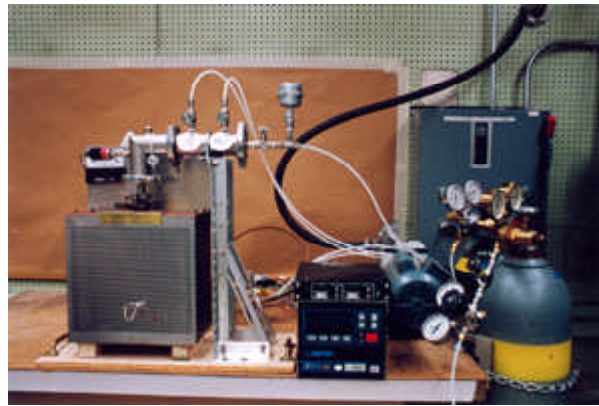


Atomic Oxygen Lamp Cleaning Facility

Fabricated and Tested

NASA Lewis Research Center's Atomic Oxygen Lamp Cleaning Facility was designed to produce an atomic oxygen plasma within a metal halide lamp to remove carbon-based contamination. It is believed that these contaminants contribute to the high failure rate realized during the production of these lamps.

The facility is designed to evacuate a metal halide lamp and produce a radiofrequency-generated atomic oxygen plasma within it. Oxygen gas, with a purity of 0.9999 percent and in the pressure range of 150 to 250 mtorr, is used in the lamp for plasma generation while the lamp is being cleaned. After cleaning is complete, the lamp can be backfilled with 0.9999-percent pure nitrogen and torch sealed.



Front view of Atomic Oxygen Lamp Cleaning Facility.

The facility comprises various vacuum components connected to a radiation-shielded box that encloses the bulb during operation. Radiofrequency power is applied to the two parallel plates of a capacitor, which are on either side of the lamp. The vacuum pump used, a Leybold Trivac Type D4B, has a pumping speed of 4-m³/hr, has an ultimate pressure of $<8 \times 10^{-4}$, and is specially adapted for pure oxygen service. The electronic power supply, matching network, and controller (500-W, 13.56-MHz) used to supply the radiofrequency power were purchased from RF Power Products Inc. Initial test results revealed that this facility could remove the carbon-based contamination from within bulbs.

For more information, visit the Electro-Physics Branch at <http://www.grc.nasa.gov/WWW/epbranch/ephome.htm>

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Programs/Projects: Broad applicability to lamp industry-wide variety of glass bulb lamps

for lighting and specific wavelength spectral source lamps; technique would assure that hydrocarbon contaminants within the lamp enclosure are not present during sealing and that the lamp function and durability would thereby be improved.