



Energy Effective Lighting Checklist

Energy Effective Lighting accomplishes the dual objectives of being efficient while meeting the needs of the space occupants. The USDOE Federal Energy Management Program is committed to saving energy and improving workspaces for Federal workers at the same time. This checklist will help you avert common mistakes and improve your Federal relighting project.

PROJECT NAME _____

SPACE NAME _____

FORM COMPLETED BY _____

DATE _____ PAGE _____

SPACE DESCRIPTION, PLANNED USAGE AND WORKER TASKS _____

CURRENT LIGHTING SYSTEM AND CONTROLS _____

OPERATING HOURS _____

MAINTENANCE _____

Using this form: See the back of this form for instructions and information about each of these characteristics. Consideration of the issues below will allow the project team to implement the maximum energy savings feasible without compromising the comfort and effectiveness of the occupants.

NOTE: In all cases refer to the *IESNA Lighting Handbook 9th Edition, 2000* to find the lighting levels for your space and for additional design guidance.

1 Surface Brightness

WALLS (use one or more of the following)

- Wallwashing systems
- Parabolics within 3 feet of walls
- Lensed troffers within 4 feet of walls

CEILING (if applicable)

- Direct/indirect or indirect systems

ENVIRONMENTAL CONSIDERATIONS

- Light colored matte surfaces
- walls ceiling partitions

2 Overhead Glare

OVER WORKSTATION AREAS

- Open-cell parabolic fixtures have T8 lamps
- Open-cell parabolic fixtures have semi-specular louvers and white reflectors
- CF downlights have cross baffles

3 VDT Glare

FURNITURE PLAN REVIEW

- VDT screens oriented away from windows

REFLECTED GLARE FROM LENSED FIXTURES

- Bright screen background with dark text
- VDT screen covers if necessary

4 Task Lighting

TO SUPPLEMENT AMBIENT LIGHT LEVELS

- Fluorescent task lights with moveable arm

IN OFFICE FURNITURE SYSTEMS

- Under-cabinet task lighting

INDUSTRIAL SPACES

- Task lighting for visually difficult tasks

5 Controls

ALL SPACES

- Control strategy is appropriate for space usage
- Maximum energy savings potential is achieved
- Controls are compatible with lamps and ballasts
- Occupancy sensors are correctly located
- Clear commissioning guidelines
- Maintenance manual and staff training

HIGH INTENSITY DISCHARGE (HID) SOURCES

- Use bi-level ballasts with occupancy sensors

DAYLIGHTING CONTROLS

(see section 6)

6 Daylighting

WINDOWS

- Operable window shades or blinds
- Wallwashing fixtures or sconces in-between windows to avoid excessive contrast

DAYLIGHTING CONTROLS

- In task areas: continuous dimming with photocells
- In non-task areas: step switching with photocells

7 Lamp color and CRI

FLUORESCENT SOURCES

- Lamp colors match where possible
- Color Rendering Index of 70 or higher

HID SOURCES

- Color appearance appropriate for tasks
- CRI appropriate for tasks

8 Flicker / Ballasts

FLUORESCENT SOURCES

- Fixtures are wired in tandem
- Electronic ballasts are compatible with:
 - lamps
 - controls
 - other technologies

HID SOURCES

- 3-phase system with alternating luminaires

✓ Checklist Instructions:

Use this checklist when developing your design and reviewing drawings for approval. Duplicate the checklist so that you have one for each of your project areas, and then review the project plans noting your acceptance or rejection of the plans considering each of the issues. If the plans need improvement, work with your project team to make the necessary changes prior to issuing approval.

- 1 Surface Brightness** • Walls and ceiling should have light colored matte surfaces wherever possible to save energy and improve lighting quality. Go the extra mile to work with others as necessary to get interiors refinished with light colors throughout. Avoid the cave effect by lighting walls and/or ceilings. Use wallwashing fixtures to create brightness at the walls. If wallwashing is not possible, then be sure to locate recessed fixtures close to the walls. Typically, parabolic fixtures should be within 3 feet of the wall and should be fitted with semi-specular louvers in order to minimize scallops. White louvers may be used in hallways to increase wall brightness. Lensed fixtures should be within 4 feet of the wall. Consider direct/indirect or indirect lighting to create high visual comfort and a perception of brightness.
- 2 Overhead Glare** • Direct glare from overly bright lamps and reflectors can cause significant visual discomfort. For downlights with compact fluorescent lamps, use cross baffles to provide shielding from the glare. In parabolic fixtures, use T8 lamps. T5's are best used in indirect or wallwashing fixtures so lamps are not exposed directly to the eye. For parabolic fixtures use semi-specular louvers and white reflectors. Specular reflectors are only acceptable in lensed or indirect fixtures.
- 3 VDT Glare** • Modern computers have greatly improved monitors which has helped to reduce VDT glare from lensed fixtures. If lensed fixtures are unavoidable, instruct VDT users to select a bright background and dark text. If VDT screens are old or of poor quality, obtain diffuse screen covers. Avoid daylight glare by reviewing your furniture plan and orienting VDT screens away from windows.
- 4 Task Lighting** • If occupant controlled task lights are used to supplement general lighting levels it may be possible to have the ambient light levels slightly reduced. Flexible fluorescent task lights with a moveable arm are the best for visual task performance. Linear under-cabinet task lights are important to reduce shadows and contrast in furniture systems. Industrial spaces with visually difficult tasks may need task lighting to achieve IESNA recommended lighting levels.
- 5 Controls** • One of the best ways to save lighting energy is with the use of controls. Use them to reduce hours of operation and to adjust light levels according to tasks. Location and commissioning of occupancy sensors are critical to their correct operation. Careful selection and calibration of controls is needed to ensure occupant acceptance with optimum performance. Check with manufacturers to ensure compatibility of control system with lamps and ballast. Use bi-level ballasts with HID lamps in combination with occupancy sensors. Have clear commissioning guidelines and a maintenance manual.
- 6 Daylighting** • Daylight is a great way to save energy and please occupants. The best daylighting provides gentle, uniform illumination throughout a space. Skylights (including retrofits) can work well in single story spaces. Be sure to provide window shades or blinds so occupants can control the intensity of the daylight. Bright windows can make adjacent walls look dark. To avoid excessive contrast, light the walls in between windows with wallwashing fixtures or sconces. To ensure energy savings, install continuous dimming controls with photocell sensors in daylit office or task areas. Step switching with photocells is very effective in non-task areas such as lobbies, corridors, and warehouse areas. Be sure that the lighting circuits on photocontrols are consistent with daylight illumination patterns. Pay extra attention to the commissioning of controls to ensure proper operation.
- 7 Lamp Color and CRI** • In office environments, lamp color (Kelvin temperature) should be similar where possible. The CRI (Color Rendering Index) should be 70 or above. In industrial environments color is usually less critical, unless color-oriented tasks are being performed. For color appearance, metal halide (white light) is preferred over high pressure sodium (HPS, yellow light). Be aware that most colors are difficult to distinguish under HPS.
- 8 Flicker / Ballasts** • Electronic ballasts reduce flicker, which has been shown to improve visual performance while saving energy. When choosing ballasts evaluate compatibility with lamps, controls and other technologies. When using 1 or 2-lamp fixtures, wire them in tandem to reduce ballast requirements. In industrial spaces with HID lamps use a 3-phase electric distribution system and put adjacent luminaires on alternate phases. This will reduce the possibility of stroboscopic effects from flicker, which is a potential safety concern.