



Traveler Related Common Procedures

Procedure Title	LCLS-II Production Cavity HPR Procedure	
Procedure ID	CP-L2PRD-CAV-CHEM-HPR	
Procedure Description	This procedure describes the high pressure rinsing (HPR) of a 9-cell LCLS-II production cavity. Specifically, steps to transfer cavity to HPR cabinet, and steps to transfer cavity from HPR cabinet to drying location.	
Revision	R1	
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Revision Notes	<i>Describe any changes between revisions here.</i>	
	R1: Initial Release	
References	<i>List and Hyperlink all documents related to this procedure.</i>	
Production Cleanroom General Rules and Restriction	New High Pressure Rinse Operating Procedure	

HPR is the last interior cleaning process before vertical RF test or cavity sting assembly; therefore it has direct impact on the RF performance of the cavity. Great care should be taken during HPR process, to ensure the proper cleaning of the cavity interior without introducing contamination. Always check glove cleanliness visually and by nitrogen blowing when in doubt, especially before removing/attaching covers from/to cavity flanges.

This procedure describes the steps from preparing cavity for HPR to setting up cavity for drying after HPR, specifically for the LCLS-II project.

BEFORE HPR:

The cavity should arrive from the assembly group in an HPR cage, all open flanges covered by Gore-Tex gaskets backed with mirror-finish stainless steel blanks. Stainless steel spring clamps are holding the covers on the flanges.

1. Don new gloves. Get the pre-moistened cleanroom wipe (from the red bag, do not use isopropyl and a dry alpha wipe).
2. Below are steps to remove top beamline (BL) flange cover and flange surface cleaning (Step 2~7 below is to remove flange covers, from top working to bottom):
 - a) Use BackTech to pick up the cage from roll cart. Park the cavity to ~3 feet in front of HPR cabinet, facing the hood, at a height so that you can reach the top beamline (BL) flange easily.
 - b) Remove the clamps on top BL flange. Open HPR door. Blow off gloves at the particle counter. Remove the top beamline flange by lifting and tilting away from cavity inner surface, avoid sliding motion when removing covers.
 - c) Wipe the sealing surface carefully with a new pre-moistened wipe, to remove possible Al gasket residue. The top flange should be within sight while be wiped. Avoid getting dirty wipe over the cavity opening. Check the cleanliness of the wipe after wiping. The seal surface should not be dirty since they are cleaned by the assembly group. Continue until visible residue is gone.
 - d) Wipe the backside of the flange, to remove particles from metal-to metal contact from clamp tips.
3. Remove field probe flange cover and wipe flange surface using similar manner as steps 2.b)-d), using a new wipe.
4. Remove top HOM flange cover and wipe flange surface using similar manner as steps 2.b)-d), using a new wipe.

5. Raise the cavity so that the bottom BL flange is easy to reach without bending down. Remove bottom HOM flange cover and wipe flange surface using similar manner as steps 2.b)-d), using a new wipe.
6. Remove FPC flange cover and wipe flange surface using similar manner as steps 2.b)-d), using a new wipe.
7. Remove bottom BL flange cover and wipe flange surface using similar manner as steps 2.b)-d), using a new wipe.
8. Place the cavity in the HPR and obtain necessary measurements for the HPR recipe:
 - a) Set the cage on the HPR stage. Detach BackTech from the cage. Wipe the cage at all BackTec clamp points with a new wipe.
 - b) Set lower wand height by aligning the lower nozzles just inside the bottom BL flange. Record the number.
 - c) Use camera to make sure wand is centered when bringing it up. Try to avoid your body getting too close to open cavity flanges during the setup.
 - d) Set upper wand height: take wand top position number when the tip is even with top BL flange surface, remove second digit after the decimal, then minus 0.1 inch. (e.g. 52.39 → 52.2)
9. Check or replace gloves. Blow clean the pre-cleaned niobium blank and two pre-cleaned stainless steel clamps. Place the Nb blank on the top flange (Do NOT use a gasket with the Nb blank). Secure it with the two clamps.
10. Close HPR door. Set recipe. Proceed with the HPR.

AFTER HPR:

1. Stop HPR. Open HPR door. Don new gloves and blow with nitrogen to check for particles.
2. Blow the pre-cleaned mirrored blanks, pre-cleaned gaskets, and pre-cleaned clamps until particle-free. Place them separately on new wipes on a cleanroom cart, clean side facing up. Gore-Tex gaskets need extra care because it directly face cavity inner surface. Transfer cart carefully to near HPR cabinet.
3. Place the bottom BL flange blanks (Mirror blank on the bottom and Gore-Tex gasket on the top) on using the stainless steel clamps to hold them in place. The clamps should be opened outside of the HPR cabinet and held open until closed on the blank and flange. (Step 3~7 below is to put covers on flanges, from bottom working to top)
4. Repeat for the FPC flange.
5. Repeat for the bottom HOM flange.
6. Repeat for the top HOM flange.
7. Repeat for the field probe flange.

8. Leave the Nb blank on top BL flange as is. Attach BackTech to the cage. Remove the cavity from the HPR cabinet.
9. Tilting to drain water:
 - a) Slowly tilt the cavity 90 degrees so that FPC flange is facing down. Keep for 30 seconds.
 - b) Slowly go through upright position (Do not let cavity go through upside down in between) to the other side where FPC flange is facing up. Keep at 90 degrees for 30 seconds.
 - c) Slowly rotate the cavity back to the upright position.
10. Transfer the cage to a roll cart. Wipe off cage section that contacted the BackTech clamps before cavity transfer. Roll the cage to an appropriate drying area. Pick up the cage with the drying BackTech. Raise the cage high enough to remove the roll cart. Wipe the bottom of the cage which has contacted the roll cart.
11. Put a clean wire cart nearby (where you can reach, but not directly next to the clean cavity) for putting covers and clamps removed from the cavity.
12. Don new gloves and blow with nitrogen to check for particles.
13. Remove the top BL flange clamps, put them on the wire cart. Then remove the Nb blank with a clean hand. The hand actuated the clamps (which may be dirty) should not be used to remove the gasket/ plate. Remove gasket/plate with a lifting motion and move away from the side so your body/gloves stay clear of the cavity opening. Place gasket/plate on the cart. Check or change gloves before next step. (Step 13~19 below is to remove flange covers, from top working to bottom)
14. Repeat step 13 for the field probe flange.
15. Repeat step 13 for the top HOM flange.
16. Raise the cavity to the final elevated dry position. Verify your gloves are still clean after touching the back-tech control module with a particle check. Don new gloves and blow with nitrogen to check for particles if necessary.
17. Repeat step 13 for bottom HOM flange.
18. Repeat step 13 for FPC flange.
19. Repeat step 13 for bottom BL flange. Beware that most of the draining water will come out at this step. Tilt the cover away from the cavity at one edge to break the surface tension seal, and then slowly drop the cover down and away from the cavity.
20. Slowly back out of drying area with the wire cart. Do not re-enter the drying area once all ports are open.