

In a recessed luminaire all electrical and optical components are housed above the ceiling line. Recessed luminaires direct light downward, or downward and toward a wall. The light distribution pattern can be narrow or broad, intense or diffuse, and provide ambient light, wall washing, or accent lighting. Recessed luminaires include troffers and “luminous ceiling,” downlight, wall wash, and accent types. These luminaires differ in size and shape, mounting, and trim choices. Many types of lamps, both incandescent and fluorescent, can be used in recessed luminaires. Purchase recessed luminaires from lighting stores, electrical suppliers, and building supply stores.

Both commodity and specification grades are available. While commodity-grade luminaires are generally less expensive, specification-grade luminaires are better quality and offer many reflector and trim options that fit into the same mounting frame. Recessed luminaires for homes have some or all of the following components.

Components

Housing: The housing surrounds the luminaire and usually is made of steel or aluminum. For some recessed luminaires, the reflector serves as the housing. The depth of the housing limits the ceilings into which the luminaire will fit. Many recessed luminaires need at least 8 inches of clearance in the ceiling cavity, or plenum. Some housings restrict air leakage through the luminaire to meet energy code air infiltration requirements. Luminaires that are rated “IC” (insulated ceiling) can be covered by insulating materials.

Lamp socket or lamp holder: The lamp socket is the electrical fitting into which the lamp base is inserted. Socket adapters are needed when a replacement lamp does not have the same type or size base as the original lamp.

Mounting frame: The mounting frame is a flanged, metal support that is used to attach the luminaire to the ceiling structure. Special frames can be obtained for mounting recessed luminaires in sloped ceilings. Mounting frames may also be different for plaster or T-bar dropped ceilings.

Ballast: A ballast is an electrical device that is used to start and operate fluorescent and high-intensity discharge lamps. In recessed lighting, the ballast is hidden from view and typically is attached to the housing or mounting frame. Ballasts usually last for many years of service and can be replaced when they fail. See the Appendix for more details on types of ballasts.

Aperture: The aperture is the opening at the bottom of the recessed luminaire through which light is directed into the room. Recessed luminaires are available in a variety of aperture shapes including round, square and rectangular. Aperture sizes and typical ceiling openings can be as small as 2 inches in diameter and as large as 2 feet by 4 feet.

Baffle: A baffle is a series of light-absorbing ridges that ring the lower inside portion of the luminaire's aperture. The baffle shields the luminaire's brightness from the occupant's normal field of view. Deep or dark-color baffles reduce a luminaire's efficiency.

Reflector: The reflector is a component that is optically designed and shaped to maximize the efficiency of the luminaire for a particular type of lamp by directing light out of the luminaire. The reflector typically is made of specular aluminum or white-painted steel. Reflectors are available in several colors, including silver, gold, bronze, and white. Light color reflectors make a luminaire more efficient than dark-color reflectors do. Some recessed luminaires that do not have separate reflector components have reflective surfaces on the interior of the housing. Recessed luminaires that have no reflector at all should incorporate a reflector lamp.

Lens or diffuser: Lenses and diffusers are optically designed to create specific light distribution patterns. They are formed from glass or plastics and are positioned in the aperture, or opening, of the luminaire. Several choices may be offered by the manufacturer for each luminaire. The use of a lens reduces a luminaire's efficiency.

Louver: A louver is a device that is inserted into a recessed luminaire that does not have a lens or diffuser. The louver shields the lamps in the luminaire from the direct view of the resident. Louvers are made of thin metal or plastic, and consist of vertically oriented parallel strips, hollow cubes, honeycomb, or parabolic shapes.

Trim: Trim commonly refers to a reflector and shielding package that fits into the housing and mounting frame of a recessed luminaire. For example, trims could include lenses, open reflectors, or black, grooved baffles, each offering a different appearance, efficiency, and level of comfort. A plastic or metal trim ring is often used to cover and seal the edges of holes cut in the ceiling for round recessed luminaires.

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Energy and Lamps

Often one type of luminaire is offered with the option of several types of lamps. For energy efficiency, choose the most efficacious lamp available for each luminaire.

Installation

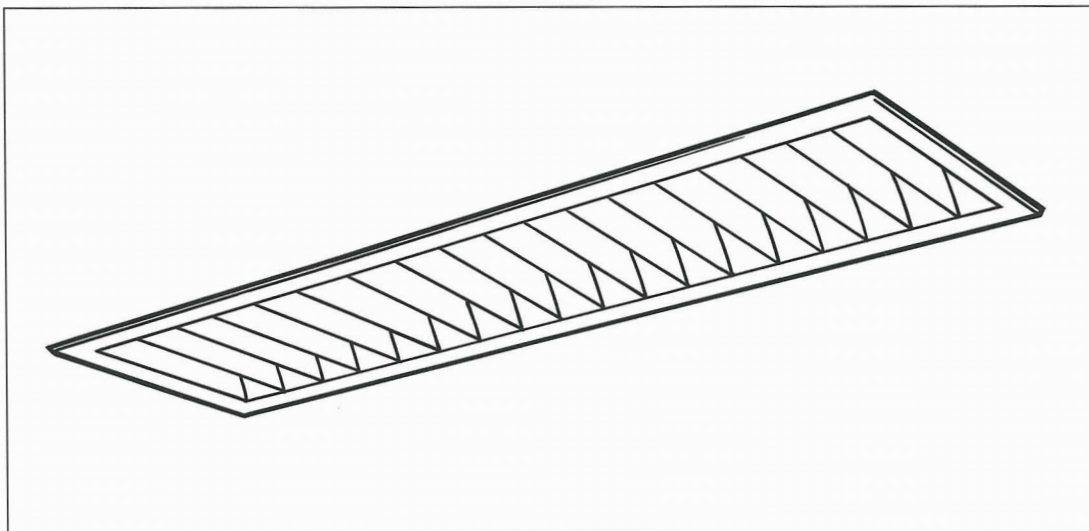
Recessed lighting is a good design choice for low ceilings and situations where a clean ceiling line is desired. Too many recessed luminaires in the same ceiling give a cluttered appearance, especially if they have different trims; coordinate trim selection and install the minimum number of luminaires required for the design. Locate luminaires near important visual tasks because the closer the luminaire is to the area that needs to be illuminated, the lower the required wattage of the lamp will be. Generally, luminaires mounted to the side and slightly in front of or slightly behind the task minimize glare and shadows.

It is easiest to install recessed luminaires in new construction or during major remodeling. Unlike many surface-mounted or suspended luminaires, which can be purchased late in the construction process, the mounting frame and housing of the recessed luminaire must be on the job site prior to the enclosure of the ceiling. Joists of nominal 8-inch depth accommodate many recessed luminaires. Coordinate the location of recessed luminaires with joists, ducts, or plumbing that may also be located in the ceiling. Recessed luminaires that install from below, sometimes called "remodel housings," are available for retrofit jobs where there is no above-the-ceiling access. Low-profile downlights and troffers are available for use in plenums of minimal depth. Check the manufacturer's data carefully for recessed depth dimensions and for required clearances around the housing.

Cautions

If the lamp in an existing luminaire is replaced with a different type of lamp, the reflector may also need to be replaced to maintain luminaire efficiency. Some ceiling types, such as concrete or stress-skin panels, leave no room for recessed luminaires. Always check the manufacturer's directions concerning installation in insulated spaces, because the heat from an improperly selected or installed recessed luminaire can be a fire hazard. The directions for installing recessed luminaires in insulated ceilings usually specify a minimum size air space to be left around the housing, unless the luminaire is specially designed for contact with insulation; if so, it will be labeled "IC" for insulated ceilings.

Recessed: Troffers and “Luminous Ceilings”



A recessed troffer is usually 2 feet by 2 feet, 1 foot by 4 feet, or 2 feet by 4 feet, and houses fluorescent lamps. A “luminous ceiling” may be recessed or attached to the ceiling and is constructed of multiple fluorescent lamp strip luminaires behind diffusing lenses. Recessed troffers distribute light downward, but vary greatly in the spread of the light distribution pattern. Troffers with diffusers have the widest spread; troffers with deeply recessed parabolic louvers have a very narrow spread. Luminous ceilings have a uniformly broad and diffuse light distribution pattern.

Energy and Lamps

Reflectors or highly reflective housings that are properly designed for the type of lamp that is used in the luminaire ensure efficiency.

Installation

Use where high light levels are needed throughout the room. Recessed troffers fit easily in suspended ceilings. One-foot by 4-foot troffers fit between ceiling joists if run parallel to the joists.

For more information refer to

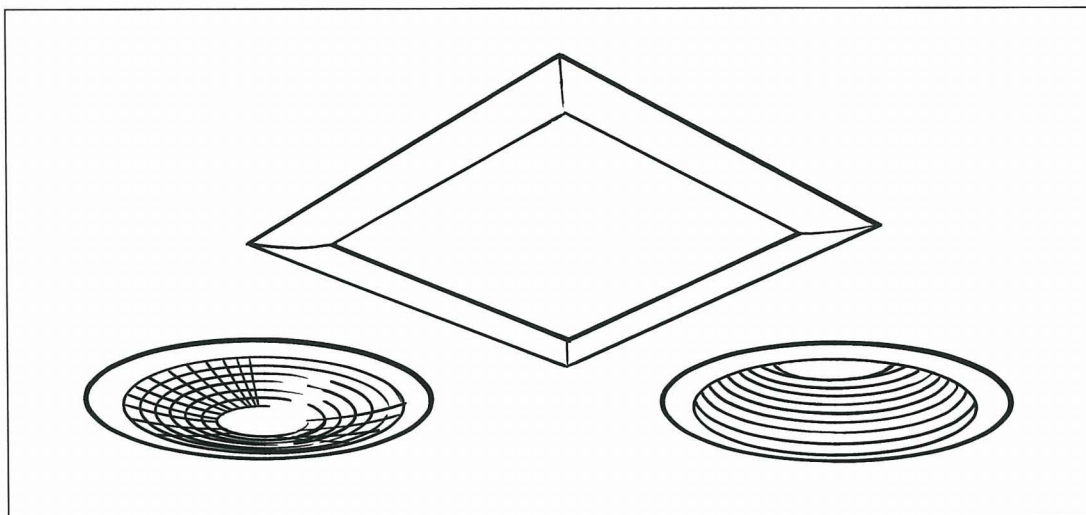
Techniques: Ambient, Task

Lamps: Linear Fluorescent, U-Shaped and Long Twin-Tube Fluorescent

Designs: Medium Kitchen 3

Other luminaires: Ceiling-Mounted Diffusers, Suspended, Recessed Downlights, Architectural

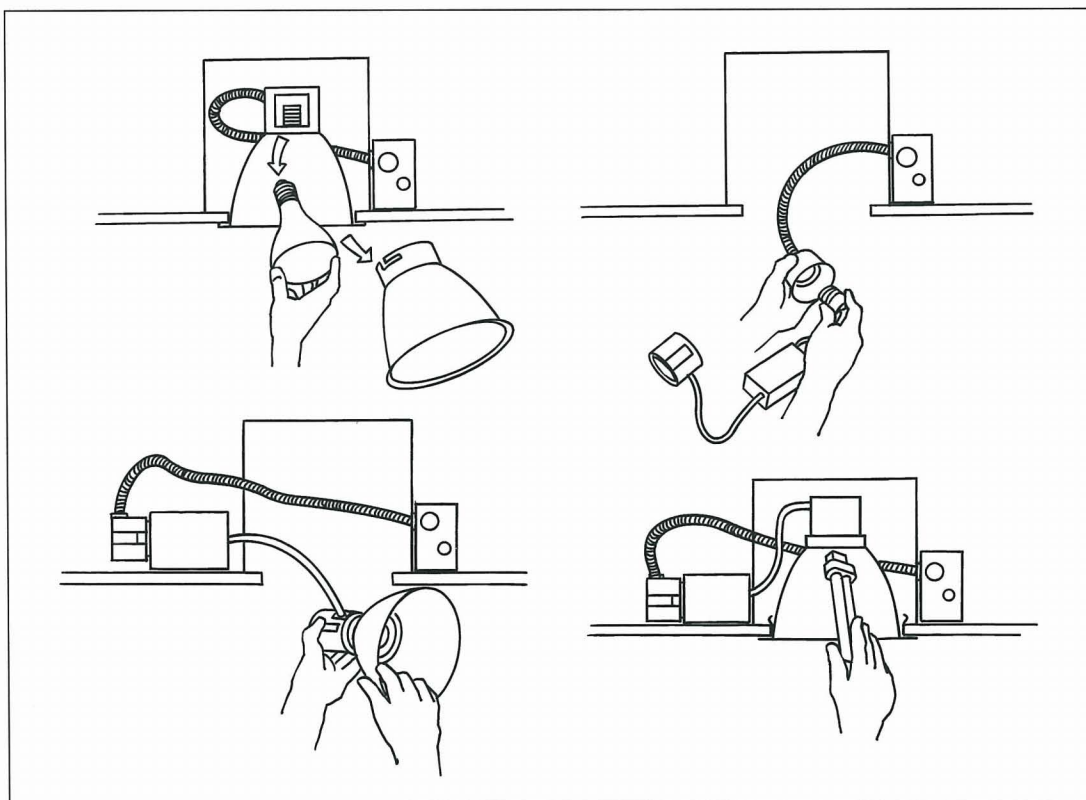
Recessed: Downlights



Recessed downlights direct light down, usually in a symmetrical distribution. Common names for recessed downlights include "cans" and "high-hats." They are used for many lighting techniques, including ambient and accent.

Energy and Lamps

Incandescent, halogen, and compact fluorescent lamps can all be appropriate for use in recessed downlights. If an existing room has recessed downlights that contain incandescent A-lamps, consider several more-efficient alternatives: replacing them with halogen lamps; replacing them with R-, ER-, or PAR-lamps if the luminaire does not have a reflector; replacing them with compact fluorescent reflector lamps if they will fit into the housing; or, using compact fluorescent lamp conversion kits as shown below. Select downlights with high efficiencies for new construction or remodeling.



Installation

Downlights mounted to the side and slightly forward of or behind the task minimize glare and shadows. Locate downlights near important visual tasks to allow lower-wattage lamps to be used. Downlights placed near a wall produce vertical scallops. If they are placed very close to the wall, the intense downlight will accentuate any texture on the wall surface. When this effect is planned, it adds visual interest to a room; when unplanned, it can be distracting. For instance, downlights placed near a brick or stone wall create dramatic shadows but downlights near a gypsum board surface will reveal any taping or sanding irregularities.

Controls

In a room with many recessed luminaires, wire the luminaires in several groups so that residents can choose to use only the luminaires that they need.

Cautions

Where recessed downlights are the only source of light in a room, the ceiling may appear dark.

For more information refer to

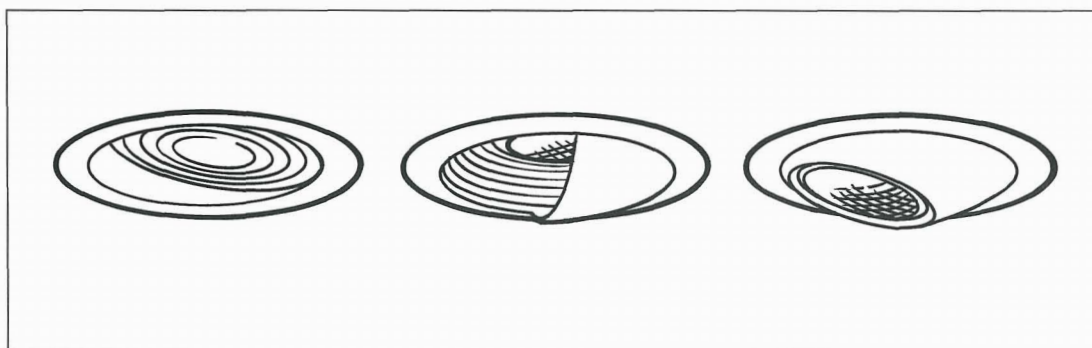
Techniques: Ambient, Task, Special Purpose

Lamps: Halogen A, Reflector, Compact Fluorescent

Designs: Medium Kitchen 1, Dining Room, Large Living Rooms 1 and 2, Medium Bath 1, Large Bath, Large Bedroom, Home Office, Closed Stair, Hallway

Other luminaires: Ceiling-Mounted, Suspended, Recessed Wall Wash, Recessed Accent

Recessed: Wall Wash



Wall wash luminaires direct light asymmetrically downward to create an area of light on a wall. How evenly the wall is “washed” depends upon three factors: the quality of the luminaire design, how far the luminaire is located from the wall, and the spacing between luminaires. The intensity of light from a wall wash luminaire decreases as it nears the bottom of the wall. One type of wall wash luminaire has a lens in the aperture that provides a diffuse light distribution pattern. Others are designed without lenses, and may have a plate partially covering the aperture to conceal the internal reflector from the occupant’s view

Energy and Lamps

Select new wall wash luminaires with high efficiencies. For existing luminaires, replace the lamp with lower-wattage lamps when light output is excessive. For example, where R-lamps are used, replace the lamps with halogen PAR-lamps. Some wall wash luminaires are designed optically for A-lamps. Replace the A-lamps with halogen A-lamps for energy savings and longer life.

Installation

Most wall wash luminaires should be spaced the same distance from each other as they are from the wall; this is known as a one-to-one spacing ratio. It usually is not necessary to place a downlight near a wall wash luminaire, since the wall wash luminaire also has a downlighting component.

Controls

Switch wall wash luminaires separately if they are used only for dramatic or architectural effect and are not needed for everyday use.

Cautions

Most wall wash luminaires should not be placed closer than 2.5 feet from the wall, or “hot spots” will result. Glossy surfaces, such as oiled wood or polished marble, will produce a mirror image of the luminaire, and should not be illuminated by wall wash luminaires. Wall wash luminaires should not be directed toward doors, because someone entering the room could be bothered by the direct glare of the lamp. Wall wash luminaires should not be directed toward windows, because lamp images can be reflected in the window glass, and those outside can be offended by direct glare.

For more information refer to

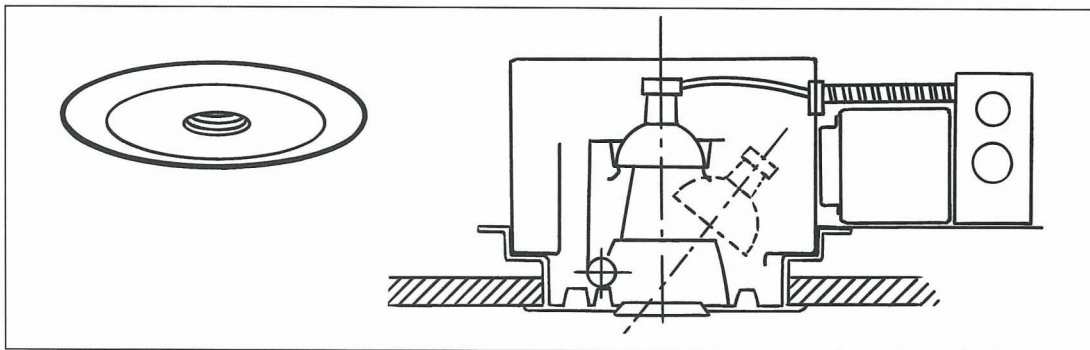
Techniques: Wall Washing, Special Purpose

Lamps: Halogen A, Reflector, Compact Fluorescent

Designs: Home Office

Other luminaires: Ceiling-Mounted Track and Adjustable Heads, Recessed Troffers, Recessed Accent, Soffits, Valances, Wall-Mounted

Recessed: Accent



Recessed accent luminaires are used to accentuate works of art, architectural features, plantings, and other items of interest. “Eyeballs” are recessed accent luminaires with a partially recessed sphere that can be rotated to provide directional lighting. Most recessed accent luminaires can be positioned to aim light where it is needed for emphasis and have an adjustable range of 35° from the vertical, and rotation of approximately 350° . An accent luminaire should be able to use a variety of lamp types so that changes in placement of artwork and furniture can be accommodated.

Recessed accent luminaires typically use incandescent or halogen reflector lamps. Accent luminaires that accommodate color filters, spread lenses, and framing shutters offer unique design choices. Direct glare can be a problem with accent luminaires; however, louvers or baffles fitted into the luminaire can reduce direct glare. An alternative to recessed accent luminaires is a specially designed track lighting system recessed into narrow openings between ceiling joists.

Energy and Lamps

If existing luminaires use R-lamps, replace the lamps with halogen PAR-lamps. When using reflector lamps of any kind, choose a beam spread to match the size of the object being illuminated.

Installation

Accent luminaires should be used sparingly, with only the most important features of a room being highlighted. Unless low-voltage lamps are used, the apertures of recessed accent luminaires can be quite large. To avoid reflected glare from glossy artwork, position the lamp inside the luminaire so that it is tilted up 30° from the vertical position. Recessed accent luminaires can be used effectively as downlights in sloped ceilings, provided the slope does not exceed 35° .

For more information refer to

Techniques: Accent, Special Purpose

Lamps: Reflector, Low-Voltage Halogen

Designs: Dining Room, Large Living Room 1

Other luminaires: Ceiling-Mounted Track or Adjustable Heads, Recessed Wall Wash, Artwork