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| 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 |

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

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| 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>> |

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| **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) |

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| **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>> |