



Replacement consideration of T12 with T8 fluorescent lamps. Comparison ... efficiency, life, color and availability.

Description of problem need or value:

Over the past few years, much discussion has taken place regarding the elimination of T12 fluorescent lamps in an effort to replace them with the more efficient T8 fluorescent lamps. In addition to the T8 lamp being more efficient, they use less glass, phosphor and reduce mercury waste.

Currently the Department of Energy has a 2012 proposed mandate which is calling for the elimination of three high usage T12 lamp platforms.

- 8' T12 HO lamp ... 100w (this lamp is currently used by the sign industry)
- 4' T12 Standard lamp ... 40w
- 8' T12 Slimline series ... 75w, one pin per side

Current list of lamp lengths used, GE lamp catalog.

Secondly, a goal to provide our customers with improved lamp life, as well as a reduction in maintenance costs. Current T12 fluorescent lamps typically offer a 12,000 hour rated life. The definition of rated life for fluorescent lamps is the point where 50% of the lamps will have failed and produce no light.

The signage industry primarily uses T12 high output lamps (HOs) for the illumination of Pylon, Monument and larger Wall Signs. When looking for suitable replacement lamps, high output T8 lamps need to be considered. To the right is a short list of T12 signage lamps provided by GE.

| Lamp Number | Length | Wattage | Life (hr) | CCT | CRI |
|--------------|--------|---------|-----------|-------|-----|
| F24T12/D/HO | 24" | 35 | 9000 | 6500K | 74 |
| F30T12/CW/HO | 30" | 40 | 9000 | 4100K | 60 |
| F36T12/D/HO | 36" | 45 | 9000 | 6500K | 75 |
| F42T12/D/HO | 42" | 55 | 9000 | 6500K | 74 |
| F48T12/D/HO | 48" | 60 | 12000 | 6500K | 75 |
| F60T12/D/HO | 60" | 75 | 12000 | 6500K | 75 |
| F64T12/D/HO | 64" | 80 | 12000 | 6500K | 75 |
| F72T12/D/HO | 72" | 85 | 12000 | 6500K | 75 |
| F84T12/D/HO | 84" | 100 | 12000 | 6500K | 75 |
| F96T12/DX/HO | 96" | 110 | 12000 | 6500K | 84 |

Overview of the proposed project:

1. Investigate the viability of T12 replacements with T8 lamps. Identify and compare lamps wattage, dimensional characteristics, color temperature (CCT), lamp socket type, cost and T8 lamp availability.
2. Determine realized value when converting to the T8 fluorescent lamp platform.

Key providers of fluorescent lamps:

- Philips • GE • Osram Sylvania
- Voltarc, specialty length lamps
- Masonlite, specialty T12 & T8 HO lamps with lamp life claims of 50,000 hours.



Simple Comparative Evaluation

| Lamp | Length | Wattage | Efficacy | CCT | CRI | Lumens | Life |
|-------------|--------|---------|----------|-------|-----|--------|-------|
| F32T8 | 48" | 32 w | 80 lm/w | 6500K | 78 | 2565 | 24000 |
| F40T12 | 48" | 40 w | 70 lm/w | 6500K | 75 | 2775 | 20000 |
| F48T12 (HO) | 48" | 60 w | 50 lm/w | 6500K | 75 | 2960 | 12000 |

Findings:

- The required range of tube length availability is very limited and varies greatly from vendor to vendor.
- The actual length of the replacing tube may vary by an inch or two.
- Typical CCT for T12 HO lamps are 6500K. The T8 lamps currently offered are typically 5000K; there are some that are 4100K and few available in the signage 6500K color temperature.
- T8 lamp life is typical 20,000 to 28,000 hours.
- T8 lamps are almost always powered by electronic ballasts.
- To achieve good uniformity in a T12 lamp system, lamps are placed into a 12" deep cabinet and are placed at 12" centers. To accomplish similar uniformity using T8 lamps, the cabinet can be shallower in depth and require center to center placement to be at 9".
- For retrofit applications, the uniformity of the sign face will be compromised.
- T8 lamps have greatly improved color rendering index (CRI.) However, CRI is important in general illumination but isn't of high importance in the signage arena, unless full color graphics are being considered.

Conclusion:

- T12 system using magnet ballasts can improve their efficiency by changing to electronic ballast.
- Lamp availability is poor and large projects having multiple signs and various usages of differently sized lamps will pose many problems.
- Efficiency improvements as much as 40% when converting to T8 lamps in combination with an electronic ballast.
- Lamp life improvement is doubled.
- Potential retrofit applications will have to be considered on a one by one basis. Face brightness and uniformity must be reviewed.
- When new product development utilizes T8 lamps, a hybrid solution should be considered: Systems requiring T8 technology can be accomplished by using a mixture of 2' and 4' lamps. An increase in the number of ballast will be necessary due to the increase in lamp count. Both 2' and 4' lamps are available in the high output platform. This method could be used with sites that require multiple signs and signs that require various lamp lengths.