor to the bottom of the pendant so people can walk under the fixture if necessary.



2,700 – 3,500K Color temperature should be warm to neutral.





Private Office

This unique space, often occupied by an executive, offers opportunity for personalization and branding to fit the user's needs—and image. It's also a place where private conversations occur. Highly-adjustable and dimmable table and floor lights support different tasks and offer personal control, while complementing overhead lighting sources. Dimming controls can enhance the quality of work and well-being while supporting energy efficiency. For ambient light from floor lamps, make sure bulbs are shaded or diffused to control glare and that bulbs in reading lamps are not visible while people are seated.

HELPFUL TIPS

- Plan for 50–100 lumens per sq. ft. from an adjustable task lamp on the worksurface.
- Provide 30-50 lumens per sq. ft. at the worksurface for general tasks.
- For glare-free illumination of whiteboards, provide 15–20 lumens per sq. ft.
- For increased user control, consider task lights that offer features such as power, USB access, and bluetooth technology.



2,700 - 3,500K Color temperature should be warm to neutral.





Project Room

Often tucked away from high traffic areas and natural light, project rooms don't always get the attention needed to provide inspiration for creativity and innovation to take place. These tactical spaces where teams strategize together accommodate a variety of activities requiring worksurfaces and vertical display areas. Programmed lighting with preset controls take the guesswork out of lighting levels to illuminate the room appropriately (e.g., the entire room versus dimming the room during a videoconference).

HELPFUL TIPS

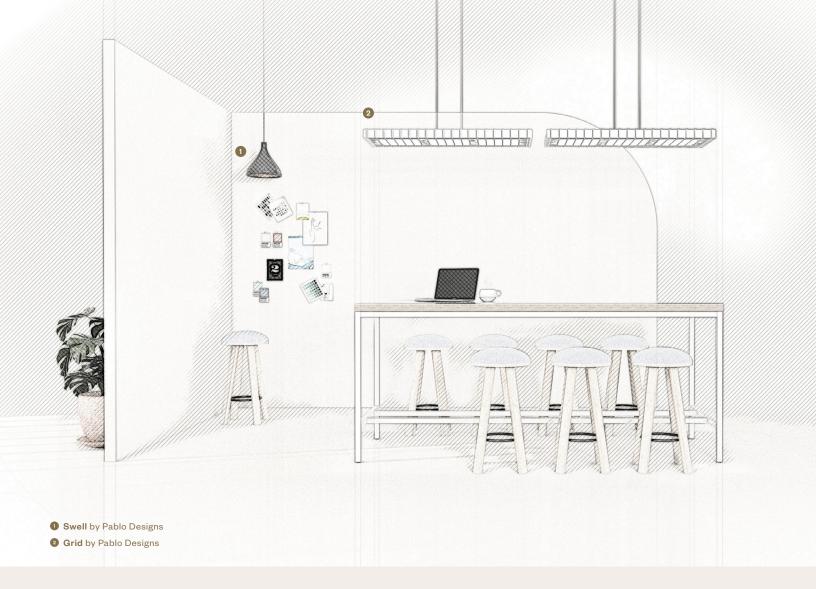
- Provide 30-50 lumens per sq. ft. at the worksurface for general tasks.
- For glare-free illumination of vertical surfaces, provide 15-20 lumens per sq. ft.
- Lighting within a room for a videoconference should allow for shadow-free illumination of 30–40 lumens per sq. ft.
- When hanging pendants, the bottom of the fixture should be 28–39" above the table.



2,700-3,500K Color temperature should be warm to neutral.



Select lamps that provide a CRI of **85 or higher**.



Retreat

Quiet havens that foster well-being offer people a chance to seek tranquility, rejuvenate, and support focused work. Soft, warm lighting creates a welcoming vibe, and can highlight artwork or textiles. Lighting elements with sound capabilities provide music or white noise. Table and floor lamps complement pendant lighting and are designed for personal comfort and control.

HELPFUL TIPS

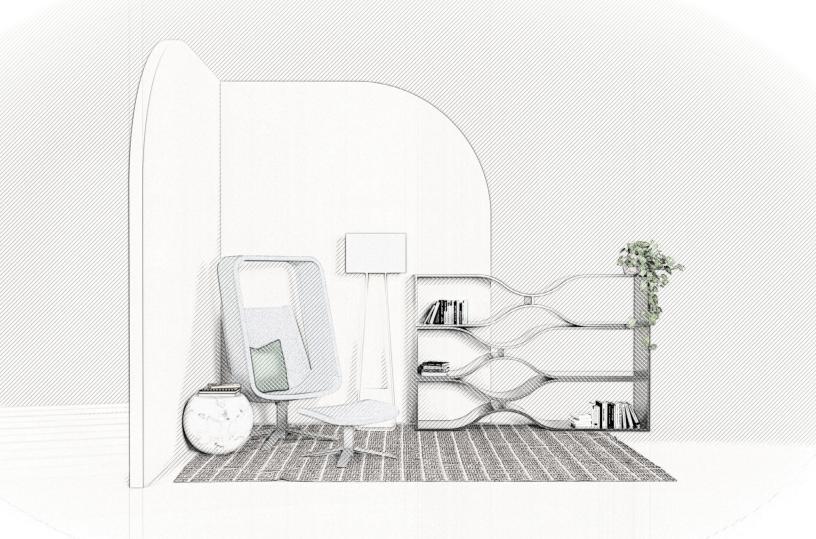
- At least 5–20 lumens per sq. ft. are needed for general illumination.
- For ambient light from floor lamps, make sure bulbs are shaded or diffused to control glare.
- Bulbs in reading lamps should not be visible while people are seated.
- Consider a light with an integrated pedestal to store or charge devices if space is limited.



2,700 - 3,000K Color temperature should be warm to neutral.



Select lamps that provide a CRI of **85 or higher**.



Collaborative Space

A comfortable, open space provides opportunities for interaction and collaboration. Warm spaces with a residential aesthetic and a blend of lighting elements draw people in. Table lamps, floor lamps, and pendant fixtures support ambient lighting. Consider a dimming system to enhance quality of interactions and user well-being within collaborative spaces.

HELPFUL TIPS

- Provide 5–20 lumens per sq. ft. for general illumination.
- In seating areas, allow 7 ft. above finished floor to the bottom of the pendant so people can walk under the fixture if necessary.



2,700-3,000K Color temperature should be warm to neutral.



Select lamps that provide a CRI of **85 or higher**.





HAWORTH COLLECTION

LIGHTING SOLUTIONS

HARNESS THE POWER OF LIGHT

Lighting Partners

Haworth is a leader in lighting solutions through our Haworth Collection portfolio. With partners BuzziSpace and Pablo Designs, we offer the options you need to address all of your lighting needs. BuzziSpace is known for its acoustic lighting solutions in unexpected, functional designs. Pablo Designs fuses beauty and utility to enhance lighting experiences.

Set the tone, enrich the atmosphere, or generate the distinct vibe that will make your project unique. Let us help you choose the lighting solutions that elevate the potential of your application—and watch transformation take place.

HAWORTH Collection



Pablo[®]



UMA by Pablo Designs



BuzziHat by BuzziSpace

Table Lighting











Circa Pablo Designs

Clamp Pablo Designs

Contour Pablo Designs

Corner Office Pablo Designs











Giraffa Pablo Designs

Lana Pablo Designs

LIM Pablo Designs

LIM360 Pablo Designs

Pixo Pablo Designs



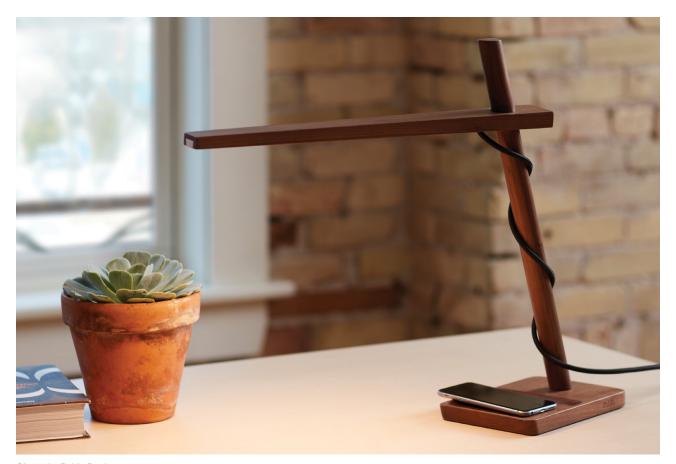
Superlight Pablo Designs



Tube Top Pablo Designs



UMA Pablo Designs



Clamp by Pablo Designs

Floor Lighting





Contour by Pablo Designs

Pendant Lighting















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Cielo Pablo Designs

Cielo XL Pablo Designs

Circa Pablo Designs





Solis Drum

Pablo Designs





BuzziBell*

BuzziSpace





Grid Pablo Designs



Swell Pablo Designs





BuzziHat*

BuzziJet* BuzziSpace

BuzziLight Mono* BuzziSpace



BuzziPleat LED* BuzziSpace



BuzziProp LED* BuzziSpace



BuzziShade* BuzziSpace

* Acoustic performance



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PAGE 21: Natural Light: Research confirms the importance of natural light and its positive effects on well-being

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PAGE 21: Natural Light: Natural light is proven to provide energy, vitamins, and a more regular sleep cycle

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LINAK

PAGE 23-24: Fixtures Designed for Various Tones

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