# Tech Note: RFN Collector Installation

This note discusses the importance of periodic replacement of the RFN collector and will provide information on proper installation.

The life of the RFN is typically determined by the performance of the collector. With proper care, the RFN life should be on the order of 2500 hours. The indicators for scheduled maintenance include unstable emission current and high keeper voltages (above 35 V).

The collector in the RFN is fabricated of Nickel that will react with Oxygen. The oxidation will be on the collector surface and can migrate into the material. When subsurface oxygen poisoning has occurred, RFN performance will degrade leading to unstable emission current and higher keeper voltages. A poisoned collector cannot be cleaned using conventional methods, such as media blast, as it will not remove the oxide deep in the material. Consequently, reconditioned collectors will not have the expected 2000+ hours of operational life. As a result, the collector should be replaced during normal PM cycles.

Installation of a new collector is a challenge because the exact spacing between the copper antenna coil and the collector is critical. Small gaps or movement between the collector and the discharge chamber will have a negative impact on the RF tuning. Any space between the collector and the discharge chamber wall can allow plasma to enter and etch the side walls, leading to further issues with tuning and replacement collector fitting.

It is very important that the collector has a snug fit (no movement) when installed. A collector assembly has two ceramic insulators that provide rigidity. The standard collector insulator length is 0.265". This size works for most new discharge chamber – collector combinations. However, natural variances in manufacturing and age of the discharge chamber will require the insulator length be increased as much as +0.015" for the collector to fit, without movement, in the discharge chamber. For many refurbishment cases, custom sized insulators are used.

During an RFN refurbishment, a pair of standard 0.265" insulators will be installed on the new collector. The fit between the collector and discharge chamber is then tested. The fit should be tight enough that the collector cannot be fully installed without some light mechanical assistance (hand-driven arbor press or strong technician). If the collector slides easily into the discharge chamber, the insulators are removed and replaced with longer ones (for example, 0.269"). The fit is then checked again and the process continues until the above tightness condition is met. Care must be taken not to use excessively long insulators as they will result in the collector circumference will be compressed down by the discharge chamber until the insulators are crushed.

A properly fit collector will not slide out easily when installed and has been fit sung into the discharge chamber.