

The image shows a modern interior space. A large, dark green rectangular box is centered in the upper half of the frame, containing the text 'SPACE TYPES - DESIGN BRIEFS' in white, uppercase, serif font. The background is a photograph of a room with a vibrant orange wall. On the left, there is a square window with a dark frame and a light-colored sill. Below the window, a horizontal strip of recessed lighting illuminates the wall. At the bottom of the image, a wall of large, rectangular, light-colored stone tiles is visible, with a dark, possibly black, fireplace or built-in unit on the right side. The floor is made of light-colored, square tiles. The overall lighting is warm and focused on the architectural details.

SPACE TYPES -
DESIGN BRIEFS

OFFICE DESIGN BRIEF

The NYC Department of Design and Construction (DDC) manages the construction and renovation of NYC's municipal buildings, most of which contain some office spaces. These guidelines cover typical open plan and private offices, as well as meeting rooms with video-conferencing.

LIGHTING QUALITY AND QUANTITY STRATEGIES

Offices have specific considerations because of their function and spatial characteristics. Please review and use the guidelines below, in concert with the basic issues of lighting quality and design strategies set forth earlier in the Design Team Strategies section of this manual.

OFFICES—SPECIFIC LIGHTING QUALITY AND QUANTITY ISSUES

ISSUE	IMPORTANCE
Direct and Reflected Glare	Very Important
Daylighting Integration and Control	Very Important
Luminance of Room Surfaces	Very Important
Appearance of Space and Luminaires	Very Important
Relationship between light source, visual task, and viewer	Very Important
Color Appearance (and Color Contrast)	Important
Flicker	Important
Light Distribution on Task Plane and Room Surfaces	Important
Modeling of Faces or Objects	Important
Shadows	Important

From *The IESNA Lighting Handbook, 9th Edition*.

photo: Dub Rogers courtesy: Gruzen Samton



Light hitting the task from many directions reduces contrast and glare.

Direct and Reflected Glare Control

Both direct and reflected glare can be distracting to workers and increase the difficulty of visual tasks, potentially resulting in a loss in productivity. Office workers at fixed workstations are particularly affected by direct and reflected glare from luminaires and windows, because they can't easily move their relationship to the computer screen or light sources. Improvements in computer monitors have reduced the problem of reflected screen glare, but black backgrounds such as CAD drawings are still prone to reflected images. Under-cabinet lights located in front of flat paper tasks are often the source of veiling reflections (reflections on

the task surface that mask the information that lies behind), and so are not the preferred source of desktop illumination. Overly bright luminaires or exposed lamps can create overhead glare, even from a luminaire that is above the normal field of view.

Daylighting Integration and Control

A building can be designed to provide high levels of relatively uniform ambient light for offices from natural daylight. Windows offer views and a desirable connection to the out-of doors, with an added benefit of providing the eyes with distant objects for visual focus, allowing them to relax from close-up

work. Sun patterns anywhere in the field of view can create harsh contrasts that are distracting and may be visually disabling, so direct sun penetrations should be avoided in office workspaces. This can be done by using blinds, louvers, overhangs, light shelves, etc.

Luminances of Room Surfaces

Lighting the walls and ceilings is just as important as lighting the task. The proper lighting of the space contributes to the adaptation level of the eye, mitigates glare, and reduces shadows – all of which improves visual performance. In addition, well-lighted room surfaces provide a more pleasant, brighter-looking and stimulating workspace, contributing to long term work performance and employee satisfaction.

Relationship between light source and visual task and viewer

The geometry between the viewer, the task and the luminaire determines the presence of both direct and reflected glare. Luminaires with strongly directional characteristics must be geometrically fixed in their relation to viewers in order to avoid glare, and so are not the appropriate choice as the standard fixture in flexible open plan space. Undercabinet lights should not be located directly in front of the viewer, unless fitted with special lenses to reduce veiling reflections. Source brightness must be controlled in open-bottomed luminaires located directly over workers. Computer screens must be located (or be adjustable) to avoid reflections from windows.

Appearance of Space and Luminaires

The visual hierarchy of surface brightnesses and the layout and style of luminaires strongly influence the character of an office. A balance should be met between the desire for interest and drama, and the need for a productive work environment. Lighting should be designed to aid in orientation of the space and to avoid visual clutter.

Light Distribution on Task Plane and Room Surfaces

A relatively uniform distribution of light, without strong shadows, is preferred for office environments. Luminance ratios should be fairly uniform. A 3:1 (maximum to minimum) ratio is preferred between the task luminance and its immediate surround. Outside the task areas a wider range of luminances are acceptable, up to 10:1 for surfaces in the field of view and up to 20:1 for the contrast ratio between windows or luminaires and the task surfaces. Shadows under overhead cabinets or shelves can create an excessive luminance contrast, but this can be improved by low-output undercabinet lights. Totally directional light will cause harsh shadows and generally will not achieve comfortable luminance ratios, therefore a combination of direct and indirect light distribution is preferred.

Reflectances and Finishes

To achieve the desired luminance ratios and uniformity, reflectances of wall and ceiling surfaces, as well as modular office partitions, furniture and fabrics, should be high. Finishes should be matte or egg-shell. Ceilings should be a minimum of 80% reflectance, with 90% preferred. Walls should be 65-70% reflective and floors not less than 20% reflective. Polished, glossy and shiny surfaces should be avoided because they can be a source of reflected glare. In addition to providing uniformity, high surface reflectances can reduce the amount of light that is needed, thereby reducing energy consumption.

Color

High color rendering (CRI 84+) lamps with color temperatures between 3500 Kelvin and 4100 Kelvin are preferred for office space functions. In order to limit the number of lamp types on a project, the lamps used in the offices should also be used in ancillary spaces.



Light-colored finishes save energy and improve lighting quality.

courtesy: Gruzen Samton

No Flicker

An office environment should be free from fluorescent flicker associated with magnetic ballasts. These ballasts are becoming obsolete, and should be replaced in older installations. Newer, high-frequency (20+ KHz) electronic ballasts do not produce flicker. Defective or failing ballasts produce lamp flicker and should be replaced immediately.

Three-dimensional Modeling

A large proportion of communication in offices is non-verbal. Harsh lighting or solely directional lighting can cause unflattering, unnatural and even confusing shadows. Some proportion of indirect lighting or inter-reflections (light reflected from the walls and ceiling) will allow faces and objects to be adequately modeled. Facial modeling is especially important in meeting rooms and video conferencing spaces.

LIGHT LEVELS (RECOMMENDED AVERAGE MAINTAINED ILLUMINANCE, IN FOOTCANDLES (FC))

OFFICE TASK	HORIZONTAL FC	VERTICAL FC	LOCAL TASK LTG. TYPE	NOTES
Filing	50	10		
Open Plan Intensive VDT* use	30	5	Undershelf & Task	
Open Plan Intermittent VDT* use	50	5	Undershelf & Task	
Private Office	50	5	Undershelf & Task	
Lobbies, lounges, and reception	10	3		
Mail Sorting	50	3		
Copy Rooms	10	3		
Conference / Meeting Rooms	30	5		
Videoconferencing	30			I

From *The IESNA Lighting Handbook, 9th Edition*

* Visual Display Terminals (VDT) i.e., computer monitors. Note 1 – Provide vertical illuminance as required for camera.

DESIGN AND LAYOUT STRATEGIES

OPEN PLAN AND PRIVATE OFFICES

As a general strategy, provide uniform overall ambient lighting. Use local task light at desks to provide light levels in excess of 30 fc. Ambient lighting that is tailored to the locations of space functions can be more energy efficient than lighting that blankets the space to allow total flexibility. Most private offices can only accommodate one furniture layout, and open plan areas typically have some zones that will always be circulation or filing, and can be treated differently. Work as a team with the owner to reasonably limit the office areas requiring future flexibility. The owner should be made aware that increasingly stringent energy codes may limit the ability of the design team to provide future flexibility in office functions or layouts.

Fixture selection and location

Pendant direct/indirect luminaires effectively distribute light to the work surfaces as well as the ceiling and walls, achieving a good quality of light for office tasks. By locating the source closer to the task, pendant lights may achieve higher light levels for the energy expended. Pendant mounted fixtures require fewer power feeds and labor for installation than ceiling-recessed luminaires. Since the energy codes are based on the use of suspended direct/indirect luminaires in office spaces, it will be difficult to meet the more stringent updated codes with less efficient luminaire types. Maximize ceiling heights in office spaces, to enhance the effectiveness of daylight and the use of pendant direct/indirect luminaires. The ideal distance from the top of a pendant luminaire to the underside of the ceiling is 18", although 12" is still acceptable. Distances less than 9" can still be accommodated with the use of lenses above the lamp to improve the uniformity of the ceiling brightness.

Task Lighting

Office tasks range in size and complexity, as do the visual capabilities of the viewer. While many office tasks can be performed under lower ambient light levels, other office tasks require higher light levels, as do many workers, especially those over 40 or lacking perfect vision. The most efficient way to provide supplemental lighting for office tasks is through the use of a local task light with its own switch. This allows the worker to determine when it is needed, providing some personal control over the work environment – a feature that almost always improves employee satisfaction. An “articulated” task light (one that is adjustable in three planes – see luminaire specifications) is preferred because it offers each user the flexibility to achieve the best angle, intensity and glare control for each specific task.



photo:

Personal control of task lighting reduces energy consumption and increases employee satisfaction.

Undercabinet Lighting

The purpose of an undercabinet light is to reduce shadows produced by overhead bins, cabinets and shelves and to balance luminance ratios. A long, linear luminaire works best for this purpose, but the full output of a T8 fluorescent lamp can result in excessively bright surfaces, creating a luminance imbalance. By specifying undercabinet luminaires that are hard-wired to the low output option of a multi-level ballast, 30%-50% of full light output is provided, in a linear configuration, in a way that permanently reduces the connected load. Further, no new lamp types are added to the project. While undercabinet lights can add supplemental light and are often called “task lights” by furniture manufacturers, they are generally less effective for task lighting than an articulated desk-top light. If they are located in front of workers, they should be fitted with special lenses or sleeves to redirect the light to the sides thereby reducing veiling reflections.

Meeting Rooms

Many meeting rooms are used for a variety of activities, and may need more than one lighting configuration. For most meeting functions, including conferencing, teaching and audio-visual (A/V) presentations, it is important to distribute light to the vertical planes, i.e., participants faces and display walls. Lighting solutions that include some diffuse or indirect distribution of light work well in conference rooms. A totally downlighted meeting room will have an uncomfortable proportion of horizontal illumination to vertical illumination, and should be avoided. On the other hand, local task lighting is not usually practical, so some directional down light component should be included for occasions when participants must perform reading tasks. There are many ways to achieve appropriate results, from indirect coves coupled with wall washers and downlights, to pendant fixtures that distribute light in multiple directions. The bottom of pendant fixtures, even if over a table, should not block the visual contact of two persons standing across the table from each other. In addition, pendants should not conflict with drop-down video projectors or other A/V components, or appear in the view of video cameras.

courtesy: Committee on IESNA Lighting for Videoconferencing and Presentation (LVPP)



Recommended illumination ranges for video-conferencing rooms, in vertical and horizontal footcandles (vfc and hfc).

Videoconferencing Rooms

Videoconferencing lighting should be designed for the comfort of the occupants and for the quality of both sent and received images. Recent research as well as advances in camera technologies have changed some of the standard approaches to video-conference lighting – high light levels and high drama are no longer desirable. Balance and uniformity are the keys. The recently formed Committee on Videoconferencing and Presentations of the Illuminating Engineering Society of North America (IESNA) is in the process of developing both a Design Guide and IESNA Recommended Practice. Publication of the Design Guide is expected in 2005/6.

The primary function in a videoconference space is the achievement of effective conferencing or instruction, not televising, so the lighting should facilitate the latter without sacrificing the former. Cameras today can transmit clear images with much less light than in the past. However, the light needed for videoconferencing is still slightly more intense and more vertical than the lighting found in typical meeting rooms. The designer should strive to meet most of the needs for videoconferencing within a design for general conferencing, with a minimum of additional (and separately controlled) luminaires dedicated only to videoconferencing.

The subjects of the video camera require three kinds of light, strategies that have long been used in the theatre. However, unlike the theatre, this lighting should be accomplished without excessive contrast.

- **Fill light** – ambient light that increases light levels without harsh shadows.
- **Background Light** – a wall wash or light behind the subjects that set them apart from their background.
- **Key light** – Direct light from angles that enhance three-dimensional facial modeling. The optimal location is 45 degrees from the side and 45 from the horizontal, (although this is not always possible).

In rooms with limited space or limited budget, a well-designed indirect lighting system supplemented with directional key lighting can achieve these goals to an acceptable level. In spaces with rear-projection, however, indirect light can obscure the screen and must be separately controlled.

Relatively uniform lighting improves the transmitted image. The closer the range of luminance values are for every surface within the camera's view, the better the camera can transmit a clear image. The typical maximum contrast ratio that a consumer-grade color camera can handle is 1:30. Luminaires that maximize contrast and drama will overload the camera's contrast range – making it send an image that is pixelated. The camera 'guesses' the parts of the image that is outside the contrast range by stealing color from adjacent pixels, resulting in an unnatural appearance and chunky areas of color. Lighting designs that maximize inter-reflections within the room will create a smoother color field and clear, accurate camera images.

Most often, while the subjects are being filmed, they are also viewing one or more TV screens – one with their own image and one showing other participants located at a remote facility. Consequently, the monitors must be shielded from direct light, and glare must be controlled so the subjects are not visually disabled when viewing the monitors.

The design of the space should include the following considerations:

- **Reflectances:** In the case of videoconferencing, the primary surface reflectance is that of human faces. Since humans come in a wide range of skin colors, the illuminance should be sufficient to adequately illuminate the detailed facial expressions of a dark skinned person without washing out detail on a light skinned person. Even wider is the range of clothing, with the maximum contrast being a white shirt and a black suit, far greater than the maximum camera range of 1:30. Since these reflectances cannot easily be altered, the lighting and the background room reflectances should be in the mid-range (30%-50%) so as not to create excessive contrast between the range of subjects in a room and their surrounds. The table is often well within the view of the camera, so should also be about 50% reflective, to allow a little



Be sure that ceiling luminaires are outside of the camera's view in videoconferencing rooms.

courtesy: Jim Benya, Benya Lighting Design/IESNA LVP Committee

diffuse light to bounce off. The table should be absolutely matte in texture. Confirm that the ceiling is out of range of the cameras, as this should have a higher reflectance of 80-90% for indirect lighting. Walls out of camera range should be 70% or higher to promote interreflections.

- **Luminance Ratios:** The luminance ratios should be 3:1 preferred between the foreground and the background, and 2:1 preferred (5:1 max) between the vertical and horizontal surfaces. In addition, there should be more than a 10:1 ratio between the darkest and lightest surfaces that are in view of the camera (and in the control of the designer). Total uniformity (1:1) is not ideal, because it can flatten the appearance of faces and objects. Some contrast (2:1 or higher) is preferred to no contrast. It should be noted that these ratios are ideal goals, but are very difficult to achieve.

ENERGY-EFFICIENCY STRATEGIES

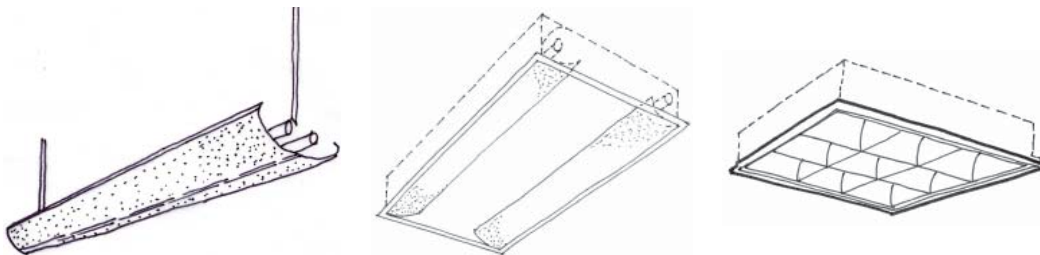
OFFICES-SPECIFIC STRATEGIES

- **Harvest daylight:** Utilize natural light to meet ambient office lighting needs wherever possible. Consider interior or exterior lightshelves to increase the penetration of indirect daylight deeper into the space. Control the electric lighting, heat gain and glare so that overall energy consumption is reduced without adversely affecting quality and comfort. See Technologies Section for continuous dimming controls and photosensor location. A full discussion of this topic is outside the scope of this manual, but is handled in many other excellent publications (see References).
- **Use task – ambient lighting** Whenever possible, provide task lights to supplement daylight and electric illumination in excess of 30 fc. In the case of meeting rooms or video-conferencing, provide separate dimming or switching controls for illumination above 30 fc.
- **Specify light-colored finishes** for room surfaces, partial height partitions and furniture, to reduce light absorption and improve comfort and system efficiency
- **Concentrate luminaires over workstations**, leaving spill light to illuminate adjacent circulation space.
- **Cluster activities** together that share similar lighting needs or similar time schedules.
- **Connect fixtures** together in logical control zones, so that luminaires for workers with similar tasks, or on similar time schedules, or adjacent to similar daylight conditions, can be controlled together, separate from spaces with different uses and conditions.
- **Zone the corridors** and open-plan areas with early-arrivers or after-hours workers in mind.
- **Use occupancy sensors:** Take advantage of intermittent use of workstations, offices and conference areas by ensuring that lights will be automatically turned off when the spaces are unoccupied. See Technologies Section for details of occupancy sensor applications.
- **Avoid unnecessary operation** of the lights by developing an energy-efficient strategy for night lighting and security lighting. See page 17.
- **Improve the task:** Evaluate the current visual tasks in the office and make improvements that will reduce reflected glare (such as improved monitor screens, or replacement of glossy papers with matte) or improvements in task contrast (such as lighter backgrounds and darker print, or larger print size, or the replacement of colored paper with white paper with colored borders). Improving the visibility of the task reduces the need for illumination and improves the quality of the lighting.



Interior lightshelves increase the ambient daylight into the office, and block the sun.

courtesy: Lighting Research Center, RPI,
Delta Publications



The increased stringency of energy codes may not allow the prevalent use of common but less energy-efficient lighting strategies such as totally indirect lighting, semi-indirect pendants and coffers, and some 2x2 luminaires.

ENERGY CODES: WATTS / SQUARE FOOT BUDGETS

FUNCTION	NYS ENERGY CODE		ANSI/ASHRAE/IESNA STD.90.1		NOTES
	2002	+/- 2006	1999/2001	2004	
OFFICE BUILDING (Building Type Method only)	1.3	1.0	1.3	1.0	1
Office-Enclosed	1.5	1.1	1.5	1.1	2,3,4
Office-Open Plan	1.5	1.1	1.3	1.1	2,3,4
Conference Meeting/Multipurpose	1.5	1.3	1.5	1.3	2
Classroom/Lecture/Training	1.3	1.4	1.6	1.4	2
Video-Conferencing					5

1. Multiply this value by the total square footage of the building, to determine the total building interior power allowance, using the Building Type method. 2. Multiply this value by the square footage of the dedicated space function. Sum the results of all the individual spaces in the building to determine the total building interior power allowance using the space-by-space method. The design of an individual space is not required to meet the watt/sf limits, as long as the total building connected load does not exceed the total interior power allowance. 3. NYS Energy Code does not distinguish between open plan and enclosed office types for power density. 4. NYS Energy Code states "Where lighting equipment is specified to be installed to meet requirements of visual display terminals as the primary viewing task, the smaller of the actual wattage of the lighting equipment or 0.35 w/ft² times the area of the space that the lighting equipment is in shall be added to the interior lighting power determined in accordance with this line item. 5. Neither code specifically addresses videoconferencing spaces. Use Conference/Meeting or Classroom/Lecture categories as most appropriate. Luminaires used exclusively for televising may be exempt from some codes.

LIGHTING CONTROLS

The proper design and commissioning of lighting controls is essential for their successful operation, and to achieve the intended energy savings. The following recommendations relate to offices. More detail can be found in the Technologies Sections and References, as well as the night-lighting and zoning discussion in the Design Strategies section. Note that a luminaire can be controlled by several methods, such as daylight dimming, occupancy sensors and time clocks.

Daylighting controls: Daylighting only saves energy if electrical energy can be reduced, hence the term "daylight harvesting." For office applications, provide continuous dimming ballasts in luminaires within the daylighted zone. Control rows of luminaires separately, as the orientation changes, or the distance from the window wall increases. Locate photosensors for either "closed-loop" or "open-loop" sensing strategies. See the Technologies and References Section herein for detailed daylighting control instructions.

Open-plan offices: In addition to any daylighting controls, "automatic shut-off" controls are required by the energy codes. (See Appendix A). In spaces with moderate density of personnel, and intermittent occupancy, ceiling mounted ultrasonic occupancy sensors are a good choice, coupled with local switches to turn the lights on. This is also a good strategy with flexible schedules and employees who work late or on weekends. The control zones should be sufficiently small (150-200sf) to truly save energy when a large open plan office is only partially occupied. In facilities that are occupied on a more rigid schedule, where almost all employees arrive and leave within an hour of each other, and there is more or less constant occupancy, a scheduling control system may be more cost effective. There should be an override capability, or a nightlight setting, so that a worker may occasionally work late or get to an interior zone without operating all the building lighting.

Private Offices: Manual-on, automatic-off occupancy sensors are the best choice of lighting control for most private offices. They save the most energy, give more control to the occupant, save lamp life and still meet the energy code requirement for automatic shutoff and bi-level switching. Unlike automatic-on sensors, they don't automatically turn on when daylight is sufficient, and they don't accidentally turn on when there is activity in the adjacent corridor. Even in an interior office, there is generally enough spill light from the corridor to enter the office and pick up a briefcase, answer a phone, or drop off a file

without turning the lights on. Sensors must be set internally, so that the automatic-off aspect cannot be overridden. See Technologies herein and Specifications on the DDC website.

Task Lighting: In addition to local on/off switches operated by the worker, task lighting can also be controlled with local infra-red occupancy sensors inside each cubicle. Additional personal control can be obtained by specifying task lights with fluorescent or compact fluorescent dimming ballasts at an increased cost. In the case of undercabinet lighting, this will not permanently reduce the connected load or reduce veiling reflections.

Meeting Rooms: Different projects will have different functional needs for their meeting rooms, but almost every one will benefit from two to three distinctive lighting conditions or light levels. All conference rooms should have an occupancy sensor for automatic shutoff. In addition, options for activating the lights range from simple manual-on switches or wall box dimmers, to daylight harvesting, to multiple scene pre-set systems.

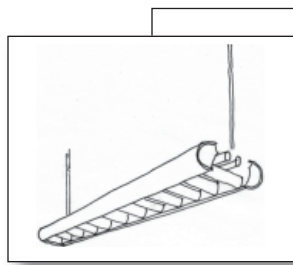
Videoconferencing Rooms: Any luminaires dedicated to videoconferencing functions should be controlled separately, and be clearly labeled or controlled by authorized staff. In addition, the direct and indirect components of luminaries should be controlled separately. Depending on the degree of complexity and the experience level of the room users, controls can range from simple manual switches and dimmers, to multiple scene pre-set systems. Like all other meeting room lighting, videoconferencing luminaires must turn off automatically when the room is not occupied.

OTHER CONSIDERATIONS

Emergency Lighting: Special care should be taken to ensure all exits and paths of egress are clearly visible above partial height partitions

Electrical Code Issues: Undercabinet lighting should be 120 volt and fitted with a local switch.

SAMPLE LUMINAIRE SCHEDULE FOR OFFICES

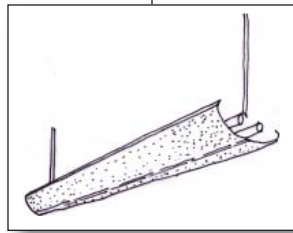


PENDANT FLUORESCENT DIRECT/INDIRECT TWO-LAMP

Location: Offices

Lamps: (2) 28-32W, High Performance T8, 835 – 841 color

Description: Stem-mounted fluorescent luminaire in lengths of 8'. White baked enamel finish. Minimum 30% uplight. Minimum 40% downlight. Minimum fixture efficiency 80%. Cross baffles 1-3/4" deep x 2" on center, semi-specular low-iridescent or white painted. Total 4-lamps per 8' long fixture. Multiple-lamp electronic parallel instant-start ballast. Also available in 12' lengths or continuous rows. Mount a minimum of 7' above finished floor. Minimum 12" stem, 18" or more preferred. Stem length varies with ceiling height.

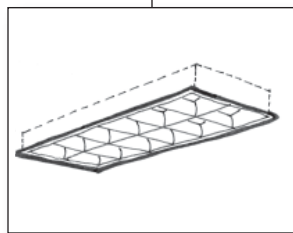


PENDANT FLUORESCENT SEMI-INDIRECT

Location: Offices

Lamps: (2) 28-32W, High Performance T8, 835 – 841 color

Description: Stem-mounted fluorescent luminaire in lengths of 8'. White baked enamel finish. Minimum 10% downlight. Total 4-lamps per 8' long fixture. Multiple-lamp electronic parallel instant-start ballast. Minimum 80% fixture efficiency. Mount a minimum of 7' above finished floor. Minimum 12" stem, 18" or more preferred, unless specifically designed for low ceilings. Stem length varies with ceiling height.

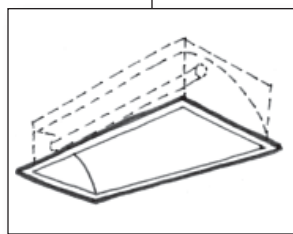


RECESSED 2'X4' TWO-LAMP PARABOLIC TROFFER

Location: Offices, private and public

Lamps: (2) 28-32W, High Performance T8, 835 – 841 color

Description: Recessed fluorescent troffer 2' by 4' with white baked enamel interior, semi-specular low-iridescent parabolic louvers with 12 cells. Minimum 2-3/4" deep louvers. Use white painted louvers in private offices. Two-lamp electronic instant-start ballast, nominal 55 input watts. 73% minimum fixture efficiency.

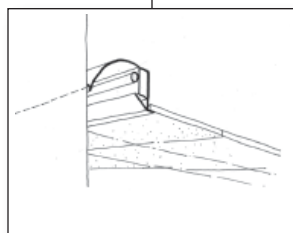


VIDEOCONFERENCE WALL WASH

Location: Video-Conference and meeting rooms, open plan offices

Lamps: (1) 40W CFL, 830 – 835 color

Description: Nominal 1'x2' recessed fluorescent wall wash located 2' to 4' away from wall being washed. Semi-specular or white painted reflector. Spaced 4' to 10' on center depending on distance from wall, ceiling height, and desired light levels. Electronic instant-start ballast.

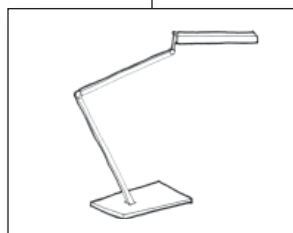


FLUORESCENT CONTINUOUS WALL WASH

Location: Open plan office walls, video-conferencing and meeting room walls

Lamps: (1) 28-32W, High Performance T8, 835 – 841 color

Description: Recessed wallwasher with semi-specular aluminum reflector. Nominal 55 input watts per (2) lamps, 67% minimum efficiency.



COMPACT FLUORESCENT TASK LIGHT

Location: Desktop

Lamps: (1) 13W to 18W, CFL, 830- 835 color

Description: Desktop compact fluorescent. Integral 120v ballast. Articulated arms allow adjustment in three planes. A maximum range of 24" above the desktop. Weighted base, grommet-mount or clamp-mounted to desktop.

