



Manufacturer of Ion Beam Equipment and Components

### Tech Note

Re: Grid Mount Stack for Plasma Process Group 16 cm Grids

Issue: Plasma Process Group provides replacement 16 cm, 3 focal point grids that can be used in the Ion Tech 16 cm RF ion source. The replacement grids require a change to the retainer/mount plate stack (also referred to as the grid mount stack) as depicted in the 504296 – 16 cm 3 Grid 3FP ASMBLY drawing.

The following are typical measurements performed on an Ion Tech grid set and mount hardware.

Measurement	Ion Tech Standard	Plasma Process Group Grids with Standard Ion Tech Mount	Plasma Process Group Grids with Modified Ion Tech Mount
Screen-Accel grid spacing (grids on bench, relaxed)	0.055"	0.055"	0.055"
Screen-Accel grid spacing (grids mounted)	0.050"	0.030"	0.051"
Retainer/Mount plate spacers (washer total)	0.145"	0.145"	0.175"

The critical function of the grid mount stack is to attach the grid assembly to the mount plate. Proper assembly is to have the screen grid in contact with the retainer plate (square holder) and the decel grid should be touching the skirt (the sharp edge on the mount plate). If any sizable gap exists in these regions, the source will suffer from unpredictable outages.

If Plasma Process Group grids are inserted into an Ion Tech grid mount/retainer plate assembly without any changes to the grid mount stack, the grids will become compressed. The screen-accel grid spacing will change from a relaxed value of 0.055" to 0.030". Therefore the grid mount stack needs to be modified according to the assembly drawing 504296C.

#### Additional information:

It is very critical to your system that the deposition source has stable ion beam current (at relatively stable RF power) and the uniformity is very stable as well. In order to achieve these requirements, the grids are designed to be stable. However, they need to be mounted in a very critical fashion. First, the grid assembly, consisting of the 3 grids, is set onto the mount plate (round plate). The mount plate has spring washers in place to push the grids up. However, it is critical that the decel grid (grid closest to target) is touching the skirt. The skirt is the sharp edge

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of the mount plate (inner diameter). The purpose of the skirt is to keep the plasma from going into the source.

With the decel grid touching the skirt, the grid retainer plate (square piece) is placed on top. The next critical design requirement is the retainer plate, when clamped, DOES NOT COMPRESS the screen grid (or top grid) closer to the accel grid (middle grid). If COMPRESSION occurs, the beam will distort, RF power is lower, sputtering damage to the decel grid will occur, and deposition uniformity and rate will be poor. If COMPRESSION occurs, additional precision washers are added to the mount stacks as necessary until COMPRESSION does not occur. We make a screen-accel spacing measurement before and after attaching the retainer plate. Typical measurements are:

Screen-accel spacing (not clamped) = 0.060"

Screen-accel spacing (clamped) = 0.058" MAXIMUM

The spring washers are designed to push the screen grid upward so it rests against the retainer plate. If a gap exists between the screen grid and retainer plate, a plasma leak will occur and the source will go out.

Therefore the mounting of the grid assembly should be 1) the decel grid touches the skirt, 2) the screen-accel gap spacing does not change, and 3) the spring washers push the screen grid up onto the retainer plate.

If these proper steps are taken, the grids will perform as expected.

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