



IR-12 and IR-12K Life Test Summary

IR-12

This unit has been in production since 1980. It is considered a rugged, reliable unit.

Prior to 1994, no records of field failures were maintained.

Since 1994, three units have been returned for analysis

- Unit was completely open in the center of the coil. Extreme explosion was evident. No history of the unit was provided. Failure of this type would be typical of very high voltage being applied across the unit, such as 120V vs. the rated 4.5 V.
- Unit had a complete open at the resistance weld between the element and the header post. Only history available was that the unit had been in operation for over 5 years. Visual examination indicated that the weld joint may have been defective and failed from fatigue due to expansion and contraction.
- Unit was returned because a yellow haze was forming on the window of the enclosed housing in which the source was operating. The root cause was determined to be a component in the ceramic cement used in manufacture. The manufacturing process was changed to use an aqueous base in July 1998.

In-house Testing

- Two units were tested to failure in December 1997. Failure on both units was in excess of 1,200°C. The failure in both cases was at the resistance weld between the element and the header post. This is the highest resistance point because the welding process reduces the diameter of the element.
- Three units have been on accelerated life test since September 1997. This is over 12,000 hours when this was written. These units have been cycled at 15 minutes on and 15 minutes off at 110% of rated voltage. We estimate that every 1000 hours is equivalent to 1 year of normal use. No failures have occurred.

IR-12K

The model IR-12 source is now available in a special higher temperature version as the IR-12K. The IR-12K can be operated at up to 975 C (1250 K) with 3 year life. The IR output of the IR-12K will vary versus time longer than the IR-12 as the IR-12K forms a surface oxide more slowly.

The device manufacturer states:

We continue to be confident with an operating voltage of 6.0 volts and a 975 C (1250 K) rating on this source. Limited use up to 7 volts will produce a temperature of 1125 C (1400 K) but lifetime will be reduced!

We have completed our accelerated life testing at 3000+ hours. All test units were operational at the conclusion of the test. Minor degradation of the ceramic cement at the end of the alumina substrate was noted at 2500 hours. This is not considered a functional defect.

