

2.12.2 Size

Recently, a system was developed that concentrated radio frequency waves into a dielectric waveguide made of ceramic, which energized light-emitting plasma in a bulb positioned inside. This system, for the first time, permitted an extremely compact yet bright electrodeless lamp.

2.12.3 Heat and Power

The use of a high-dielectric waveguide allowed the sustaining of plasmas at much lower powers, down to 100 W in some instances. It also allowed the use of conventional gas-discharge lamp fill materials which removed the need to spin the bulb. The only issue with the ceramic waveguide was that much of the light generated by the plasma was trapped inside the opaque ceramic waveguide. This was until the optically clear quartz waveguide was invented, which appears to resolve this issue.

2.12.4 High-Efficiency Plasma (HEP)

High-efficiency plasma lighting is the class of plasma lamps that have reached system efficiencies of 90 lumens, until now. Lamps in this class are potentially one of the most energy-efficient light sources for outdoor, commercial and industrial lighting. This is due not only to their high system efficiency but also to the small light source they present enabling very high luminaire efficacy.

The 'system efficiency' for a High Efficiency Plasma lamp is given by the last three variables, that is, it excludes the luminaire efficacy. Though plasma lamps do not have ballast, they have an RF power supply that fulfils the equivalent function. In electrodeless lamps, the inclusion of the electrical losses, or 'ballast factor', in lumens per watt claimed can be particularly significant as conversion of electrical power to radio frequency (RF) power can be a highly inefficient process, depending on the type used.

Many modern plasma lamps have very small light sources, far smaller than HID bulbs or fluorescent tubes, leading to much higher luminaire efficacies also. High intensity discharge lamps have typical luminaire efficacies of 55%, and fluorescent lamps of 70%. Plasma lamps typically have luminaire efficacies they can reach 90%.

2.12.5 System Efficiency

System efficiency of over 100 lumens per Watt is claimed with a usable system life of up to 40,000 hours and low lumen depreciation during life. The system is scalable from 70 watts up to 5 kW; the lamp can be produced in mercury free versions and apparently can be easily recycled at the end of life.