|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Traveler Title | Cavity Vertical Testing | | | |
| Traveler Abstract | Cryogenic RF testing of JLEIC Crab Cavity | | | |
| Traveler ID | SRFRD-VTA-CAV-VTRF-JLEIC | | | |
| Traveler Revision | R2 | | | |
| Traveler Author | Subashini De Silva | | | |
| Traveler Date | 17-Mar-23 | | | |
| NCR Informative Emails | powen | | | |
| NCR Dispositioners | sdesilva, acastilla | | | |
| D3 Emails | sdesilva, powen, acastilla | | | |
| Approval Names | Subashini De Silva | Alejandro Castilla | Peter Owen |  |
| Approval Signatures |  |  |  |  |
| Approval Dates |  |  |  |  |
| Approval Title | Author | Reviewer | 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. | | | |
| [VTA SOP](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-20642/VTA%20Cryo%20Use%20Procedures.pdf) | [C100R VTA Test Procedure](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-245459/C100R-PR-VTA-CAV-VTRF-R2.pdf) | CALCULATE E AND QO WITH ERRORS WITH HOM V6C2 WITHCalFact1 | FORMULAS 12\_A\_6F |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Revision Note |  |
| R1 | Initial release of this Traveler. Based on C100R-CAV-VTRF-R3 |
| R2 | Update Traveler to adapt to JLEIC Crab Cavity |

|  |  |  |
| --- | --- | --- |
| Step No. | Instructions | Data Input |
| 0 | VTA Test Traveler for JLEIC Crab Cavity. |  |
| 1 | Enter cavity SN for JLEIC\_CRAB.  Note any special handling, processing (chemistry or bake) or off-normal conditions associated with this cavity before test. | [[CAVSN]] <<CAVSN>>  [[SpecialHandling]] <<COMMENT>> |
| 2 | Cavity Parameters   * Fundamental Mode Frequency – 952.6 MHz * Lower Order Mode (LOM) Frequency – 849.7 MHz * NumOfCells - 2 * HalfWaveLength – 176.35 mm * RoverQ – 149.9 Ω * GeoFactor (*G*) – 171.12 Ω * EpOverVt – 5.71 * BpOverVt – 11.72 | [[Freq]] <<FLOAT>>(MHz)  [[Freq\_LOM]] <<FLOAT>>(MHz) |
| 3 | Record Test Date, Dewar No, Top Plate ID and Operator(s). | [[TestDate]] <<TIMESTAMP>>  [[Dewar]]{{3,4,5,7,8}} <<SELECT>>  [[VTATSSN]] <<VTATSSN>>  [[TestOperator1]] <<VTAOPS>>  [[TestOperator2]] <<VTAOPS>> |
| 4 | Note whether cavity vacuum is OK.  Record cavity vacuum pressure, if so instrumented.  Note any conditions unfavorable to proceed with testing. | [[CavityVacuumOK]] <<YESNO>>  [[CavityVacuum]] <<SCINOT>>  [[VacuumUnit]]{{mBarr, Torr}} <<SELECT>>  [[CavityVacuumComment]] <<COMMENT>> |
| 5 | Record Dewar helium bath liquid level, temperature and baratron pressure.  Do not continue unless Dewar LHe level is above the end group. | [[DewarLHeLevelcm]] <<FLOAT>>(cm)  [[DewarTempK]] <<FLOAT>>(K)  [[DewarPressureTorr]] <<FLOAT>>(Torr) |
| 6 | Zero power meters then calibrate cables at cavity fundamental frequency as specified in theC100R VTA Test Procedure[.](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-48113/CP-C100-CAV-VTRF-R2.docx) | [[PowermetersZeroed]] <<YESNO>>  [[CableCalibrationOK]] <<YESNO>>  [[CableCalibrationComment]] <<COMMENT>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 7 | Perform fundamental mode measurements using a network analyzer in accordance with the C100R VTA Test Procedure.  Fundamental mode frequency must be close to 958 MHz.  Measure LOM 855 MHz. | [[Freq]] <<FLOAT>>(MHz)  [[LOM\_Freq]] <<FLOAT>>(MHz) |
| 8 | Post the area for high power test. Follow VTA SOP for procedure. | |
| 9 | At approximately 1-3 W, determine the cavity coupling.  If the cavity appears to be critically coupled, perform the steps in the procedure to determine coupling. If the cavity is critically coupled, select Overcoupled.  Optional: Upload oscilloscope data. | [[CavityCoupling]]  {{Overcoupled, Undercoupled}}  <<SELECT>>  [[TDS\_txt]] <<FILEUPLOAD>> |
| 10 | Perform decay measurements and record Vt, Qo, Qextin, Qextfp, %Qextfperror**.** | [[Vt]] <<FLOAT>> (MV)  [[Qo]] <<SCINOT>>  [[Qextin]] <<SCINOT>>  [[Qextfp]] <<SCINOT>>  [[Qextfperror]] <<FLOAT>> (%) |
| 11 | Process multipacting levels and record Vt where multipacting barriers were observed in the comment section. | [[MultipacitngProcessed]] <<YESNO>>  [[DewarTempK]] <<FLOAT>>(K)  [[MultipactingBarriersComment]] <<COMMENT>> |
| 12 | **High Power Test**  Test the cavity performance over its full dynamic range. Observe the administrative limit: FE Limit 1000 mR/hrRecord the following values from the high power test. |  |
| Low field Q0(Maximum Q0 at 0.1 MV)  Maximum cavity voltage achieved (Vt)  Q0 at maximum Vt | [[Max\_Q0]] <<FLOAT>>  [[Max\_Vt]] <<FLOAT>>(MV)  [[Max\_Q0AtVtmax]] <<FLOAT>> |
| FEonset: Onset of field emission (defined to be the first measured voltage where measured radiation is >= 1e-2 mR/hr).  Maximum radiation level at the end of the run. | [[FEonsetMV]] <<FLOAT>>(MV)  [[FEMaxFinal]] <<SCINOT>>(mR/h) |
| Rmax value for the highest radiation level inside Dewar lid | [[Radmax]] <<SCINOT>> (mR/h) |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 12 | Record cavity performance limitation. If the performance limit is Other, record performance limit description in the comment box. | [[PerformancLimit]] {{RF power,FE,Quench,Cable,Operator,Admin,Other}} <<SELECT>>  [[PerformanceLimit]] <<COMMENT>> |
| 13 | Upload the raw data file with VTA RF testing results using file name: CavID\_yymmdd.txt. | [[RF\_TestRawData]] <<FILEUPLOAD>> |
| 14 | Upload Screenshot for LabView Program.  Note: In the screenshots Eacc indicate Vt for this traveler. | [[Cable\_Calibration]] <<FILEUPLOAD>> |
| 15 | Upload data file from Temperature Sensor Measurement during RF tests. | [[Temp\_SensorData]] <<FILEUPLOAD>> |