Light Fixtures and Directional Effects

Specifications:
- Method of Mounting
- Method to make Electrical Connection
- Housing
  - Lamp
  - Lamp Socket
  - Decorative Lens or Diffuser
  - Shielding or Optics
  - Support Arms or Stem
  - Locking Mechanism
  - Way to access the lamp
  - Ballast or Transformer
  - Aperture Trim & Flange
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Light Fixtures and Directional Effects

Direction of Light
- Goal of a luminaire is to put light where the user needs it
- Convenient way to classify luminaires is by the direction of light emitted from the luminaire

Distribution of Light
- Light going Up / Indirect
- Light going Down / Direct

Distribution Types
- Direct
- Semi-Direct
- General Diffuse
- Direct-Indirect
- Semi-Indirect
- Indirect

Distribution: Direct
- 100% of the light directed down
Light Fixtures and Directional Effects

**Distribution: Direct**

100% of the light directed down

**Distribution: Semi-Direct**

Smaller portion direct up
Most of the light directed down

**Distribution: General Diffuse**

Light directed evenly around

**Distribution: General Diffuse**

Light directed evenly around
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**Distribution: Direct - Indirect**

50% of the light directed up
- 50% of the light directed down

**Distribution: Semi-Indirect**

Most of the light directed up
- Small portion of the light directed down
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**Distribution: Indirect**

100% of the light directed up

**Distribution Types**

- Direct
- Semi-Direct
- General Diffuse
- Direct-Indirect
- Semi-Indirect
- Indirect

**Mounting**

- **Surface**

  Typical Components:
  - Recessed Junction Box
  - Housing
    - Back Plate
    - Lamp and Lamp Socket
    - Diffuser or Shielding
    - Base or Leg for Table Lamp
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Mounting

- Pendant

Typical Components:
- Recessed Junction Box
- Housing
  - Canopy
  - Stem
  - Lamp and Lamp Socket
  - Diffuser or Shielding

Mounting: Pendant

Section
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Mounting

- Recessed

Typical Components:
  - Splice Box
  - Housing
    - Lamp and Lamp Socket
    - Aperture Cone
    - Diffuse or Shielding

Typical components of a recessed downlight.
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Glare

- Direct glare from windows and luminaries.
- Reflected glare on computer screen from ceiling luminaries.

Glare Prevention Tips:
- Position light to walls and ceilings, e.g., fixtures such as A, B, and C (see p. 7) work well.
- Use daylight to light walls and ceilings.
- Use adjustable blinds or shades that control window glare while maintaining view.
- Choose higher reflectance menu surfaces.
- Select only repositionable or white painted louvers and reflectors.
- Select exterior or specular (shiny) reflectors or louvers that can be seen from any angle.
- Shield the line from view with baffles, louvers, lenses, or diffusing covers.

Shielding

- Use shielding from eye level 15-45 degrees to protect from direct glare.
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**Reflector**

Reflectors around or above the lamp used to increase performance of the fixture

**Shielding**

Lamp placed above ceiling aperture or louver to provide shielding from normal viewing angles

**Glare Control**

Contour of ceiling aperture or louver to provide Glare Control from normal viewing angles
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**Reflectors** around or above the lamp used to increase the performance of the fixture.

**Shielding**
Lamp placed above ceiling aperture or louver to provide shielding from normal viewing angles.

**Glare Control**
Contour of ceiling aperture or louver to provide glare control from normal viewing angles.
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General or Ambient: Troffer

A small amount of concealed brightness is introduced to the wall and ceiling, creating a brighter, more inviting environment without creating unwanted glare.

The sharp cut-off provides good glare protection, and the soft, diffuse light creates a warm, welcoming atmosphere. People and objects have a distinct view of the light source.

A diagram illustrates the light distribution pattern, showing how the light is directed and how it affects the surrounding area.
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External
- Pole or Post Mounted

External
- Building or Ground Mounted

External
- Ground Mounted for Object Lighting
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**Basic Lighting Design**

- **General or Ambient lighting**
  Provides an area with overall illumination. Also known as ambient lighting, general lighting radiates a comfortable level of brightness, enabling one to see and walk about safely.

- **Task Lighting or Lighting at the Work plane**
  Helps you perform specific tasks such as reading, sewing, cooking, homework, hobbies, games, or balancing your checkbook.

- **Accent Light or Highlighting**
  Adds drama to a room by creating visual interest. As part of a decorating scheme, it is used to spotlight paintings, houseplants, sculpture, and other prized possessions, or to highlight the texture of a wall, drapery or outdoor landscaping.

**Luminance Patterns**

Specific luminous patterns have a consistent and definable effect on an occupants’ subjective impression of a space.

Designers can use these patterns to create spaces which are appropriate for the intended use. Each pattern reveals its opposite as well: for example, to make a space seem more public, a designer can look at the criteria for making a space seem private and do the opposite.

- Spaciousness / Confinement
- Visual Clarity / Haziness
- Relaxation / Activation
- Private / Public

**Privacy:**
Privacy is light being in the shadows. Lighting patterns which are overall low, non-uniform, and darker zone of the occupant than in the surroundings will reinforce an impression of privacy. Vertical rather than horizontal surfaces should be lit.
Light Fixtures and Directional Effects

**Luminance Patterns**

**Relaxation:**
Relaxation also implies non-uniform lighting, with non-uniform wall lighting contributing to this impression. Warm color sources contribute to a relaxing feeling. Aspects of the patterns for relaxation can be effectively combined with those for visual clarity to create effective and comfortable work environments.

**Visual Clarity:**
Visual clarity refers to the crispness and distinctness of the visual environment, rather than how well a task can be seen. Visual clarity is reinforced by shadows, by emphasis on horizontal surfaces such as the work plane and the ceiling, and by higher luminous in the center of the room.

**Spaciousness:**
Relatively bright ceilings and walls are particular importance to reinforce a sense of spaciousness. Uniform illumination also helps make the room feel spacious.

**Light Distribution Strategies**

**General or Ambient Lighting:**
General lighting provides uniform illumination over the entire area of a room, allowing flexibility in the placement of workstations. Localized general lighting also provides approximately uniform illumination, but luminaries are located in a pattern that responds to the specific arrangement of workstations.

**Local or Task Lighting**
Local lighting provides high illumination on relative small areas. It can be too bright and uncomfortable unless surrounding surfaces are also illuminated, as shown. Local lighting used with general lighting is called supplementary lighting.
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General or Ambient: Standard Lighting

What’s wrong with this picture?
- Poorly lit areas
- Light from windows
- No light on ceiling or fixtures

Better

In the last decade, during which personal computers have proliferated in the office, researchers have paid increased attention to lighting. Several studies have investigated the relationship of modern office lighting to the visual health, satisfaction and productivity of office workers.

- The American Society of Interior Designers found that 68% of employees complain about the light in their offices.
- A Silicon Valley study pointed out that 79% of VDT users want better lighting.
- A 1989 Louis Harris survey, the Steelcase Office Environment Index, revealed that workers think of eyestrain as the number one health hazard in the office—ahead of radiation, asbestos.

This degree of dissatisfaction is difficult to ignore. It confirms the need to identify the best methods of lighting the computerized office.

General or Ambient: Direct versus Indirect

Better
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General or Ambient: Recessed

Direct

General or Ambient: Recessed

Direct

General or Ambient: Recessed

Direct

General or Ambient: Recessed

Direct
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General or Ambient: Pendant

- Indirect
- Direct
- Semi-Indirect

General or Ambient: Pendant

- Semi-Indirect

Accent: Asymmetrical Distribution

- Asymmetrical Direct
- Asymmetrical Indirect
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**Accent: Asymmetrical Distribution at Wall**

- Asymmetrical Direct

**Accent: Asymmetrical Distribution at Wall**

- Pendant
  - Asymmetrical Direct

**Accent: Asymmetrical Distribution at Wall**

- Recessed
  - Asymmetrical Direct

**Accent: Asymmetrical Distribution at Wall**

- Surface
  - Asymmetrical Indirect / Direct
Light Fixtures and Directional Effects

Highlight or Accent:

Combinations

Highlight or Accent

Combinations
Light Fixtures and Directional Effects

Combinations

- Underwriters Laboratory Testing
  - Dry Applications
  - Damp Applications
  - Wet Applications
  - Wet/Dry Applications
  - Underwater Applications
  - Corrosive Applications
  - Hazardous Applications

Problems with combinations

Fixtures Inside and Out

- Underwriters Laboratory Testing
Light Fixtures and Directional Effects

Finding Fixtures

- General Lighting Mnfrs Websites
  - www.Lightolier.com
  - www.Erco.com

- Light Fixture Search Sites
  - www.LightSearch.com
  - www.eLumit.com

- Retail Sites
  - www.Lightology.com
  - www.unicahome.com
  - www.lumens.com
  - www.100watt.net