Purpose:
To quantify the dwell position inaccuracy in Titanium ring applicators and develop a test to be performed quarterly, after source exchange.

Methods:
All three rings from our Titanium kit (30, 45, 60 deg.) were used for this study. EDR2 film was placed on the Simulator table and a ring was taped to the film, with a solid water slab as buildup. A 1-cm spacing dummy wire was inserted into the ring. The film was exposed using 135 kV, 80 mA, 400 mAs. An HDR treatment was then delivered using the even source dwell positions from 2 to 16, with a 5 mm step size, nominal dwell time 0.4 sec/position. The procedure was repeated three times for each ring. The films were scanned and analyzed with the RIT software. The distance between the center of each source position to the adjacent dummy dots was measured for each ring on all three films. An average shift (AS) was obtained for each ring.

New films were exposed with a treatment offset equal and in the opposite direction relative to the AS for the ring used. The films were visually inspected to assess if the source positions are centered in between two adjacent dummy dots, and also scanned and analyzed with the RIT software. This test will be performed quarterly to verify if the shifts remain stable.

Results:
The average shift was 2.5, 2.4, and 2.4 mm distally for the 30, 45, and 60 deg. rings, respectively. The offset for the quarterly test was set to 2 mm proximally, to take into account the 1 mm tolerance for the source position.

Conclusions:
The dwell position inaccuracy in Titanium ring applicators was quantified and the quarterly test was successfully performed for two quarters. Work is started to assess the dosimetric implications of this shift.