|  |  |
| --- | --- |
| Traveler Title | Cebaf Reworked Cryomodule 5-cell Cavity Dimensional Inspection |
| Traveler Abstract | This traveler details the steps required to dimensionally inspect a 5-cell C75 cavity. The steps consist of capturing dimensions for receiving inspection, post pair disassembly, flange flatness correction, if needed. Also, the traveler captures steps for final inspection after RF tuning and final lapping. |
| Traveler ID | C75-CAV-INSP |
| Traveler Revision  | R7 |
| Traveler Author | A. DeKerlegand |
| Traveler Date | 25-March-2022 |
| NCR Informative Emails | Georged |
| NCR Dispositioners | gciovati,areilly,forehand |
| D3 Emails | Gciovati,areilly,forehand |
| Approval Names | A. DeKerlegand | G. Ciovati | T. Reilly |  |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | Project Manager |  |

|  |  |
| --- | --- |
| 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. |
| Interatom as built drawing[11116-D-0001](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-209494/11116-0001%20REV%20B%201-2.pdf) | [JL0059982 - Rev A](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-209729/JL0059982_A_C75%20CAVITY%20ASSY%20-%20WELDED%20FPC.pdf) | [JL0031321 - Rev E](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-209728/JL0031321_E_C75%20CAVITY%20ASSY.pdf) |  |  |
| Original 5-cell cavity | C75 cavity assy with "welded" FPC – Rev. A | C75 cavity assy with "stamped" FPC – Rev. E |  |  |

|  |  |
| --- | --- |
| Revision Note |  |
| R1 | Initial release of traveler |
| R2 | New Dimensions added to inspection. Distance of Cell 1 to Cell 5. Distance of FPC to Cell 1 |
| R3 | Dimension nominals updated per C75 cavity drawings. Fpc flange height changed to 3.060" and Fpc distance to beam tube updated to 1.880" Dimensions added for Formed FPC and Welded FPC. Comment box added to step 2 |
| R4 | Specified which dimensions are for reference only and do not require NCR. Corrected FPC to Cell 1 center dimension for either welded or stamped FPC and FPC to beam tube flange distance reference value changed from 1.880" to 1.820" |
| R5 | Step 2 added to capture Fpc end group serial number. Step 3 added to capture HOM end group serial number. File upload added to step 4. Reference only dimensions noted in blue italics for step 6. |
| R6 | Radio button added to steps 2 and 3 to identify newly built end groups. Flange thickness check added step 6. |
| R7 | Radio button added to verify inside of beam pipe/beamtube is checked for damage, pitting, scratches etc. |

|  |  |  |
| --- | --- | --- |
| Step No. | Instructions | Data Input |
| 1 | Select from drop down box the C75 cavity serial number | [[CAVSN]] <<CAVSN>> |
| 2 | Select from drop down box the FPC end group serial number on cavity (from C20-CAV-INSP-FPCEG)Newly built FPC end group? (If Yes, leave FPCEGSN blank) | [[FPCEGSN]] <<FPCEGSN>>[[FPCYesNo]] <<YESNO>> |
| 3 | Select from drop down box the HOM end group serial number on cavity (from C20-CAV-INSP-HOMEG)Newly built HOM end group? (If Yes, leave HOMEGSN blank) | [[HOMEGSN]] <<HOMEGSN>>[[HOMYesNo]] <<YESNO>> |
| 4 | **Please wear nitrile gloves while handling cavities. Do not touch the inside of cavities**.Visual inspection.Visually inspect the cavity (internal and external). Record any damage in the comment box. Any stains, dents, pits, foreign material, and/or scratches thru indium seal path should be noted in comment box.Inside of Beam pipe / beam tube okay?Flanges okay?End groups okay?***NOTE – Pictures should be taken regardless of cavity condition***. At minimum pictures should consist of all flanges seal area and inside of beam tubes. Also, take pictures of end groups external and cells external. | [[VisualInspUser]] <<SRF>>[[VisualInspDate]] <<TIMESTAMP>>[[InsideBeamtube]] <<YESNO>>[[Flanges]] <<YESNO>>[[VisualInspComment]] <<COMMENT>>[[VisualYesNo]] <<YESNO>>[[VisualFiles]] <<FILEUPLOAD>> |
| 5 | Specify inspection process**.** i.e. Initial inspection, post tuning, lapping, rework. Please provide details regarding inpection type. i.e. explanation if traveler captures rework from disassembly for leak or failed test. | [[ProcessStep]] {{tuning,lapping,rework,initial,final}} <<SELECT>>[[VisualInspProcessComment]] <<COMMENT>> |

|  |  |  |
| --- | --- | --- |
| Step No. | Instructions | Data Input |
| 6 | Dimensionally inspect cavity using Coordinate Measuring Machine. Bend cavity if needed to ensure that the FPC flange parallelism and perpendicularity, as well as the beam tube perpendicularity are within the drawing values listed below. Save all CMM inspection reports for every cycle of tuning and cavity straightening on M:drive. If any of the cavity flanges have flatness measurements that are over 0.002", those flanges will need to be reworked. If over 0.006" use backing flanges to improve flatness. *NOTE – dimensions listed as reference only do not require a NCR.* | [[CMMUser]] <<SRF>>[[CMMDate]] <<TIMESTAMP>>[[CMMComment4]] <<COMMENT>>[[Number\_of\_tune\_bend\_cycles]] <<INTEGER>>[[BendingRequired]] <<YESNO>>[[CMMFiles]] <<FILEUPLOAD>> |
| **Drawing Number** | **Description** | **Drawing Value / TOL.**  | **Measured Value** | **Within Tolerance** |
| JL0059982 | Length | 28.320 + .160 | [[MeasValue1]] <<FLOAT>> | [[Tolerance1]] <<YESNO>> |
| JL0059982 | FPC Flange Height – *Reference only* | 3.060 + - .005 | [[MeasValue2]] <<FLOAT>> |
| JL0059982 | FPC to beam tube flange distance – *Reference only* | 1.82 + - .010 | [[MeasValue3]] <<FLOAT>> |
| JL0059982 | FPC Flange parallelism | .010  | [[MeasValue4]] <<FLOAT>> |
| JL0059982 | FPC Flange perpendicularity | .020 | [[MeasValue5]] <<FLOAT>> |
| JL0059982 | Beam tube flange (FPC) perpendicularity | .010 | [[MeasValue6]] <<FLOAT>> |
| JL0059982 | Beam tube flange (Probe) perpendicularity | .010 | [[MeasValue7]] <<FLOAT>> |
| JL0059982 | Cell 1 to Cell 5 distance – *Reference only* | 18.699 + .236 | [[MeasValue8]] <<FLOAT>> |
| JL0059982 | FPC to Cell 1 center – reference only. **Use check box to specify whether End group is STAMPED or WELDED.** *Reference only* | 4.054 **OR**3.716  | [[MeasValue9]] <<FLOAT>> | Select box for type**[[FPC\_STAMPED]]** <<YESNO>>**[[FPC\_WELDED]]**<<YESNO>> |
| JL0059982 | Cell 5 center to HOM FP end group plane – *Reference only* | 1.803 | [[MeasValue10]] <<FLOAT>> |
| JL0059982 | FP end group plane to HOM FP flange – *Reference only* | 0.963 | [[MeasValue11]] <<FLOAT>> |
| JL0059982 | FPC flangedistance to cell 1 plane – reference only **Use check box to specify whether End group is STAMPED or WELDED.** *Reference only* | 2.510 + .020**OR**2.171 + .020 | [[MeasValue12]] <<FLOAT>> | Select box for type**[[Flange\_STAMPED]]** <<YESNO>>**[[FlangeWELDED]]**<<YESNO>> |
| JL0059982 | Fpc flange flatness | .002 | [[MeasValue13]] <<FLOAT>> | [[Tolerance2]] <<YESNO>> |
| JL0059982 | Beam tube flange (FPC) flatness | .002 | [[MeasValue14]] <<FLOAT>> | [[Tolerance3]] <<YESNO>> |
| JL0059982 | Beam tube flange (Probe) flatness | .002 | [[MeasValue15]] <<FLOAT>> | [[Tolerance4]] <<YESNO>> |
| JL0059982 | HOM (Field Probe) flange flatness | .002 | [[MeasValue16]] <<FLOAT>> | [[Tolerance5]] <<YESNO>> |
| JL0059982 | HOM (Non-Field Probe) flange flatness | .002 | [[MeasValue17]] <<FLOAT>> | [[Tolerance6]] <<YESNO>> |
| JL0059982 | Fpc flange thickness | .500 MIN | [[MeasValue18]] <<FLOAT>> | [[Tolerance7]] <<YESNO>> |
| JL0059982 | Beam tube flange (Fpc) thickness | .325 MIN | [[MeasValue19]] <<FLOAT>> | [[Tolerance8]] <<YESNO>> |
| JL0059982 | Hom (Non-Field Probe) flange thickness | .325 MIN | [[MeasValue20]] <<FLOAT>> | [[Tolerance9]] <<YESNO>> |
| JL0059982 | Hom (Fp) flange thickness | .325 MIN | [[MeasValue21]] <<FLOAT>> | [[Tolerance10]] <<YESNO>> |
| JL0059982 | Beam tube (Probe end) flange thickness | .325 MIN | [[MeasValue22]] <<FLOAT>> | [[Tolerance11]] <<YESNO>> |

|  |  |  |
| --- | --- | --- |
| Step No. | Instructions | Data Input |
| 7 | Measure the surface finish of the cavity flanges listed below using the Mitutoyo Profilometer. Check the four corners of flange outside of indium seal path and enter averaged value in measured value box below. **NOTE** - Beam tube flanges are visual inspection only. | [[SurfaceFinishUser]] <<SRF>>[[SurfaceFinishDate]] <<TIMESTAMP>>[[SurfaceFinishComment5]] <<COMMENT>>[[SurfaceFinishFiles]] <<FILEUPLOAD>> |
| **Drawing Number** | **Description** | **Drawing Value**  | **Has Flange had BCP ?** | **Measured Value** | **Within Tolerance** |
| 11116-D-0001 | FPC flange | 32 microinch  | [[BCP6]] <<YESNO>> | [[MeasValue18]] <<FLOAT>> | [[Tolerance7]] <<YESNO>> |
| 11116-D-0001 | HOM flange (Field Probe) | 32 microinch | [[BCP7]] <<YESNO>> | [[MeasValue19]] <<FLOAT>> | [[Tolerance8]] <<YESNO>> |
| 11116-D-0001 | HOM flange (Non-Field Probe) | 32 microinch | [[BCP8]] <<YESNO>> | [[MeasValue20]] <<FLOAT>> | [[Tolerance9]] <<YESNO>> |
| 11116-D-0001 | Beam tube flange (FPC)  | 32 microinch | [[BCP9]] <<YESNO>> | Visual only | [[Tolerance10]] <<YESNO>> |
| 11116-D-0001 | Beam tube flange (Probe)  | 32 microinch | [[BCP10]] <<YESNO>> | Visual only | [[Tolerance11]] <<YESNO>> |