



# RESIDENTIAL LIGHTING DESIGN GUIDE

## WHAT SETS US APART

### INNOVATION

We combine the latest energy efficient technology and design styles to create an extensive range of attractive and sustainable luminaires. We have over 5,000 products, including many high performance products that can't be found anywhere else. Our EcoTechnology solutions offer sustainable energy solutions that meet the qualitative needs of the visual environment with the least impact on the physical environment.



### SUSTAINABILITY

At ConTech Lighting, our commitment to the environment is as important as our commitment to innovation, quality and our customers. We believe that lighting can be environmentally responsible and energy efficient, while providing high-quality performance and outstanding aesthetic design. EcoTechnology applies to our daily operation as well as to our products; from materials, manufacturing and transportation to the disposal process for our products and by-products.

### QUALITY

We use the best components and manufacturing methods resulting in the highest quality fixtures. From cast housings and high performance reflectors, to the testing of each ballasted fixture before it ships, ConTech Lighting is defined by its quality.

### SERVICE

Our responsive, personalized customer focus, and market expertise represents an oasis of outstanding service in an industry that values it, but frequently doesn't receive it. We are here for you, live and in person, Monday through Friday 7:30am – 5:30pm CST.

### PRODUCT AVAILABILITY & SPEEDSHIP<sup>™</sup>

Our products are in stock and ready to ship. Our unique SpeedShip<sup>™</sup> process helps us toward our goal of shipping 100% of placed orders within 48 hours; at no additional cost to you.



### MARKET EXPERTISE

Every market has its own unique lighting challenges. Designs can get tricky, having to verify every fixture, test every connector and make certain that every length of track is just right. We have an experienced staff of sales professionals to assist you with your projects from concept to completion.



A home is a unique challenge to properly light; it is the ultimate multi-use environment. Lighting a residence requires thoughtful and careful planning and design. Proper lighting makes a difference in how one feels about their home. It adds drama and beauty to rooms, makes smaller rooms look more open and airy, larger rooms feel cozy and inviting. Proper lighting lets home owners enjoy their home to its full potential.

ConTech Lighting will guide you through the lighting process and be your lighting resource. Uniquely qualified to fulfill your lighting needs, ConTech manufactures a variety of lighting systems including track, recessed, and decorative fixtures. It takes time and effort to ensure that your investment in lighting will be returned to the bottom line, and it's a partnership we'll be involved with every step of the way.

# RESIDENTIAL LIGHTING DESIGN GUIDE

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# GOALS OF RESIDENTIAL LIGHTING DESIGN

The quantity and quality of illumination, the impression it creates about the merchandise and the effect it has on the appearance of the space are all factors in a successful lighting design. A designer must consider a variety of key characteristics when developing their lighting plan including lamp life, system efficiency, lumen maintenance, color rendering and appearance, daylight integration and control, light distribution, points of interest, cost, system control and flexibility.

- Create a warm and inviting environment while making it functional and safe
- Integrate and balance ambient, task and accent lighting into every room to allow for a variety of settings and moods
- Establish a path of illumination through the house to allow comfortable transition and movement from room to room
- Enhance and strengthen the character of the living space by highlighting areas of interest and architectural details
- Design a flexible lighting scheme to take you from dawn to dusk and a system that is easy to maintain
- Address energy efficiency and code issues

When lighting a residential space, consider the following:

- Size and shape of the space
- Traffic patterns through the home
- How the room will be used: there is almost always some type of task involved in each space and some tasks require more light than others
- The ceiling height and shape: light will be reflected off these surfaces and contribute to the ambient light level in the room
- Age of the persons living in the space: the older we get, the more we are adversely affected by glare
- Color of the walls: darker walls absorb more light and may require higher levels of illumination
- Art work and highlight areas: determining the pieces and places to be highlighted helps determine the number of accent lights needed
- Families of luminaries: recessed downlights used as adjustable accents and wall washers should match in aperture size and trim finish as well as use similar lamp types. Complement these choices with the same, or similar, finished fixtures to avoid drawing attention to the lighting system



# COLOR, REFLECTION and CONTRAST

People are spending more time at home and want more from it - a place to work, a place to socialize, a place to relax. Lighting is a key element in a safe, comfortable and attractive home. The best lighting is integrated into the architecture of the space: enhancing the architect's conception of the space, reinforcing the activity occurring in the space and highlighting prominent areas. Lighting should complement home owners' lifestyle; the quantity and quality of illumination, the impression it creates about the home and the effects it has on the objects inside it are all factors in how they feel about their home.

When lighting residences, a "one size fits all" approach is unsuccessful, as different rooms require different lighting and controls. It is important to work on a house-by-house, room-by-room basis to determine specific lighting design criteria with enough flexibility for a personal touch. The lighting design needs to be kept simple to avoid visual clutter; use a family of luminaires for cohe-

siveness in the design. It is important to layer the light, ambient (general), task, accent, and decorative, to get the best balance of light in the space.

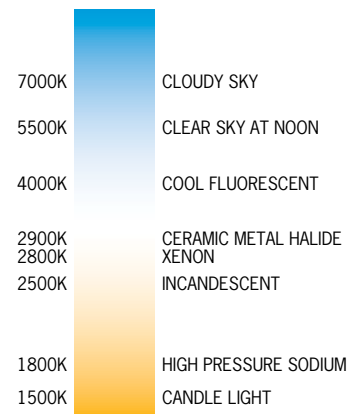
Lighting typically uses 12-15% of the electricity used in the home. Dimming controls can also reduce energy costs by lowering light levels to conserve energy and increase lamp life, provide varying moods in a space and alter the intensity of light to suit particular tasks and activities. All of ConTech Lighting's Track systems can be operated by a dimming control. A lighting designer must consider a variety of key characteristics when developing lighting designs including lamp life, system efficiency, lumen maintenance, color rendering and appearance, daylight integration and control, light distribution, points of interest, cost, system control and flexibility. ConTech's extensive product selection allows you to create the perfect lighting solution every time.



## CORRELATED COLOR TEMPERATURE

Correlated Color Temperature, or CCT, is a measure of a lamp's color appearance when lighted. All lamps are given a color temperature based on the color of the light emitted. White light falls into three general categories: warm, neutral and cool, measured in Kelvin (K). White light with a hint of yellow-like candlelight is called "warm white" (below 3000K); it enhances reds and oranges, dulls blues, and adds a yellow tint to whites and greens. Neutral white (3000K – 3500K) enhances most colors equally, and does not emphasize either yellow or blue. Bluish white, like moonlight on snow, is considered "cool white" (above 3500K); enhancing blues, dulls reds and imparts a bluish tint to whites and greens.

Warm light makes a space feel smaller, more comfortable and familiar, where cooler light make areas appear more spacious.



WARM



NEUTRAL



COOL

## COLOR RENDERING INDEX

Color Rendering Index, or CRI, is a measure of how a light source renders colors of objects compared to how a reference light source renders the same colors. CRI can be used to compare sources of the same type and CCT.

A palette of specific colors is used, and the CRI calculation is the difference between each color sample illuminated by the test light source and the reference source. The group of samples is averaged, and a score between 0 and 100 is calculated, with 100 being the best match between light sources.

The higher the CRI of a light source, the better – and more natural – colors appear.

	APPEARANCE
R1	Light Grayish Red
R2	Dark Grayish Yellow
R3	Strong Yellow Green
R4	Moderate Yellowish Green
R5	Light Bluish Green
R6	Light Blue
R7	Light Violet
R8	Light Reddish Purple
R9	Strong Red
R10	Strong Yellow
R11	Strong Green
R12	Strong Blue
R13	Light Yellowish Pink
R14	Moderate Olive Green



Low CRI



High CRI



# REFLECTION

MATERIAL	REFLECTANCE PERCENT
<b>Diffuse:</b> <i>Uniform surface brightness</i>	
Limestone	35-60
White Paint	75-90
White Structural Glass	70-80
<b>Spread:</b> <i>General diffuse reflection</i>	
Brushed Aluminum	55-60
Etched Aluminum	70-82
Processed Aluminum (Diffuse)	70-80
Satin Chrome	50-55
<b>Specular:</b> <i>Directional control of brightness at specific angles</i>	
Chrome	60-65
Metal coated plastic	75-95
Mirrored and optical coated glass	80-95
Polished aluminum	69-70
Stainless Steel	55-65

Reflection of light off of the various surfaces within the space should be accounted for in the lighting design. When surfaces with a higher reflectance are used, light is reflected back into the space, and higher illuminance levels are created. Light reflectance is based on a scale of 0, total surface light absorption, to 100, total light reflection.

Spread reflection materials, such as brushed aluminum, have a high, though diffused, reflection, reflecting 5-10% of light. Diffused reflection materials, as simple as a white painted wall, give a uniform brightness, and are good reflecting backgrounds for coves and smaller spaces. In addition to reduced energy costs, white and light-reflective surfaces help reduce shadows from racks and stacked goods.

# CONTRAST RATIOS

Home environments need to make the residents feel comfortable while allowing for important tasks while accenting key areas of the home. Simply increasing brightness is not only a waste of electricity, but is also not effective. The key is layering light and using contrast throughout the space.

There are four basic layers of lighting: General lighting, also called ambient, accent lighting, task lighting, and decorative lighting. Measured in footcandles, the IESNA has illuminance level recommendations based on the type of lighting, the type of space, the type of people, and how the lighting will be used (Page 14). By layering these light types, depth and functionality is added to the space.

Contrast is achieved by using an increased illumination within the different types of light, commonly task and accent, to emphasize featured items against the general light levels. Contrast can be used to create visual hierarchies within the space, enabling attention to be drawn to and focused on certain areas based on the contrast ratio. For example, a 2:1 contrast ratio, with the accent lighting being two times brighter than the general lighting level, creates a barely recognizable contrast. Whereas a 30:1 contrast ratio will create a strong focal effect on the focal items.

Each type of lighting has many options, and by incorporating the recommended light levels and contrast ratios, the end result is a space with high visual interest, depth, and dimension.

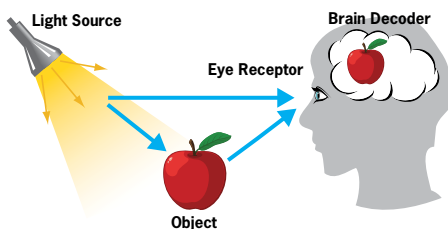


2:1 Ratio



30:1 Ratio

# OPTICAL PERFORMANCE



Performance requirements for lamps and integrated luminaires:

1. Visual appearance of light on a surface
2. Numerical performance, light level, and efficiency
3. Visual appearance and glare control of the luminaire itself



# LAYERS OF LIGHT

There are four layers of light typically used in residential lighting: general (also called ambient) lighting, task lighting, accent lighting, and decorative lighting. Combining and balancing these lighting types gives visual interest to the space and creates a more attractive, exiting and inviting environment.

## GENERAL LIGHTING

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General lighting is the main source of illumination in a space. This uniform, base level of lighting can easily become the focus of energy reduction, as the light levels from other fixtures can be lowered.

Recommended light levels for general lighting is 30 - 50 footcandles. It provides the area with overall illumination, more specifically for orientation and general tasks. Ambient lighting should radiate a comfortable level of brightness and provide a sense of relaxation and spaciousness. The light level should be uniform throughout the space, inconspicuous and neutral. A simple way to achieve this is by arranging recessed fixtures using reflectors, baffles, and lensed trims in overlapping positions.

Perimeter lighting, or wall washing, helps define spaces, provides vertical lighting and makes the space feel larger. Done with sconces or wall washers, vertical lighting creates a pleasant, welcoming environment and adds to the visibility and visual impact of the space. It is important that vertical surfaces are lit for visual comfort, spaciousness and visual and directional cues.

## TASK LIGHTING

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Task lighting is used to illuminate an area for a specific task; providing a focused, localized, and higher level of illumination. Necessary to the functioning of a space, it is important to use energy efficient sources to reduce operating costs.

Task lighting is most effective when used as a supplement to general lighting in workspaces, conference areas and on counter tops. Effective task lighting should eliminate shadows on the specific illuminated area, while preventing glare from the lamp or off surfaces.

Although ambient light should still provide the majority of illumination, task lighting reduces the reliance on overhead lighting, and provides a better quality of light for specific tasks. Recommended light levels for task areas are 50 – 200 footcandles. When lighting a task area, take into account the difference in brightness, or contrast, between the task area and the surrounding space. A 3:1 ratio of task lighting to general illumination provides a nice contrast. The amount of light needed on the task, or luminance, is usually the most flexible variable of task lighting, and can be increased to compensate for low contrast levels.



## ACCENT LIGHTING

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Accent lighting reinforces design aesthetics and creates a dramatic emphasis on shapes, textures, finishes and colors. It creates a visual interest in the space and can enhance almost anything. It adds depth, contrast and creates a focal point; it highlights shape, texture, finish and color. If this light is directed ambiguously, the end result may have many unwanted shadows obstructing the details of the highlighted items as well as distracting glare.

The key is to make this illumination more precise and of higher intensity than the surrounding ambient light. Track fixtures, recessed housings with adjustable trims and concealed adjustable illumination with point source lamps provide directional control and are especially effective for accent lighting.

They are easy to aim precisely to highlight products' best attributes and influence the customers' impression. Accenting everything and emphasizing nothing is a common mistake with accent lighting; always keep in mind that there such a thing as providing too much light.

The IESNA recommends a 5:1 ratio of accent lighting to ambient light to make objects stand out and create a significant visual effect; dark merchandise may require a higher ratio to bring out detail. Recommended light levels for accent lighting are between 150 – 500 footcandles. For feature displays, higher ratios of 15:1 or 30:1 are used, especially to create sparkle in jewelry or crystal.



## DECORATIVE LIGHTING

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Decorative lighting serves a dual purpose: not only to contribute to the lighting layers in a retail environment, but also to enhance the look of the space as a design element. Decorative lighting includes pendants, sconces, chandeliers, table and floor lamps, and cylinders. Decorative lighting should complement and add visual interest to the interior, as well as provide or contribute to the overall lighting plan.

Pendants should be mounted 6 - 8 feet above the finished floor (a.f.f.) so they are still within view, but not too low as to deter visual communication.

Wall sconces and wall mounted cylinders should be mounted approximately 5-1/2 feet a.f.f.; this helps to create a sense of human scale.

Adding décor, beauty and style using decorative lighting is also an important reflection of the homeowner, and reinforces the theme and style of the space. Decorative lighting can also contribute a feeling of hospitality and comfort.

By combining and layering these lighting types, your home environment will be more attractive, exciting, and inviting.









# APPLICATION SOLUTIONS

There are many factors to achieving great lighting design; the end goal is to use lighting intelligently to create a feeling of well-being for the home owner. At ConTech, our goal is to create a balance between lighting effect, affordability and adaptability.



## ENTRY WAYS

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Outside, the entrance to the home should be well lit to welcome guests and identify visitors. Inside, the ambient lighting should provide an inviting atmosphere and ensure safe passage into other areas of the home. Ceiling mounted fixtures are perfect for providing a soft, warm ambient light to welcome visitors into your home.

## STAIR AND HALLWAYS

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Stairways and hallways are two areas of the home that need to be especially well lit for safety. In the hallway, fixtures should be placed every 4-6 feet. An effective technique for lighting these areas is wall washing; it defines form and space while highlighting texture, visually increasing the size of a room and making the space seem lighter and more open. The lighting on the wall may have a varied, scalloped look or an even “wash” of light, depending on the spacing of the fixtures.

## UTILITY ROOMS

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Well diffused ambient lighting, such as recessed lighting, is usually sufficient for the utility room. However, if there are specific task areas, such as sorting and mending, consider a line of track lighting with pendant fixtures for a higher level of illumination over this area and to add a splash of color and elegance to the space.



## BATHROOMS

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Safety, function and aesthetics are primary considerations when lighting a bathroom. The light should be bright enough, even at night, to move around safely; even and shadow-free to allow grooming practices. Recessed lighting is ideal for the bathroom as it casts comfortable, glare-free illumination. Con-Tech Lighting offers a wide variety of recessed housings with

an assortment of damp location listed trims for the bathtub and shower areas. For specific task areas, such as the sink and mirror, consider using ConTech's wall sconces to flank the mirror or using pendants hung from the ceiling.

## BEDROOMS

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In the bedroom, it is important to focus on the overall mood. The lighting should be flexible for different moods using a combination of ambient and task lighting to provide bright enough illumination for reading and other tasks. Smaller, light-colored rooms may not need as much ambient lighting, as there may be enough reflection from the other layers of light to compensate. Larger rooms with darker surfaces may

need more ambient lighting, as dark colors absorb more light. Accent lighting can be used to highlight artwork and architectural details. Consider using recessed lighting near the head of the bed, with a switch or dimmer nearby, to highlight the bed and provide task lighting for reading. Using dimmers gives the ability to control different light levels independently, so the room can adapt to different moods as desired.

## HOME OFFICES

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Now more than ever, the home is becoming a place for work: between 20 and 40 million people do some type of work at home. The home office is also a place for homework and research, paperwork and bills. It is important to create a comfortable environment free of harsh contrasts and distracting

glare, especially on computer monitors. Task lighting should focus on work areas; a strip of track lighting over the desk or track pendants over the desk area help illuminate details and prevent eyestrain. Pictures and professional certificates can be accented by adjustable track fixtures.

## EMERGENCY LIGHTING

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For an added sense of protection in the home, ConTech offers emergency lights. A power outage is often unexpected, and never welcome. ConTech's emergency lights are equipped with a battery that provides more than 90 minutes of emergency illumination. The battery is automatically charged and kept at

peak readiness, and when power is restored, the battery is automatically recharged to the proper level. These fixtures can be used effectively in any area of the home including the kitchen, bedrooms, stairways, basement and garage.





## KITCHENS

Kitchens have become the ultimate multi-use room, the heart of the home. They need plenty of ambient and task lighting to be efficient and functional. Recessed fixtures provide a layer of ambient light that can be supplemented with task lighting. ConTech's undercabinet lighting provides ideal task lighting for work surfaces and counter tops, and reduces shadows and overhead glare. The same undercabinet fixtures can be

mounted above the cabinets to reflect light off the ceiling, contributing to the overall ambient light level and adding visual interest to the room. Breakfast nooks and kitchen islands can be lit with one of ConTech's mono-point pendants set on a dimmer and accented with one of our distinctive shades to allow adequate task lighting for homework or hobbies and allow lower, cozier light level for meals.

## DINING ROOMS

Lighting in the dining room should be beautiful and functional. Typically, a chandelier or track system with string pendants and elegant glass shades are the focal point of a room. Set on a dimmer, a soft glow can be created, similar to candlelight. Recessed or track lighting provide ambient lighting and highlight any prize possessions in the room such as art-

work or sculpture. Undercabinet lighting is a perfect accent to a china cabinet, hutch or breakfront. Mounted inside, it becomes a showpiece highlighting beautiful china or glass. Wall sconces can flank either side of the sideboard or buffet, contribute to the ambient lighting in the room as well as high-light display objects.

## LIVING AND FAMILY ROOMS

A variety of activities take place in the living room: general entertaining, watching television, working on the computer, homework, reading... the correct light levels must be incorporated to suit each activity and mood. Accent lighting should be on artwork and architectural details. Track lighting and adjustable recessed downlights are good choices for these high-lights. Wall washing is ideal for book shelves and large artwork. Sconces flanking either side of the fireplace work beautifully

with a line of recessed or track fixtures above, making the fireplace the focal point of the room. Undercabinet lighting under shelving units contribute to the ambient lighting or on top of the units to accent the ceiling, expand the space and add visual interest to the room. Glare can distract from TV watching or computer use. Be sure that the light levels near these areas are lower to maintain the screen image.

## REDUCING ENERGY IN THE HOME

As energy costs continue to rise, homeowners are looking for simple ways to reduce energy costs. The most tried and true practice is to turn off lights when a room is not in use. Choose the right fixtures for your home, which also means choosing the right light source. Incandescent lamps provide excellent color and are easily dimmable, but also consume a lot of energy and burn out quickly. Compact fluorescent lamps use 75% less energy, are more efficient and run at a cooler temperature. LED

Sources offer great quality, lower energy use, and longer life - the best of both worlds. Look for fixtures that use one higher wattage lamp, rather than several lamps with lower wattages. To get the most out of your lighting design, keep fixtures and lamps free of dirt and debris. Dirt can absorb as much as 50% of the light emitted from a lamp. Whenever possible, use dimming controls. They give flexibility to the lighting plan and lower light levels to conserve energy and increase lamp life.





# IESNA ILLUMINANCES<sup>1</sup>

## WEIGHTING FACTORS TO BE CONSIDERED IN SELECTING SPECIFIC ILLUMINANCE LEVELS

Task and Occupant Characteristics	Design Value		
	1	2	3
Occupant's Age	Under 40	40 to 55	Over 55
Speed and/or Accuracy	Not Important	Important	Critical
Reflectance of Task	Greater than 70%	30-70%	Less than 30%

## RESIDENTIAL ILLUMINANCE RECOMMENDATIONS FOR GENERAL LIGHTING AND SPECIFIC VISUAL TASKS

Areas/Tasks	Illuminance (FC) <sup>2</sup>
<i>For Specific Visual Tasks</i>	
Dining	10, 15, or 20
Reading (Casual, Normal, Books, Magazine, Papers)	20, 30, or 50
Kitchen Counter (Range, Sink, Non-Critical)	20, 30, or 50
Laundry (Preparation at tubs, washer, and dryer)	20, 30, or 50
Ironing	20, 30, or 50
Grooming	20, 30, or 50
Full Length Mirror	20, 30, or 50
Multi-Purpose Tables	20, 30, or 50
Hand and Machine Sewing (Occasional, High Contrast)	20, 30, or 50
Music Study (Simple Scores)	20, 30, or 50
Workbench Hobbies	20, 30, or 50
Reading (Handwriting, Reproductions, Poor Copies)	50, 75, or 100
Study (Prolonged, Serious or Critical)	50, 75, or 100
Kitchen Counter (Range, Sink, Difficult Seeing)	50, 75, or 100
Hand and Machine Sewing (Light to Medium Fabrics)	50, 75, or 100
Music Study (Advanced Scores)	50, 75, or 100
Workbench Hobbies (Difficult Tasks)	50, 75, or 100
Easel Hobbies	50, 75, or 100
Hand or Machine Sewing (Dark Fabrics, Low Contrast)	100, 150, or 200
Music Study (Substandard Size Scores)	100, 150, or 200
Workbench Hobbies (Critical Tasks)	100, 150 or 200
<i>For General Lighting</i>	
General Lighting	5, 7.5, or 10
Conversation, Relaxation, and Entertainment	5, 7.5, or 10
Passageways	5, 7.5, or 10

1. IESNA Lighting Handbook, 8th Edition



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All specifications subject to change without notice.

**ecoTECHNOLOGY**  
sustainable energy solutions

