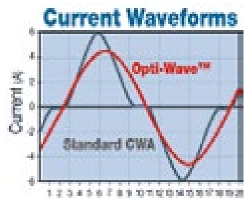
Venture's Technical Information:
BALLAST PERFORMANCE
The following performance factors affect ballast specifications:

Constant Wattage Autotransformer (CWA)



The current crest factor is the ratio of the peak lamp current to the root-mean-square (rms) value of the current. High current crest factors are associated with high lumen depreciation of HID lamps. Lamp specifications set upper limits for CCF. A typical range of current crest factors for lag, HX and regulated lag ballasts is 1.4-1.5. For CWA ballasts CCF ranges from 1.6 to 1.8. Electronic ballasts can can be as low as 1.0.

Open Circuit Voltage (OCV)

The voltage across the output terminals of ballast with no load connected is the OCV. Lamp OCV requirements differ for the various ballast circuit types.

Sustaining Voltage (Vss)

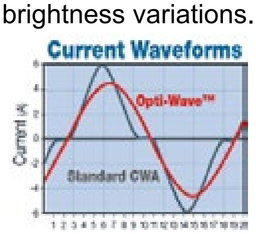
Vss is the instantaneous voltage across the lamp when lamp current crosses zero. If the voltage is not sufficient, the lamp will not ignite on the next half cycle of current, and drop out. Adequate Vss is needed from every ballast type, but is particularly important for CWA ballasts. However, it is difficult to measure without sophisticated lab equipment. ANSI standard values are determined for the condition just following the development of a full arc discharge. This is when the current characteristics of CWA ballasts are most likely to cause lamp drop out. ANSI does not specify Vss for lag or HX circuits.

AC Line Regulation

Line regulation is the percent change in lamp wattage per percent change of supply voltage. In the US, Canada and most of Europe, supply voltage can be unreliable (such as a brownout or blackout); however, normal variability is small. An exception might be an industrial application where large electrical loads switching on and off affect lighting circuits. Where supply voltages are steady, HX ballasts provide the best performance at a cost comparable to CWA ballasts. When there is a serious line voltage regulation issue, regulated lag or electronic ballasts are preferred. Lag ballasts dominate HID lighting in Europe, where supply voltage is regulated to ±5%. In North America, lighting circuits wired according to the National Electric Code typically stay within the ±5%.

Lamp Regulation

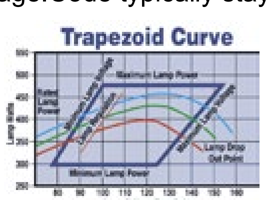
By definition, lamp voltage regulation is the change in lamp wattage divided by the corresponding change in lamp voltage initially and during life. The ANSI lamp voltage range allowed for a new (100-hour) lamp is typically ±12%. Modern lamp manufacturing processes typically yield metal halide lamps with a much tighter voltage range. However, metal halide lamps typically rise between 1 and 2 V per 1000 hours. At end of life, the metal halide lamp voltage can be more than 25% higher than at 100 hours. With modern AC power lines regulated to within 5%, it is more important to have tight regulation of lamp power with respect to lamp voltage variation than supply voltage regulation. This results in the least lamp-to-lamp color and brightness variations.



The operating characteristics of any ballast can be mapped in a graph of lamp wattage vs. lamp voltage. For lag and HX ballasts, the graph is a parabola where the peak wattage typically occurs when the lamp voltage is about 60% of the OCV. The curve stops when the lamp voltage reaches about 80% of the OCV. At this point, the lamp stops operating. The graph for most CWA or constant current ballasts is relatively straight line. HPS lamps need operating characteristics similar to resistive and lag ballasts, a constant current characteristic is unstable.

High pressure sodium lamp "Trapezoids"

The HPS trapezoid is bounded by upper and lower wattage limits. At the low watt limit, the lumens are low; at the high watt limit, life is short. The left side of the trapezoid represents the lowest voltage lamp a user could encounter. The right side represents the highest voltage lamp a user should expect to operate. The sides of the trapezoid slope because increasing power increases the voltage of HPS lamps. Acceptable ballasts chart a path that passes through both sides within the min. and max. wattage limits. The three ballast curves in the graph above illustrate the effect of low, nominal, and high line voltage.Code typically stay within the ±5%.



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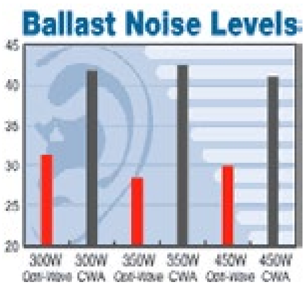
Minimum ambient temperature for starting

ANSI and IEC write lamp specifications so that lamps will start at -30°C (-22°F) to -40°C (-40°F). Mercury vapor and metal halide lamps will start at lower voltages at room temperature. As temperatures drops below -40°C, not much happens until Xe (HPS) or Ar (metal halide and mercury vapor) starting gases condense to the liquid state. At these temperatures (-160°C/-310°F and lower) we are not aware of lighting opportunities.

Ballast Noise

Magnetic ballasts generate audible noise as a result of magnetically induced mechanical stress. This may be amplified or attenuated depending on fixture design, mounting methods and room acoustics. There are presently no noise standards for HID ballasts. Generally, Single Voltage Hybrid and HX ballasts are noticeably quieter (greater than 10 dB) than CWA, CWI or regulated lag ballasts.



Venture Lighting International
6675 Parkland Blvd.
Suite 100
Solon, Ohio 44139
Phone: 800-451-2606

U.S. Northeast: neorders@venturelighting.com
U.S. Southeast: seorders@venturelighting.com
U.S. Central: centralorders@venturelighting.com
U.S. Western: westorders@venturelighting.com