SPECTRAL OUTPUT STABILITY PERFORMANCE DATA

To demonstrate the output stability of Fusion's microwave-powered lamp systems as they might operate under typical factory environments, Fusion performed a series of tests that show conclusively that Fusion microwave lamps have the stability that meets the demanding requirements of today's industrial processes.

These tests included the following:

- Stability of spectral output versus bulb age.
- Stability of spectral output versus AC line voltage.
- Stability of spectral output versus cooling air pressure.
- Stability of spectral output versus magnetron age.
- Linearity of spectral output as the lamp power level is varied.

Statistical measures of variations were performed using a two-sample t-test with a 95% confidence interval.

The results of these tests, shown here in condensed form, demonstrate conclusively the stability of Fusion's lamps – independent of bulb type, operating condition, or age of the lamp.

Therefore, Fusion's customers can be assured that a Fusion lamp system, when operated within the specified operating conditions, will have stable output up to and beyond the rated life of the lamp components, and under the most demanding factory environments.

Fusion continues to run the output stability versus bulb age test and will post updated results on our website: www.fusionuv.com

For more information or for more detailed data, please contact Fusion UV Systems or your sales representative.

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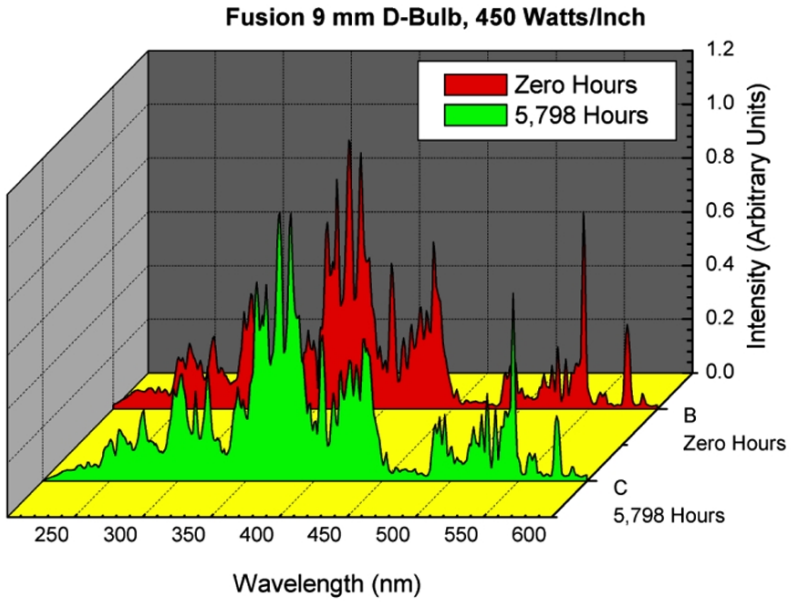
BULB STABILITY

In order to demonstrate the stability of Fusion's bulbs as they accumulate hours of use, the following test was performed on each of the bulbs that are commonly used by Fusion's customers: approximately every 100 hours of lamp "on" time, the spectral output of the lamp was measured with a laboratory spectrometer. This data was then compared to a bulb with zero hours of operating time. The results, shown here for a 9 mm D-bulb running at 450 watts per inch at zero hours and at 5,798 hours, show that the spectral output of the bulb does not vary with time. *Statistically, there is no change in output as the bulb ages.*



What does this stability mean to the customer? It means that customers who demand the greatest stability in output versus operating hours can be assured that Fusion's standard bulbs will supply that much needed stability.

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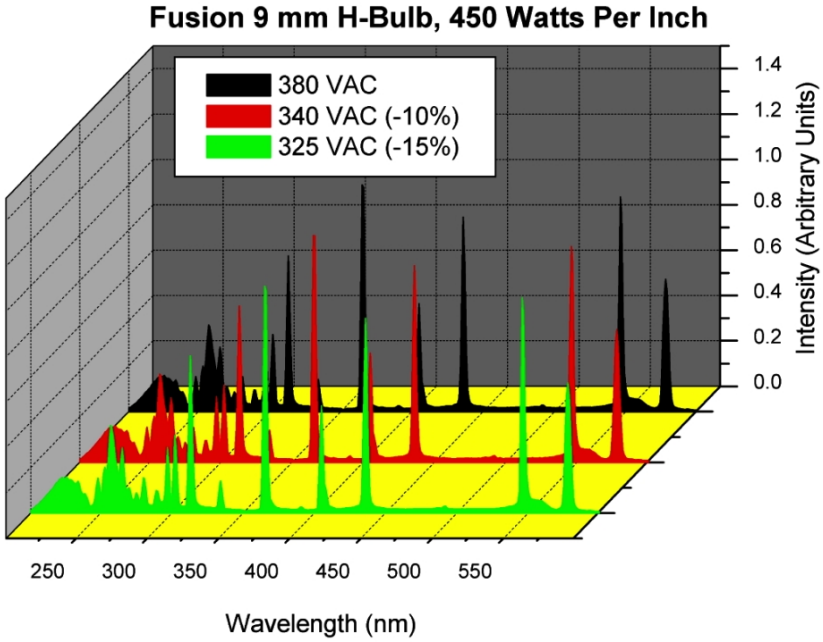
POWER SUPPLY STABILITY

To demonstrate the stability of Fusion's lamps as the factory input line voltage varies, the following test was performed: a 9 mm H-bulb was run at 450 watts per inch using Fusion's VPS Variable Power Supply (VPS6). The line voltage feeding the power supply was set at values at and below the recommend lower limit. At each line voltage setting the spectral output of the lamp was measured. The results of that test, shown here, demonstrate conclusively that there is no statistically significant variation in output as the line voltage is varied.



The benefit to the customer is clear: as the line voltage in the factory changes, the lamp output will be unchanged.

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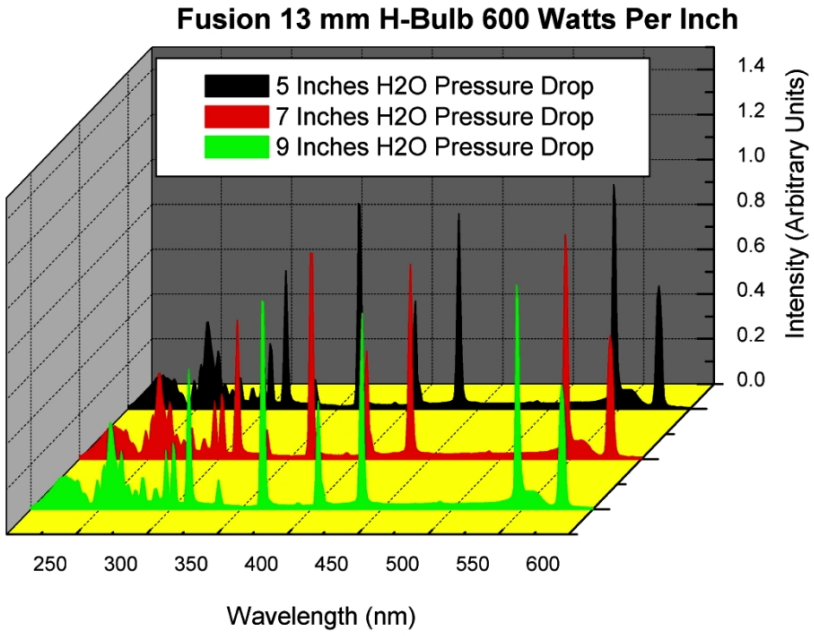
STABILITY OF COOLING SYSTEM

To demonstrate the stability of Fusion's lamps as the factory cooling air pressure varies, the following test was performed: a 13 mm H-bulb was run at 600 watts per inch with a VPS6 while the cooling air pressure was varied over the recommended range. At each pressure level the spectral output of the lamp was measured. The results of that test, shown here, demonstrate conclusively that there is no statistically significant variation in output as the factory cooling air system varies.



The benefit to the customer is clear: as the cooling air system in the factory varies, the lamp output will be unchanged.

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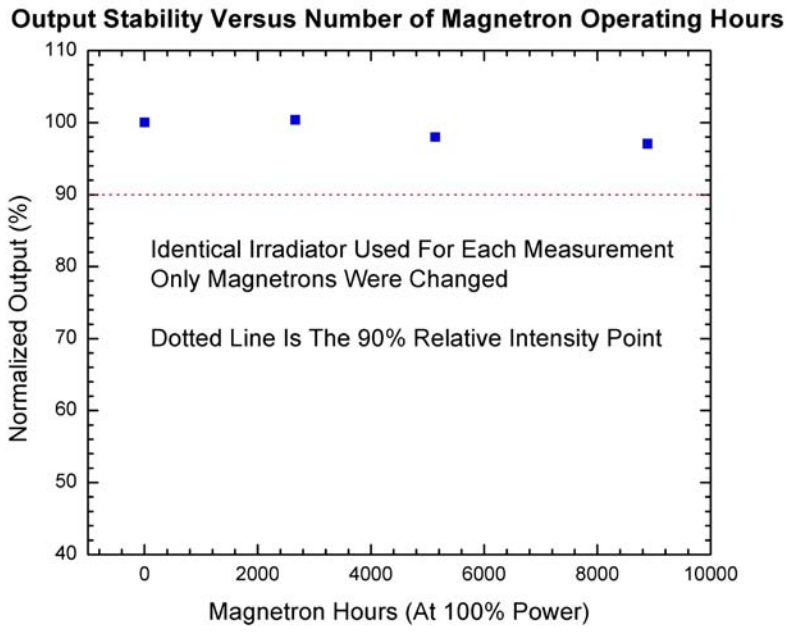
STABILITY OF MAGNETRONS

To demonstrate the stability of Fusion's lamp output as the magnetrons age, Fusion performed the following test: a new 13 mm H-bulb was run at 600 Watts per inch in an I600 irradiator (which contains two 3 kW magnetrons). Magnetrons with varying numbers of hours of operation (all at 100% power) were installed and spectral output was measured. The results of that test, shown here, demonstrates that even after 8,000 hours of operation, the output of the magnetron has not decreased significantly and remains well above the 90% of "zero hour" output level (represented by the dotted line in the graph).



The benefit to the customer is clear: as the magnetron ages, the lamp output will not vary significantly.

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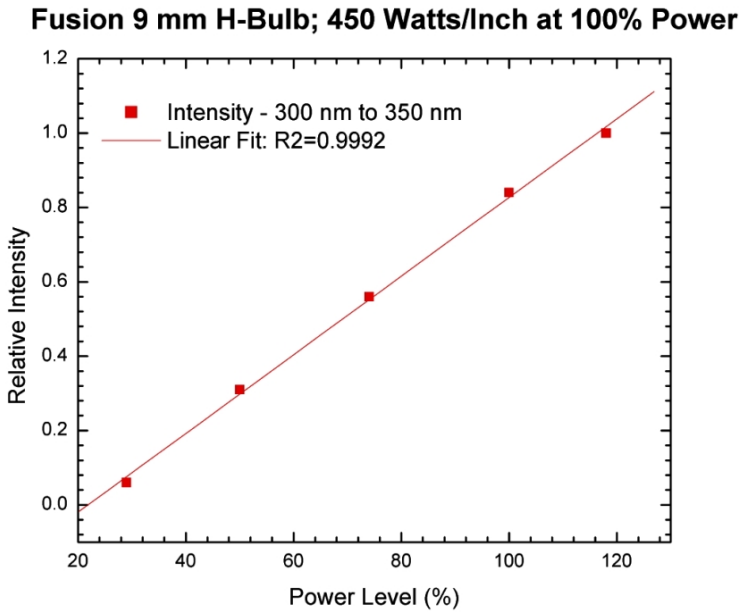
LINEARITY VERSUS POWER LEVEL

Customers want to know that the output of the lamp behaves linearly as the power level is changed. To demonstrate this, the following test was performed: a 9 mm H-bulb was run at various VPS power levels. The radiometric output of the lamp was measured at each power level. The results of that test, shown here for the 300 nm to 350 nm wavelength range, demonstrate conclusively the linearity of lamp output as the power level changes.



The benefit to the customer is clear: no matter what power level the lamp (a mercury with H bulb) is run at, the output is predictable.

COMPARATIVE DATA

For a report that documents the spectral output from arc lamps, please see *UV Lamp Performance Over Time*, Stephen B. Siegel, Peter Mandellos, and David Luster; UV Process Supply, Inc., Illinois, USA; http://www.uvcuring.com

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