EL3 Decorative Lighting (Climate Zones: all)

Decorative lighting (wall sconces and pendant fixtures) can add visual interest and focus to the space, especially at the sales transaction area. These fixtures are included in the tabulation of the base LPD, and consideration should be given to energy-efficient solutions, including compact fluorescent, ceramic metal halide (CMH), and light-emitting diode (LED) lighting.

EL4 Casework Lighting (Climate Zones: all)

Casework lighting is not included in the tabulation of the LPD as long as it is integrated into the casework and is installed by the casework manufacturer. Lighting for casework must remain sensitive to the energy goals of the space. Strong consideration should be given to energy-efficient or low-energy solutions, including linear fluorescent, fiber optic, and linear LED sources.

EL5 Reflectance (Climate Zones: all)

Higher surface reflectance on ceilings and walls may increase store visibility through the front windows and will increase lighting levels and energy performance within the space. However, higher reflectance may not conform to a retailer's specific image. Energy savings outlined in this Guide are based on reflectance of 80-50-20 (ceiling-wall-floor). If the reflectance is lower, then additional attention to the ambient lighting energy requirements may be necessary. Avoid direct lighting of specular surfaces (mirrors, glass, polished metals, or polished stone) in customer areas, if possible; otherwise, consider carefully the reflected light component and its effect on the customer.

An 80%+ ceiling and 70%+ wall reflectance is preferred in daylight zones (see DL2). Reflectance values are available from paint and fabric manufacturers. Reflectance should be verified by the QA provider.

EL6 Color Rendering Index (Climate Zones: all)

The color rendering index (CRI) is a scale measurement identifying a lamp's ability, generally, to adequately reveal color characteristics. The scale maximizes at 100, with 100 indicating the best color-rendering capability. It is recommended that lamps specified for the ambient and accent lighting of retail merchandise have a CRI of 80 or greater to allow the consumer to effectively examine the color component of a product.

EL7 Linear Fluorescent Lamps and Ballasts (Climate Zones: all)

To achieve the LPD recommendations in Chapter 3, high-performance T-8 lamps and high-performance electronic ballasts are used for general lighting. The use of standard T-8 and energy-saving T-8 lamps may also be considered but may result in lower ambient light levels or an increased number of fixtures or lamps to achieve recommended light levels. Standard T-8 and energy-saving T-8 lamps also are available with lower CRI values than recommended in EL6, which may compromise the lighting solution.

High-performance T-8 lamps are defined, for the purpose of this Guide, as having a lamp efficacy of 90+ nominal lumens per watt, based on mean lumens divided by the cataloged lamp input watts. Mean lumens are published in the lamp catalogs as the degraded lumen output occurring at 40% of the lamp's rated life. High-performance T-8s also are defined as having a CRI of 81 or higher and 94% lumen maintenance. The higher performance is achieved either by increasing the output (3100 lumens) while keeping the same 32 W input as standard T-8s or by reducing the wattage while keeping the light output similar to standard T-8s (e.g., 2750 lumens for 28 W or 2850 lumens for 30 W).

High-performance electronic ballasts are defined, for the purpose of this Guide, as two-lamp ballasts using 55 W or less with a ballast factor (BF) of 0.87 or greater. One-lamp, three-lamp and four-lamp ballasts may be used but should have the same or better

efficiency as the two-lamp ballast. Dimming ballasts do not need to meet this requirement. The higher output 3100 lumen lamps are visibly brighter than standard T-8s. Using ballasts with a BF of 0.77 may provide more comfortable lamp brightness, in direct luminaires where the lamp is visible, without sacrificing efficiency.

- *Program start* ballasts are recommended on frequently switched lamps (switched on and off more than five times a day) because they greatly extend lamp life over frequently switched instant start ballasts.
- *Instant start* T-8 ballasts typically provide greater energy savings and are the least costly option; also, the parallel operation allows one lamp to operate even if the other burns out. However, instant start ballasts may reduce lamp life, especially when controlled by occupancy sensors or daylight switching systems.
- T-5 ballasts should always be program start.

EL8 Fluorescent T-5 Sources (Climate Zones: all)

To achieve the LPD recommendations in Chapter 3, T-5HO and T-5 lamps may be part of the solution. They have initial lumens per watt that compare favorably to the high-performance T-8s. In addition to energy, T-5s use fewer natural resources (glass, metal, phosphors) than comparable lumen output T-8 systems. However, when evaluating the lamp and ballast as a system (at the mean lumens of the lamps), high-performance T-8 systems perform better than T-5HO systems. In addition, T-5s have higher surface brightness and should not be used in open-bottom fixtures. It may be possible to achieve the base LPD while maintaining the desired light levels using T-5 fixtures as the primary light source if careful selection of the fixture reduces direct glare from the lamp.

EL9 Compact Fluorescent (Climate Zones: all)

To achieve the LPD recommendations in Chapter 3, compact fluorescent lamps may be used for general ambient lighting and wall-washing. *Compact fluorescent lamps* are defined, for the purpose of this Guide, as having a lamp efficacy of 55+ nominal lumens per watt, based on mean lumens divided by the cataloged lamp input watts, and a CRI of 82 or greater. Use electronic ballasts on all compact fluorescent lighting.

Compact fluorescent lighting may be used for general store lighting but is less efficient than linear fluorescent and is much more expensive to dim. Compact fluorescent lighting should not be used for accent lighting.

EL10 Ceramic Metal Halide (Climate Zones: all)

To achieve the LPD recommendations in Chapter 3, ceramic metal halide (CMH) lamps may be used for general ambient, accent lighting, and wall-washing. *CMH lamps* are defined, for the purpose of this Guide, as having a lamp efficacy of 50+ nominal mean lumens per watt and a CRI of 81 or greater. Use electronic ballasts on all CMH lighting.

EL11 Halogen IR (Climate Zones: all)

To achieve the LPD recommendations in Chapter 3, halogen IR lamps may be used for accent lighting. *Halogen IR lamps* are defined, for the purpose of this Guide, as having a lamp efficacy of 20+ lumens per watt and using thin films to help redirect thermal energy through the filament, increasing light output.

CMH lamps can be up to 250% more efficient and have three to five times greater lamp life than halogen sources and are recommended over halogen IR lamps. However, there will likely be instances where the use of CMH lamps will not be practical as a result of cost considerations or because the size or ambient condition of the space will not support the intensity of CMH lamps. In these scenarios it may be necessary to consider the use of halogen lamps in either low voltage or line voltage forms. If halogen IR lamps are used, then it is recommended that the lamp envelopes be limited to MR16 bulb sizes. In all cases, the lamp wattage would be comparable to the lower wattage