



## PID Lamp Characteristics

### PID Lamp Selection

RAE Systems photoionization detectors (PIDs) currently offer lamps with three different photon energies: 9.8 eV, 10.6 eV and 11.7 eV. A special high-intensity version of the 10.6 eV lamp is also available for use with ppbRAE Plus. Instruments are shipped with the standard 10.6 eV lamp unless otherwise specified. The 11.7 eV lamp measures the broadest range of compounds, while the 10.6 eV lamp is somewhat more selective, and the 9.8 eV lamp is the most selective. Because of the different type of lamp window needed to allow the higher energy light to pass, the 11.7 eV lamp has a shorter life (see table) and is more expensive. Therefore we recommend using the 9.8 or 10.6 eV lamps whenever possible.

### Lamp Output and Resolution

The larger (1/2") lamps used in the MiniRAE 2000, ppbRAE Plus, UltraRAE and RAEGuard have greater output than the smaller (1/4") lamps used in the ToxiRAE, MultiRAE and AreaRAE. 10.6 eV lamps also have stronger output than 11.7 eV lamps. The IAQRAE and AreaRAE IAQ use a 3/8" 10.6 eV lamp/sensor combination with intermediate output. Higher output translates to better resolution and lower detection limits. The resolution also depends on the type of compound measured; generic values for isobutylene are listed below. The "super-bright" 10.6 eV lamps are required for ppb level detection, and the ppbRAE Plus cannot use 11.7 eV lamps. These stronger lamps are not recommended for other PIDs because they may saturate the sensor at high VOC concentrations.

### Lamps Stored in Glass Ampoules

Because lamps gradually lose power even when not in use, the warranty periods listed below apply even if the lamp is not turned on. New 1/4" 11.7 eV lamps shipped in sealed ampoules are warranted for storage of 3 months. The 1-month operating warranty begins at the earlier of the 3-month storage period or when the gas-tight container is opened. In order to maintain the warranty, these dates must be recorded.

### Lamp Care

Store lamps under dry conditions to minimize attack on the lamp window. Keep the lamps clean using dry methanol; never use acetone on 11.7 eV lamps. Turn off 11.7 eV lamps when not in use, to minimize yellowing of the window. Storing an entire ToxiRAE II unit in a dessicator between uses extends the life of the 11.7 eV lamp without the need to remove the lamp repeatedly.

### Lamp Driver

In MiniRAE 2000s the lamp driver (LDRV) may be increased in the Diagnostic Mode to help turn on 11.7 eV lamps or extend their useable life. 10.6 eV lamps are normally operated at LDRV of 175. 11.7 eV lamps use LDRV of 200 but can be increased to 225 if they fail to turn on after some use. The ppbRAE uses LDRV of 200 for 10.6 eV lamps as a default. If LDRV is changed, the lamp fail threshold may need to be adjusted also. Use of a higher LDRV than necessary slightly decreases battery life and response linearity. Firmware versions 1.22 for the MiniRAE 2000 and ppbRAE introduced automatic lamp drive adjustment, and the LDRV and Fail menus are absent from the Diagnostic Mode menu. In Version 1.23 these reappear and allow the user to set the LDRV. However, the monitor still measures the optimal LDRV and may override the user's set point if it is too low to turn on the lamp.

### Lamp Replacement

RAE Systems PID lamps do not burn out suddenly, because they have no filament. Thus, because of the shorter life, we recommend purchasing 11.7 eV lamps as close as possible to the date of use. The strength of the lamp, and thus its expected life, can be determined using the special Diagnostic Mode (See Technical Note TN-123).



## Lamp Warranties and Resolution

Lamp Energy	Part Number	Lamp Diameter	Typical Resolution	Warranty Period	Typical Life
9.8 eV	050-0020-000	1/2"	0.1 ppm	6 months	1 year
9.8 eV	050-0030-000	1/4"	0.2 ppm	6 months	1 year
10.6 eV*	050-0000-000	1/2"	0.1 ppm	1 year (3 yrs)*	2 to 3 years
10.6 eV super bright	050-0000-001	1/2"	0.002 ppm	1 year	1 year
10.6 eV	050-0010-000	1/4"	0.1-0.2 ppm	1 year	1 year
10.6 eV	023-0601-106	3/8"	0.02 ppm	1 year	1 year
11.7 eV	050-0001-000	1/2"	0.1-0.2 ppm	1 month	1 to 2 months
11.7 eV in ampule	050-0011-001	1/4"	1.0 ppm	1 month	1 to 2 months

\* 10.6 eV lamps used in MiniRAE 2000 are warranted for 3 years, as long as the warranty card is returned.