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| Traveler Title | NB3SN Vacuum Vessel Assembly Traveler |
| Traveler Abstract | This traveler outlines the necessary steps and checkpoints to install and assemble the helium vessel into the vacuum vessel assembly. All work shall be performed by trained Cryomodule Assembly Technicians only.***Radiological controls are a critical component of the cryomodule rework assembly process. RCTs will be actively engaged in the movement, assembly, and consolidation of radioactive components. This will include the collection of individual RAM tags and associated "coupons" as the equipment is re-installed to produce the completed cryomodule. A member of the RadCon department should have a final sign-off prior to transporting to the tunnel.***  |
| Traveler ID | NB3SN-CMACU-VV-ASSY |
| Traveler Revision  | R1 |
| Traveler Author | John Fischer |
| Traveler Date | 11-Nov-24 |
| NCR Informative Emails | areilly,weaksmc,fischer |
| NCR Dispositioners | fischer,cheng |
| D3 Emails | areilly,fischer,weakmc,cheng |
| Approval Names | John Fischer | Jeff Campbell | John Fischer | Matt Weaks |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Technical Reviewer | Work Center Lead | Project Representative |

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| References | List and Hyperlink all documents related to this traveler. This includes, but is not limited to: safety (THAs, SOPs, etc), drawings, procedures, and facility related documents. |
| [C75 Helium Vessel Assy: 11126-0001](https://misportal.jlab.org/jlabDocs/documents/versions/6565/download) | [C75 Helium Vessel Mu Shields: 11141-0047](https://misportal.jlab.org/jlabDocs/documents/versions/7160/download) | [C75 Nitronic Rod: 11141-0011](https://misportal.jlab.org/jlabDocs/documents/versions/7147/download) | [C75 Vacuum Vessel: 11141-0007](https://misportal.jlab.org/jlabDocs/documents/versions/124299/download) | [C75 Cu Strap Block: 11141-0061](https://misportal.jlab.org/jlabDocs/documents/versions/7169/download) |
| [C75 Nitronic Rod Seat: 11141-0090](https://misportal.jlab.org/jlabDocs/documents/versions/7188/download) | [C75 Vacuum Vessel: 11141-E-0007](https://misportal.jlab.org/jlabDocs/documents/versions/7184/download) | [C75-CU-HV-MLI: 11141-0051](https://misportal.jlab.org/jlabDocs/documents/versions/7163/download) | [JL0094547 Cu Srap Dwg](https://misportal.jlab.org/jlabDocs/documents/versions/138352/download) | [C75-0X Assembly Activities Logbook](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-212174/C75-01%20Magnetic%20Hygiene%20Record%20Spreadsheet.xlsx) |
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| Revision Note |  |
| R1 | Initial release of this Traveler. |

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| Step No. | Instructions | Data Input |
| 1 | Verify the Helium Vessel Assembly Traveler is complete.Record the Cryounit serial number. | [[HVATechnician]] <<SRF>>[[CUSN]] <<CUSN>>[[HVADate]] <<TIMESTAMP>>[[HVAComment]] <<COMMENT>> |
| 2 | Record the helium vessel and vacuum vessel serial numbers. | [[HeVVTechnician]] <<SRF>>[[HESSN]] <<HESSN>>[[VVSN]] <<VVSN>>[[HeVVDate]] <<TIMESTAMP>>[[HeVVComment]] <<COMMENT>> |
| 3 | Extract the 50K thermal shield from the Vaccum Vessel, then remove the 50K MLI.\*\*The MLI will be re-used after the shield modifications are complete, be careful\*\* | [[TSVVTechnician]] <<SRF>>[[TSVVDate]] <<TIMESTAMP>>[[TSVVComments]] <<COMMENT>> |
| 4 | Layout then Weld the extra waveguide thermal straps to the inside of the shield as shown here. There shall be 18 additional straps when completed. [JL0094547 Cu Srap Dwg](https://misportal.jlab.org/jlabDocs/documents/versions/138352/download) | [[WGTTechnician]] <<SRF>>[[WGTWelder]] <<SRF>>[[WGTDate]] <<TIMESTAMP>>[[WGTComments]] <<COMMENT>> |

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| 5 | Re-install the 50K MLI blankets onto the shield, then insert and re-hang the shield assembly into the Vacuum Vessel. Verify all fasteners are tight and that the shield is centered in the VV. | [[BlanketShieldTechnician]] <<SRF>>[[BlanketShieldDate]] <<TIMESTAMP>>[[BlanketShieldComments]] <<COMMENT>> |
| 6 | Rough-align the vacuum vessel on the transfer cart using the fixture. | [[VVTCTechnician]] <<SRF>>[[VVTCDate]] <<TIMESTAMP>>[[VVTCComment]] <<COMMENT>> |
| 7 | Magnetic Hygiene- Record the date, starting and finishing time of the major assembly steps, and the Fluxgate readings in the. [C75-0X Assembly Activities Logbook](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-212174/C75-01%20Magnetic%20Hygiene%20Record%20Spreadsheet.xlsx)Major changes in the fluxgate readings during assembly task shall be discussed with the group Supervisor and Project Engineer. | [[MagHygieneTechnician]] <<SRF>>[[MagHygieneDate]] <<TIMESTAMP>>[[MagHygieneComment]] <<COMMENT>>[[MagHygiene]] <<FILEUPLOAD>> |
| 8 | Clean the helium vessel ends with acetone then isopropyl alcohol. Wear chemical resistant gloves and use lint free wipes.  | [[HeVEndsTechnician]] <<SRF>>[[HeVEndsDate]] <<TIMESTAMP>>[[HeVEndsComment]] <<COMMENT>> |
| 9 | Install superinsulation end pieces onto helium vessel while on the scissors table [Helium Vessel head MLI](https://misportal.jlab.org/jlabDocs/documents/versions/7163/download) (11141-0001) Wear gloves. | [[SiEndsTechnician]] <<SRF>>[[SiEndsDate]] <<TIMESTAMP>>[[SiEndsComment]] <<COMMENT>>  |

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| 10 | Position the helium vessel and vacuum vessel on the installation tooling as shown below. | [[HeVVInstallTechnician]] <<SRF>>[[HeVVInstallDate]] <<TIMESTAMP>>[[HeVVInstallComment]] <<COMMENT>> |

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| 11 | Verify the tooling is fully seated into the helium vessel nitronic rod seats, and is properly locked on the Thompson rails. | [[HevNRTechnician]] <<SRF>>[[HevNRDate]] <<TIMESTAMP>>[[HevNRComment]] <<COMMENT>> |
| 12 | Install the diode into the 50k shield and position wire as per CEBAF drawing [Vacuum Vessel](https://misportal.jlab.org/jlabDocs/documents/versions/7184/download) (11141-E-0007). | [[DiodeElectricalTechnician]] <<SRF>>[[DiodeDate]] <<TIMESTAMP>>[[DiodeComment]] <<COMMENT>> |
| 13 | Lower the scissors table to it’s lowest position, clean the helium vessel with acetone then isopropyl alcohol. Wear chemical resistant gloves and use lint free wipes. | [[ScissorsTechnician]] <<SRF>>[[ScissorsDate]] <<TIMESTAMP>>[[ScissorsComment]] <<COMMENT>> |
| 14 | Install the helium vessel magnetic shielding. [Helium Vessel Mu](https://misportal.jlab.org/jlabDocs/documents/versions/7160/download) (11141-E-0047). Wear gloves shielding is sharp. | [[HeVMagTechnician]] <<SRF>>[[HeVMagDate]] <<TIMESTAMP>>[[HeVMagComment]] <<COMMENT>> |
| 15 | Install the helium vessel superinsulation [Helium Vessel MLI](https://misportal.jlab.org/jlabDocs/documents/versions/7163/download) (11141-E-0051). 4 blankets consisting of ~24 layers total. Wear gloves to avoid finger prints. | [[HeVSiTechnician]] <<SRF>>[[HeVSiDate]] <<TIMESTAMP>>[[HeVSiComment]] <<COMMENT>> |
| 16 | Install multi layer insulation patches onto the axial restraint rod lugs on the helium vessel. Wear gloves. | [[MLIPTechnician]] <<SRF>>[[MLIPDate]] <<TIMESTAMP>>[[MLIPComment]] <<COMMENT>> |
| 17 | Insert the helium vessel. Slide the vacuum vessel over the helium vessel. Continually check clearance around the helium vessel until vacuum vessel is centered longitudinally. | [[HeVVClearTechnician]] <<SRF>>[[HeVVClearDate]] <<TIMESTAMP>>[[HeVVClearComment]] <<COMMENT>> |
| 18 | Install the upper support rods [Nitronic Rod](https://misportal.jlab.org/jlabDocs/documents/versions/7147/download) (11141-B-0011) and tighten until the helium vessel is fully supported. (both ends of vessel). | [[UNiSRTechnician]] <<SRF>>[[UNiSRDate]] <<TIMESTAMP>>[[UNiSRComment]] <<COMMENT>> |
| 19 | Remove the helium vessel support tooling | [[HeVSTRemoveTechnician]] <<SRF>>[[HeVSTRemoveDate]] <<TIMESTAMP>>[[HeVSTRemoveComment]] <<COMMENT>> |
| 20 | Install the remainder of the nitronic and axial rods. | [[NARInstallTechnician]] <<SRF>>[[NARInstallDate]] <<TIMESTAMP>>[[NARInstallComment]] <<COMMENT>> |

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| 21 | Align the helium vessel in the vacuum vessel. Ensure that the helium vessel saddle and vacuum vessel top hat flange are parallel. Repeat beamline centering procedure until centered and vessel faces are parallel to each other. Recheck the longitudinal center. Finally, torque nuts on all rods to 75-150 in/lbs. | [[HeVAlignTechnician]] <<SRF>>[[HeVAlignDate]] <<TIMESTAMP>>[[HeVAlignComment]] <<COMMENT>> |
| 22 | Install superinsulation patch [Nitronic Rod Seat MLI](https://misportal.jlab.org/jlabDocs/documents/versions/7188/download) (11141-D-0090) blankets over the nitronic rod seats on helium vessel. Four places on each end. | [[SiPInstallTechnician]] <<SRF>>[[SiPInstallDate]] <<TIMESTAMP>>[[SiPInstallComment]] <<COMMENT>> |
| 23 | Install grounding straps and G-10 rod shielding tubes onto the nitronic rods. [Vacuum Vessel End View](https://misportal.jlab.org/jlabDocs/documents/versions/7169/download) (11141-B-0061).Cover the assembly with Kapton tape. | [[GSInstallTechnician]] <<SRF>>[[GSInstallDate]] <<TIMESTAMP>> |
| 24 | Hold point for Supervisor sign off. | [[Supervisor]] {{FISCHER,WORLAND,JJCAMP}} <<HOLDPOINT>>[[SupervisorDate]] <<TIMESTAMP>>[[SupervisorComment]] <<COMMENT>>[[SupervisorFileUpload]] <<FILEUPLOAD>> |