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| **L2HE Downstream Beam Pipe Procedure** |
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| Document Owner: | C.Wilcox | Department Owner: | SRF Operations |

# Purpose

The purpose of this document is to provide instructions for installing the downstream ion pump and tee assembly onto the L2HE Cryomodule to facilitate testing in the LERF.

# Scope

This procedure applies to L2HE Cryomodule assembly actions to be taken by trained and knowledgeable Assembly Technicians to cleanly add the downstream ion pump and tee assembly which is required for testing. Details are contained in the attached process steps.

# Terms and Definitions

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| Term | Definition |
| Slow bleed/pump system | Specially outfitted vacuum cart with controls to specifically slow pump and bleed required for beam pipe clean assembly activities. |
| <Term 2> | <Definition> |
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# Roles and Responsibilities

The following roles have responsibilities described in this document.

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| Role | Responsibility |
| Supervisor | Will address and monitor work actions are done correctly, to Procedure |
| Vacuum Assembly Technician | Technician that has been trained and qualified for clean assembly work. Individual shall also be familiar with specialized pumping system and appropriate gowning and cleaning techniques. |

# Procedure

1. Gather the Beam Pipe and all associated parts to be cleaned and send into the main clean room
2. Assemble the Ion Pump Tee in the clean room as per the appropriate drawing using standard clean room practices.
* Protect the burst disk at all times
* When installing the titanium (Faraday) window, use a large aluminum magnesium seal. Tighten the bolts using a star pattern and step up method: 15 ft/lbs, and then 31 ft/fbs. Repeat the final torque pattern until you no longer get movement on the hardware.
* When installing the 6” conflat blank, only add 4 bolts and lightly torque them. This will function as a dust seal for final assembly.
1. When installing the ion pump onto the tee, use studs instead of the hardware called out on the drawing.
2. Once the clean room pre-assembly has been completed. Have the assembly DOUBLE-BAGGED AND PLACED ON THE PARTS SHELF FOR FINAL ASSEMBLY ONTO THE CRYOMODULE.
3. You are now ready to prepare for assembly onto the Cryomodule using these steps.
* Begin setting up the laminar flow hood over the downstream end of the Cryomodule.
* Cover all other exposed surfaces in the flow hood with plastic sheeting (including the floor)
* Allow the flow hood to run continuously.
* Wipe down all surfaces with Alcohol and then blow off with Ionized N2.
* Set up the particle counter and begin monitoring the particle count.
* Stage all supplies and tools inside the flow hood, on a perforated work surface.
* Once particle counts have stabilized at zero on the 0.3 micron scale, you are ready to gown up and perform installation.
* Make sure you have all tools and hardware needed to perform the installation. The following steps are the point of no return until installation is complete.
1. Enter the flow hood as far away as from the work as possible and don the following NEW packaged clean assembly garments in this order:
* Hairnet, face mask, yellow gloves (correct size), booties, Full head sock, full clean room coveralls, and white gloves layered over the yellow gloves,
* Make sure white glove cuffs cover the cotton elastic wrist cloth on coveralls.
1. Remove the bags from the pre-assembled ion pump tee and blow off with filtered ionized nitrogen, blow off exposed beampipe conflat flange as well until particle count reads 0 on the 0.3 micron scale.
2. Blow off all hardware and gaskets required for the conflat connection to the beam pipe and set aside. This hardware needs to be brand new and cleaned prior to installation.
3. Remove all hardware with the exception of 4 bolts in the 2, 4, 8, and 10 o’ clock positions.
* When loosening hardware, hold the bolt still with a wrench and spin the nuts off of the back.
* Carefully remove each bolt avoiding rubbing them against the thru- hole walls. DO NOT REUSE THIS HARDWARE FOR INSTALLATION.
* Blow off inside the thru-holes monitoring the particle counts until they read 0 on the 0.3 scale.
* Remove the blanking flange on the ion pump tee and the beam pipe. Do not blow inside with nitrogen.
1. Install the tee onto the beampipe flange using the clean previously blown off hardware and gasket. Affix the magnet, support bracket, and hardware.
2. Install the slow pump down turbo hose onto the ion pump right angle valve. Activate the slow pump down system.
* Leak check the entire assembly and record findings
* Start the ion pump.
* Close the right angle valve on the ion pump.
* Shut down the turbo pump and bleed up the hose to the ion pump right angle valve. Monitor the ion pump pressure during the bleed up to make sure the right angle valve does not leak through. If the beam pipe vacuum fluctuates while you are back filling the turbo hose, abort the bleed up, pump down the chamber and notify the Supervisor.
* Once the hose is bled up and the beam pipe vacuum remains stable, you are ready to remove the hose and install a clean blown off blanking flange onto the ion pump with clean hardware.

12. Slowly open the cold gate valve making the ion pump/beam pipe vacuum common with the rest of the cavity string.

# References

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# Release and Revision History

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| Rev # | Major Changes | Effective Date: |
| 1 | Initial version | DD Mmm YYY |

# Approvals

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