|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Traveler Title | **C100 Cryomodule Acceptance Test – High Power Testing** | | | | |
| Traveler Abstract | *Acceptance Testing of the C100 Cryomodule in the Cryomodule Test Facility (CMTF). This traveler controls and documents the High Power RF Measurements performed on the C100 cryomodule prior to installation in the accelerator.* | | | | |
| Traveler ID | C100-CM-HPRF-ACTS | | | | |
| Traveler Revision | R1 | | | | |
| Traveler Author | M. Drury | | | | |
| Traveler Date | 6/22/11 | | | | |
| NCR Emails | drury, hogan | | | | |
| Approval Names | M. Drury | J. Hogan | M. Wiseman | C. Reece | J. Hogan |
| Approval Signatures |  |  |  |  |  |
| Approval Dates |  |  |  |  |  |
| Approval Title | Author | Reviewer | 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. | | | |
| [A-08-007-OSP](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-20964/A-08-007-OSP.pdf)  CMTF Operational Safety Procedure | [Conduct of Operations for the CMTF](https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-7460/CMTF%20COO%202008.doc) | CRM-120-7030-1000  Cavity String and Instrumentation Flow Schematic | [CRM-120-8020-0040 End Can Wiring Schematic](file:///M:\asd\asddata\CMTF\C100%20Cryomodule%20Tests\CRM1208020-0040-RevA%20EndCanWiring.pdf) |  |
|  |  |  |  |  |

|  |  |
| --- | --- |
| Revision Note |  |
| R1 | Initial release of this Traveler. |

|  |  |
| --- | --- |
| **Part Description:** | C100 Cryomodule S/N: [[CMSN]] <<CMSN>> |
| **Table of Contents** | |
| **Section** | **Page** |
| High Power RF: High Power Checklist | 2-8 |
| High Power RF: Qext's, FPC's and HOM's | 9 |
| High Power RF: Maximum Gradient Determination (Emax) | 10 |
| High Power RF: Extended (One Hour) Run (Emaxop) | 11 |
| High Power RF: Field Emission Measurements | 12 |
| High Power RF: Qo Measurements / Static Heat Load - Primary Circuit | 13-15 |
| High Power RF: Pressure Sensitivity Measurements | 16 |
| High Power RF: Static Lorentz Measurement | 17 |
| High Power RF: Swept AM Lorentz Transfer Function | 18 |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 1 | Record the Cavity ID’s for each cavity position. (Note: Cavity 1-Supply side, Cavity 8-Return side) | [[Cavity 1 ID]] <<CAVSN>>  [[Cavity 2 ID]] <<CAVSN>>  [[Cavity 3 ID]] <<CAVSN>>  [[Cavity 4 ID]] <<CAVSN>>  [[Cavity 5 ID]] <<CAVSN>>  [[Cavity 6 ID]] <<CAVSN>>  [[Cavity 7 ID]] <<CAVSN>>  [[Cavity 8 ID]] <<CAVSN>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 2 | **High Power Checklist** |  |
| 3 | Complete the **RF Cable Calibration Measurements** for the cryomodule under test as described in the procedure C100-CMTF-CM–CABL-CAL, using the CMTF Cable Calibration Worksheet.  Upload the completed spreadsheet. Note any problems in comments. | [[RFCableCalTech]] <<USERNAME>>  [[RFCableCalComplete]] <<TIMESTAMP>>  [[RFCableCalComments]] <<COMMENT>>  [[RFCableCalibrationFile]] <<FILEUPLOAD>> |
| 4 | **Test Arc Detectors** for Cavities 1-8. Verify that each detector generates a fault and disables RF. Check off each working arc detector interlock. Note any problems in the comment block.  **\*\*Do Not Attempt to Supply High Power RF to Cavity if the associated Arc Detector and Interlock are not Functioning Correctly!\*\*** | [[ArcDetectorIntlkInspector]] <<USERNAME>>  [[ArcDetectorIntlkCheckComplete]] <<TIMESTAMP>>  [[ArcDetectorIntlkComments]] <<COMMENT>>  [[C1ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C2ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C3ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C4ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C5ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C6ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C7ArcDetectorIntlkPassed]] <<CHECKBOX>>  [[C8ArcDetectorIntlkPassed]] <<CHECKBOX>> |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | **Data Inputs** | |
| 5 | **IR Detectors (Warm Window Temperatures):** Determine the baseline IR voltage (cavities at 2K with no RF), set the trip level and test the interlock by applying heat to the detector for each cavity. Record the results in the table below  **\*\*Do Not Attempt to Supply High Power RF to Cavity if ithe associated IR Detectors and Interlock are not Functioning Correctly!\*\*** | | [[IRDetectorIntlkInspector]] <<USERNAME>>  [[IRDetectorIntlkCheckComplete]] <<TIMESTAMP>>  [[IRDetectorIntlkComments]] <<COMMENT>> | |
| **Vacuum Side IR Detectors** | | | | |
| **Cavity** | **Baseline Voltage (V)** | **Trip Voltage (V)** | | **Interlock Test (check if passed)** |
| **1** | [[C1VacIRBaseVolts]] <<FLOAT>> | [[C1VacIRTripVolts]] <<FLOAT>> | | [[C1VacIRIntlkPassed]] <<CHECKBOX>> |
| **2** | [[C2VacIRBaseVolts]] <<FLOAT>> | [[C2VacIRTripVolts]] <<FLOAT>> | | [[C2VacIRIntlkPassed]] <<CHECKBOX>> |
| **3** | [[C3VacIRBaseVolts]] <<FLOAT>> | [[C3VacIRTripVolts]] <<FLOAT>> | | [[C3VacIRIntlkPassed]] <<CHECKBOX>> |
| **4** | [[C4VacIRBaseVolts]] <<FLOAT>> | [[C4VacIRTripVolts]] <<FLOAT>> | | [[C4VacIRIntlkPassed]] <<CHECKBOX>> |
| **5** | [[C5VacIRBaseVolts]] <<FLOAT>> | [[C5VacIRTripVolts]] <<FLOAT>> | | [[C5VacIRIntlkPassed]] <<CHECKBOX>> |
| **6** | [[C6VacIRBaseVolts]] <<FLOAT>> | [[C6VacIRTripVolts]] <<FLOAT>> | | [[C6VacIRIntlkPassed]] <<CHECKBOX>> |
| **7** | [[C7VacIRBaseVolts]] <<FLOAT>> | [[C7VacIRTripVolts]] <<FLOAT>> | | [[C7VacIRIntlkPassed]] <<CHECKBOX>> |
| **8** | [[C8VacIRBaseVolts]] <<FLOAT>> | [[C8VacIRTripVolts]] <<FLOAT>> | | [[C8VacIRIntlkPassed]] <<CHECKBOX>> |
| **Air Side IR Detectors** | | | | |
| **1** | [[C1AirIRBaseVolts]] <<FLOAT>> | [[C1AirIRTripVolts]] <<FLOAT>> | | [[C1AirIRIntlkPassed]] <<CHECKBOX>> |
| **2** | [[C2AirIRBaseVolts]] <<FLOAT>> | [[C2AirIRTripVolts]] <<FLOAT>> | | [[C2AirIRIntlkPassed]] <<CHECKBOX>> |
| **3** | [[C3AirIRBaseVolts]] <<FLOAT>> | [[C3AirIRTripVolts]] <<FLOAT>> | | [[C3AirIRIntlkPassed]] <<CHECKBOX>> |
| **4** | [[C4AirIRBaseVolts]] <<FLOAT>> | [[C4AirIRTripVolts]] <<FLOAT>> | | [[C4AirIRIntlkPassed]] <<CHECKBOX>> |
| **5** | [[C5AirIRBaseVolts]] <<FLOAT>> | [[C5AirIRTripVolts]] <<FLOAT>> | | [[C5AirIRIntlkPassed]] <<CHECKBOX>> |
| **6** | [[C6AirIRBaseVolts]] <<FLOAT>> | [[C6AirIRTripVolts]] <<FLOAT>> | | [[C6AirIRIntlkPassed]] <<CHECKBOX>> |
| **7** | [[C7AirIRBaseVolts]] <<FLOAT>> | [[C7AirIRTripVolts]] <<FLOAT>> | | [[C7AirIRIntlkPassed]] <<CHECKBOX>> |
| **8** | [[C8AirIRBaseVolts]] <<FLOAT>> | [[C8AirIRTripVolts]] <<FLOAT>> | | [[C8AirIRIntlkPassed]] <<CHECKBOX>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 6 | Test the **Beamline Vacuum Interlock** by disconnecting signal input cable from interlock board. Verify that a fault is generated and RF is disabled. Check the box if working. Note any problems in the comment block.  **\*\* Do Not Attempt to Supply High Power RF to any Cavity if the Beamline Vacuum Ion Pump and Interlock is Not Working Properly \*\*** | [[BLVacIntlkInspector]] <<USERNAME>>  [[BLVacIntlkCheckComplete]] <<TIMESTAMP>>  [[BLVacIntlkComments]] <<COMMENT>>  [[BLVacIntlkPassed]] <<CHECKBOX>> |
| 7 | Test the **Waveguide Guard Vacuum Interlocks** by disconnecting signal input cable from interlock board. Verify that a fault is generated and RF is disabled. Check off each working interlock. Note any problems in the comment block.  **\*\* Do Not Attempt to Supply High Power RF to a Cavity if the associated Waveguide Vacuum Ion Pump and Interlock are Not Functioning Properly \*\*** | [[WGVacIntlkInspector]] <<USERNAME>>  [[WGVacIntlkCheckComplete]] <<TIMESTAMP>>  [[WGVacIntlkComments]] <<COMMENT>>  [[WG1VacIntlkPassed]] <<CHECKBOX>>  [[WG2VacIntlkPassed]] <<CHECKBOX>>  [[WG3VacIntlkPassed]] <<CHECKBOX>>  [[WG4VacIntlkPassed]] <<CHECKBOX>>  [[WG5VacIntlkPassed]] <<CHECKBOX>>  [[WG6VacIntlkPassed]] <<CHECKBOX>>  [[WG7VacIntlkPassed]] <<CHECKBOX>>  [[WG8VacIntlkPassed]] <<CHECKBOX>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 8 | **Verify that Geiger-Mueller tubes are connected and correctly positioned around cryomodule:**  Typical setup (for 7 channel system )is as follows :   * Channel 1 on return-side beamline. * Channel 2 at FPC for Cavity 8 * Channel 3 at FPC for Cavity 7 * Channel 4 at FPC for Cavity 6 * Channel 5 at FPC for Cavity 5 * Channel 6 at FPC for Cavity 4 * Channel 7 on supply side beamline.   or   * Channel 1 on return-side beamline. * Channel 2 at FPC for Cavity 5 * Channel 3 at FPC for Cavity 4 * Channel 4 at FPC for Cavity 3 * Channel 5 at FPC for Cavity 2 * Channel 6 at FPC for Cavity 1 * Channel 7 on supply side beamline.   Note any deviations from this scheme in the comment box. | [[GMTubeInspector]] <<USERNAME>>  [[GMTubeInspectComplete <<TIMESTAMP>>  [[GMTubeComments]] <<COMMENT>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 9 | **Inspect all waveguide connections in the test cave.** All waveguide sections must be in place with all flange bolt holes filled. Bolts must not be loose.  Note any problems in the comment box.  **\*\*No waveguide that is capable of delivering RF power into the cave may be open. Waveguide must be terminated either by connection to cryomodule or by shorting plate or an appropriate load.**  **The cave must not be swept unless this step has been completed.\*\*** | [[WaveGuideInspector]] <<USERNAME>>  [[WaveGuideInspectComplete]] <<TIMESTAMP>>  [[WaveguideComments]] <<COMMENT>>  [[WaveguideInspectPassed]] <<CHECKBOX>> |
| 10 | **Inspect all RF heliax cable connections.** A proper connection means at least hand tightened and connected to the appropriate connector. Note any problems in the comment block.   * All eight Ptrans cables are properly connected to the appropriate field probe connectors. * All RF Heliax cables hanging from RF patch panels 1A, 2A, 3A, 4A are properly connected. * All eight pair of cables coming from the directional couplers are properly connected. * All cables are properly connected to waveguide switching chassis located on South wall of cave.   **\*\* The cave must not be swept until this inspection has been successfully completed.\*\*** | [[RFCableInspector]] <<USERNAME>>  [[RFCableInspectComplete]] <<TIMESTAMP>>  [[RFCableComments]] <<COMMENT>>  [[RFCableInspectPassed]] <<CHECKBOX>> |

|  |  |  |
| --- | --- | --- |
| 11 | **PSS function check:**  After completing a sweep of the cave, bring the RF HPA into the High Voltage state. Drop the PSS state from “Run” to “Open Access” using the key and verify that HPA has dropped out of the High Voltage. Note any problems in comment block.  If PSS fails test, contact PSS on-call personnel immediately.  **Note: If there is a cryomodule in the Cave with u-tubes stabbed, then ODH2 certification is required to participate in the PSS sweep.**  **\*\* RF must not be supplied to cavities until this test is completed successfully.\*\*** | [[PSSFunctionCheckInspector]] <<USERNAME>>  [[PSSFunctionCheckComplete]] <<TIMESTAMP>>  [[PSSFunctionCheckComments]] <<COMMENT>>  [[PSSFunctionCheckPassed]] <<CHECKBOX>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 12 | Verify that all **High Power Checkout Steps** are complete and all requested information has been entered into the appropriate fields. This step must be completed before High Power RF operations may begin. | [[HighPowerCheckOutComplete]] {{drury,kdavis,hogan}} <<HOLDPOINT>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 13 | Determine the **Maximum Gradient and Maximum Operating Gradient** (Emax and Emaxop) for each cavity.  After initial tuning of RF to Cavity, measure the **Qext’s** of the **Fundamental Power Coupler, Field Probe and HOM couplers, A and B.** See the procedure C100-CMTF-CM-CAV-HPRF-QEXT for instructions.  Record those values in the appropriate fields in the table below.  Proceed with the determination of Emax. See the procedure, C100-CMTF-CM-CAV-EMAX for instructions. Some processing of the Waveguide Guard Vacuums may be necessary.  Once Emax has been determined,record the requested data in the table below.  Proceed with the determination of Emaxop. Instructions for this process are found in the procedure, C100-CMTF-CM-CAV-EMAX.  Enter all requested data in the tables below. | [[C1QextMeasTech]] <<USERNAME>>  [[C1QextMeasComplete]] <<TIMESTAMP>>  [[C2QextMeasTech]] <<USERNAME>>  [[C2QextMeasComplete]] <<TIMESTAMP>>  [[C3QextMeasTech]] <<USERNAME>>  [[C3QextMeasComplete]] <<TIMESTAMP>>  [[C4QextMeasTech]] <<USERNAME>>  [[C4QextMeasComplete]] <<TIMESTAMP>>  [[C5QextMeasTech]] <<USERNAME>>  [[C5QextMeasComplete]] <<TIMESTAMP>>  [[C6QextMeasTech]] <<USERNAME>>  [[C6QextMeasComplete]] <<TIMESTAMP>>  [[C7QextMeasTech]] <<USERNAME>>  [[C7QextMeasComplete]] <<TIMESTAMP>>  [[C8QextMeasTech]] <<USERNAME>>  [[C8QextMeasComplete]] <<TIMESTAMP>> |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | | |
| 14 | **Qext Measurements:** Record Qext’s for each coupler on each cavity in the table below. If any unusual behavior such as changes in pulse shape occur, attach screenshots of waveforms. | | | | | |
| **Cavity** | **QextFPC** | **QextFieldProbe** | **QextHOMA** | **QextHOMB** | **Screenshots** | **Comments** |
| **1** | [[C1QextFPC]] <<SCINOT>> | [[C1QextFP]] <<SCINOT>> | [[C1QextHOMA]] <<SCINOT>> | [[C1QextHOMB]] <<SCINOT>> | [[C1PulsedWaveforms]] <<FILEUPLOAD>> | [[C1QextComments]] <<COMMENT>> |
| **2** | [[C2QextFPC]] <<SCINOT>> | [[C2QextFP]] <<SCINOT>> | [[C2QextHOMA]] <<SCINOT>> | [[C2QextHOMB]] <<SCINOT>> | [[C2PulsedWaveforms]] <<FILEUPLOAD>> | [[C2QextComments]] <<COMMENT>> |
| **3** | [[C3QextFPC]] <<SCINOT>> | [[C3QextFP]] <<SCINOT>> | [[C3QextHOMA]] <<SCINOT>> | [[C3QextHOMB]] <<SCINOT>> | [[C3PulsedWaveforms]] <<FILEUPLOAD>> | [[C3QextComments]] <<COMMENT>> |
| **4** | [[C4QextFPC]] <<SCINOT>> | [[C4QextFP]] <<SCINOT>> | [[C4QextHOMA]] <<SCINOT>> | [[C4QextHOMB]] <<SCINOT>> | [[C4PulsedWaveforms]] <<FILEUPLOAD>> | [[C4QextComments]] <<COMMENT>> |
| **5** | [[C5QextFPC]] <<SCINOT>> | [[C5QextFP]] <<SCINOT>> | [[C5QextHOMA]] <<SCINOT>> | [[C5QextHOMB]] <<SCINOT>> | [[C5PulsedWaveforms]] <<FILEUPLOAD>> | [[C5QextComments]] <<COMMENT>> |
| **6** | [[C6QextFPC]] <<SCINOT>> | [[C6QextFP]] <<SCINOT>> | [[C6QextHOMA]] <<SCINOT>> | [[C6QextHOMB]] <<SCINOT>> | [[C6PulsedWaveforms]] <<FILEUPLOAD>> | [[C6QextComments]] <<COMMENT>> |
| **7** | [[C7QextFPC]] <<SCINOT>> | [[C7QextFP]] <<SCINOT>> | [[C7QextHOMA]] <<SCINOT>> | [[C7QextHOMB]] <<SCINOT>> | [[C7PulsedWaveforms]] <<FILEUPLOAD>> | [[C7QextComments]] <<COMMENT>> |
| **8** | [[C8QextFPC]] <<SCINOT>> | [[C8QextFP]] <<SCINOT>> | [[C8QextHOMA]] <<SCINOT>> | [[C8QextHOMB]] <<SCINOT>> | [[C8PulsedWaveforms]] <<FILEUPLOAD>> | [[C8QextComments]] <<COMMENT>> |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | | |
| 15 | **Maximum Gradient Determination:** Record Emax and select a limiting condition. See the procedure, C100-CMTF-CM-CAV-EMAX for a list of limiting conditions. Use the File Upload to document any interesting conditions or behaviors encountered during this procedure.  [[Replace the CnEmaxLimit (n=1..8) Text Field below with a Select Field: [[CnEmaxLimit]] {{Arc Fault,IR Fault, Cavity Quench,End Group Quench,BLVac Fault,WGVac Fault,Power Limited,Heat Load Limited,Admin Limit,Other}} <<SELECT>>]] <<NOTE>> | | | | | |
| **Cavity** | **Operator** | **Time of Completion** | **Emax (MV/m)** | **Limiting Condition** | **File Upload** | **Comments** |
| **1** | [[C1EmaxTech]] <<USERNAME>> | [[C1EmaxComplete]] <<TIMESTAMP>> | [[C1Emax]] <<FLOAT>> | [[C1EmaxLimit]] <<TEXT>> | [[C1EmaxFiles]] <<FILEUPLOAD>> | [[C1EmaxComments]] <<COMMENT>> |
| **2** | [[C2EmaxTech]] <<USERNAME>> | [[C2EmaxComplete]] <<TIMESTAMP>> | [[C2Emax]] <<FLOAT>> | [[C2EmaxLimit]] <<TEXT>> | [[C2EmaxFiles]] <<FILEUPLOAD>> | [[C2EmaxComments]] <<COMMENT>> |
| **3** | [[C3EmaxTech]] <<USERNAME>> | [[C3EmaxComplete]] <<TIMESTAMP>> | [[C3Emax]] <<FLOAT>> | [[C3EmaxLimit]] <<TEXT>> | [[C3EmaxFiles]] <<FILEUPLOAD>> | [[C3EmaxComments]] <<COMMENT>> |
| **4** | [[C4EmaxTech]] <<USERNAME>> | [[C4EmaxComplete]] <<TIMESTAMP>> | [[C4Emax]] <<FLOAT>> | [[C4EmaxLimit]] <<TEXT>> | [[C4EmaxFiles]] <<FILEUPLOAD>> | [[C4EmaxComments]] <<COMMENT>> |
| **5** | [[C5EmaxTech]] <<USERNAME>> | [[C5EmaxComplete]] <<TIMESTAMP>> | [[C5Emax]] <<FLOAT>> | [[C5EmaxLimit]] <<TEXT>> | [[C5EmaxFiles]] <<FILEUPLOAD>> | [[C5EmaxComments]] <<COMMENT>> |
| **6** | [[C6EmaxTech]] <<USERNAME>> | [[C6EmaxComplete]] <<TIMESTAMP>> | [[C6Emax]] <<FLOAT>> | [[C6EmaxLimit]] <<TEXT>> | [[C6EmaxFiles]] <<FILEUPLOAD>> | [[C6EmaxComments]] <<COMMENT>> |
| **7** | [[C7EmaxTech]] <<USERNAME>> | [[C7EmaxComplete]] <<TIMESTAMP>> | [[C7Emax]] <<FLOAT>> | [[C7EmaxLimit]] <<TEXT>> | [[C7EmaxFiles]] <<FILEUPLOAD>> | [[C7EmaxComments]] <<COMMENT>> |
| **8** | [[C8EmaxTech]] <<USERNAME>> | [[C8EmaxComplete]] <<TIMESTAMP>> | [[C8Emax]] <<FLOAT>> | [[C8EmaxLimit]] <<TEXT>> | [[C8EmaxFiles]] <<FILEUPLOAD>> | [[C8EmaxComments]] <<COMMENT>> |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | |
| 16 | **Maximum Operating Gradient Determination** **(1 Hour Run):** After completing each 1Hour Run, record the requested information in the table below. Copy data from logfiles to the One Hour Run Spreadsheet Template and process as necessary. Upload the completed spreadsheet. | | | | |
| **Cavity** | **Operator** | **Time Completed** | **Emaxop**  **(MV/m)** | **File Upload** | **Comments** |
| **1** | [[C1EmaxopTech]] <<USERNAME>> | [[C1EmaxopComplete]] <<TIMESTAMP>> | [[C1Emaxop]] <<FLOAT>> | [[C1EmaxopFile]] <<FILEUPLOAD>> | [[C1EmaxopComments]] <<COMMENT>> |
| **2** | [[C2EmaxopTech]] <<USERNAME>> | [[C2EmaxopComplete]] <<TIMESTAMP>> | [[C2Emaxop]] <<FLOAT>> | [[C2EmaxopFile]] <<FILEUPLOAD>> | [[C2EmaxopComments]] <<COMMENT>> |
| **3** | [[C3EmaxopTech]] <<USERNAME>> | [[C3EmaxopComplete]] <<TIMESTAMP>> | [[C3Emaxop]] <<FLOAT>> | [[C3EmaxopFile]] <<FILEUPLOAD>> | [[C3EmaxopComments]] <<COMMENT>> |
| **4** | [[C4EmaxopTech]] <<USERNAME>> | [[C4EmaxopComplete]] <<TIMESTAMP>> | [[C4Emaxop]] <<FLOAT>> | [[C4EmaxopFile]] <<FILEUPLOAD>> | [[C4EmaxopComments]] <<COMMENT>> |
| **5** | [[C5EmaxopTech]] <<USERNAME>> | [[C5EmaxopComplete]] <<TIMESTAMP>> | [[C5Emaxop]] <<FLOAT>> | [[C5EmaxopFile]] <<FILEUPLOAD>> | [[C5EmaxopComments]] <<COMMENT>> |
| **6** | [[C6EmaxopTech]] <<USERNAME>> | [[C6EmaxopComplete]] <<TIMESTAMP>> | [[C6Emaxop]] <<FLOAT>> | [[C6EmaxopFile]] <<FILEUPLOAD>> | [[C6EmaxopComments]] <<COMMENT>> |
| **7** | [[C7EmaxopTech]] <<USERNAME>> | [[C7EmaxopComplete]] <<TIMESTAMP>> | [[C7Emaxop]] <<FLOAT>> | [[C7EmaxopFile]] <<FILEUPLOAD>> | [[C7EmaxopComments]] <<COMMENT>> |
| **8** | [[C8EmaxopTech]] <<USERNAME>> | [[C8EmaxopComplete]] <<TIMESTAMP>> | [[C8Emaxop]] <<FLOAT>> | [[C8EmaxopFile]] <<FILEUPLOAD>> | [[C8EmaxopComments]] <<COMMENT>> |
| **Total Energy Contribution with all Cavities Running at Emaxop:**  [[Sum C1Emaxop through C8Emaxop, multiply sum by 0.7 and enter result in CMMaxEnergy]] <<NOTE>> | | | | | [[CMMaxEnergy]] <<FLOAT>>MeV |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | |
| 17 | Complete the **Field Emission vs. Gradient Measurement.** See the procedure, C100-CMTF-CM-CAV-FE for instructions. Record the requested information in the table below. Copy data from the logfiles into the **Field Emission Spreadsheet Template.** Process as necessary and upload below. | | | | |
| **Cavity** | **Operator** | **Time Completed** | **Field Emission Onset**  **(MV/m)** | **File Upload** | **Comments** |
| **1** | [[C1FETech]] <<USERNAME>> | [[C1FEComplete]] <<TIMESTAMP>> | [[C1FEOnset]] <<FLOAT>> | [[C1FEFile]] <<FILEUPLOAD>> | [[C1FEComments]] <<COMMENT>> |
| **2** | [[C2FETech]] <<USERNAME>> | [[C2FEComplete]] <<TIMESTAMP>> | [[C2FEOnset]] <<FLOAT>> | [[C2FEFile]] <<FILEUPLOAD>> | [[C2FEComments]] <<COMMENT>> |
| **3** | [[C3FETech]] <<USERNAME>> | [[C3FEComplete]] <<TIMESTAMP>> | [[C3FEOnset]] <<FLOAT>> | [[C3FEFile]] <<FILEUPLOAD>> | [[C3FEComments]] <<COMMENT>> |
| **4** | [[C4FETech]] <<USERNAME>> | [[C4FEComplete]] <<TIMESTAMP>> | [[C4FEOnset]] <<FLOAT>> | [[C4FEFile]] <<FILEUPLOAD>> | [[C4FEComments]] <<COMMENT>> |
| **5** | [[C5FETech]] <<USERNAME>> | [[C5FEComplete]] <<TIMESTAMP>> | [[C5FEOnset]] <<FLOAT>> | [[C5FEFile]] <<FILEUPLOAD>> | [[C5FEComments]] <<COMMENT>> |
| **6** | [[C6FETech]] <<USERNAME>> | [[C6FEComplete]] <<TIMESTAMP>> | [[C6FEOnset]] <<FLOAT>> | [[C6FEFile]] <<FILEUPLOAD>> | [[C6FEComments]] <<COMMENT>> |
| **7** | [[C7FEOTech]] <<USERNAME>> | [[C7FEComplete]] <<TIMESTAMP>> | [[C7FEOnset]] <<FLOAT>> | [[C7FEFile]] <<FILEUPLOAD>> | [[C7FEComments]] <<COMMENT>> |
| **8** | [[C8FETech]] <<USERNAME>> | [[C8FEComplete]] <<TIMESTAMP>> | [[C8FEOnset]] <<FLOAT>> | [[C8FEFile]] <<FILEUPLOAD>> | [[C8FEComments]] <<COMMENT>> |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | | |
| 18 | Complete the **Qo measurement sequence** for each cavity. See the procedures C100-CMTF-CM-CAV-QO for detailed instructions.  In the table below, record the value of Qo at 6.0 MV/m, 19.2 MV/m and at Emaxop.  Record the highest gradient (MV/m) at which the cavity still meets the specification for dynamic heat load to the primary circuit: (**30 Watts).** | | | | | |
| **Cavity** | **Operator** | **Time Completed** | **Qo @ 6.0MV/m** | **Qo @ 19.2 MV/m** | **Qo @ Emaxop** | **RF Heat Load @ Emaxop (W)** |
| **1** | [[C1QoTech]] <<USERNAME>> | [[C1QoComplete]] <<TIMESTAMP>> | [[C1QoAtSix]] <<SCINOT>> | [[C1QoAtNineteen]] <<SCINOT>> | [[C1QoAtEmaxop]] <<SCINOT>> | [[C1RFHeatLoad]] <<FLOAT>> |
| **2** | [[C2QoTech]] <<USERNAME>> | [[C2QoComplete]] <<TIMESTAMP>> | [[C2QoAtSix]] <<SCINOT>> | [[C2QoAtNineteen]] <<SCINOT>> | [[C2QoAtEmaxop]] <<SCINOT>> | [[C2RFHeatLoad]] <<FLOAT>> |
| **3** | [[C3QoTech]] <<USERNAME>> | [[C3QoComplete]] <<TIMESTAMP>> | [[C3QoAtSix]] <<SCINOT>> | [[C3QoAtNineteen]] <<SCINOT>> | [[C3QoAtEmaxop]] <<SCINOT>> | [[C3RFHeatLoad]] <<FLOAT>> |
| **4** | [[C4QoOTech]] <<USERNAME>> | [[C4QoComplete]] <<TIMESTAMP>> | [[C4QoAtSix]] <<SCINOT>> | [[C4QoAtNineteen]] <<SCINOT>> | [[C4QoAtEmaxop]] <<SCINOT>> | [[C4RFHeatLoad]] <<FLOAT>> |
| **5** | [[C5QoOTech]] <<USERNAME>> | [[C5QoComplete]] <<TIMESTAMP>> | [[C5QoAtSix]] <<SCINOT>> | [[C5QoAtNineteen]] <<SCINOT>> | [[C5QoAtEmaxop]] <<SCINOT>> | [[C5RFHeatLoad]] <<FLOAT>> |
| **6** | [[C6QoOTech]] <<USERNAME>> | [[C6QoComplete]] <<TIMESTAMP>> | [[C6QoAtSix]] <<SCINOT>> | [[C6QoAtNineteen]] <<SCINOT>> | [[C6QoAtEmaxop]] <<SCINOT>> | [[C6RFHeatLoad]] <<FLOAT>> |
| **7** | [[C7QoOTech]] <<USERNAME>> | [[C7QoComplete]] <<TIMESTAMP>> | [[C7QoAtSix]] <<SCINOT>> | [[C7QoAtNineteen]] <<SCINOT>> | [[C7QoAtEmaxop]] <<SCINOT>> | [[C7RFHeatLoad]] <<FLOAT>> |
| **8** | [[C8QoTech]] <<USERNAME>> | [[C8QoComplete]] <<TIMESTAMP>> | [[C8QoAtSix]] <<SCINOT>> | [[C8QoAtNineteen]] <<SCINOT>> | [[C8QoAtEmaxop]] <<SCINOT>> | [[C8RFHeatLoad]] <<FLOAT>> |
| Total RF Heat Load with all Cavities Running at Emaxop:  [[Sum C1RFHeatLoad through C8RFHeatLoad and Enter Result in CMRFHeatLoad]] <<NOTE>> | | | | | | [[CMRFHeatLoad]] <<FLOAT>> |

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No** | **Instructions** | | |
| 19 | **Qo Measurements:** Record the highest gradient (MV/m) at which the cavity still meets the specification for dynamic heat load to the primary circuit: **(≤ 30 Watts)**.  If the cavity exceeds the specification before reaching 19.2 MV/m, an NCR must be generated.  Copy data from logfile into Qo Measurement Spreadsheet Template. Process as necessary and upload the completed file  Use the comment box to note any problems, etc. | | |
| **Cavity** | **Maximum Gradient for Heat Specification (MV/m)** | **File Upload** | **Comments** |
| **1** | [[C1EmaxHeatSpec]] <<FLOAT>> | [[C1QoFile]] <<FILEUPLOAD>> | [[C1QoComments]] <<COMMENT>> |
| **2** | [[C2EmaxHeatSpec]] <<FLOAT>> | [[C2QoFile]] <<FILEUPLOAD>> | [[C2QoComments]] <<COMMENT>> |
| **3** | [[C3EmaxHeatSpec]] <<FLOAT>> | [[C3QoFile]] <<FILEUPLOAD>> | [[C3QoComments]] <<COMMENT>> |
| **4** | [[C4EmaxHeatSpec]] <<FLOAT>> | [[C4QoFile]] <<FILEUPLOAD>> | [[C4QoComments]] <<COMMENT>> |
| **5** | [[C5EmaxHeatSpec]] <<FLOAT>> | [[C5QoFile]] <<FILEUPLOAD>> | [[C5QoComments]] <<COMMENT>> |
| **6** | [[C6EmaxHeatSpec]] <<FLOAT>> | [[C6QoFile]] <<FILEUPLOAD>> | [[C6QoComments]] <<COMMENT>> |
| **7** | [[C7EmaxHeatSpec]] <<FLOAT>> | [[C7QoFile]] <<FILEUPLOAD>> | [[C7QoComments]] <<COMMENT>> |
| **8** | [[C8EmaxHeatSpec]] <<FLOAT>> | [[C8QoFile]] <<FILEUPLOAD>> | [[C8QoComments]] <<COMMENT>> |

|  |  |  |
| --- | --- | --- |
| **Step No** | **Instructions** | **Data Inputs** |
| 20 | Record the **Average Static Heat Load** (in Watts) to the primary (2K) helium circuit. See the procedure CMTF-CM-CAV-QO for instructions. Use the Static Heat Load Spreadsheet Template to calculate the average and process as necessary. Upload the processed spreadsheet. Enter any requested information to the right.  **Specification: 25 Watts Nominal** | [[StaticHeatLoadOperator]] <<USERNAME>>  [[StaticHeatLoadCalcComplete]] <<TIMESTAMP>>  [[StaticHeatLoadComments ]] <<COMMENT>>  [[StaticHeatLoad]] <<FLOAT>> (W)  [[StaticHeatLoadFile]] <<FILEUPLOAD>> |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | |
| 21 | Complete the **Pressure Sensitivity Measurement** for all cavities. See the procedure C100-CMTF-CM-CAV-PSNS for detailed instructions. Record the requested data in the table below | | | | |
| **Cavity** | **Operator** | **Time Completed** | **Pressure Sensitivity**  **(Hz / torr)** | **File Upload** | **Comments** |
| **1** | [[C1PresSensTech]] <<USERNAME>> | [[C1PresSensComplete]] <<TIMESTAMP>> | [[C1PresSens]] <<FLOAT>> | [[C1PresSensFile]] <<FILEUPLOAD>> | [[C1PresSensComments]] <<COMMENT>> |
| **2** | [[C2PresSensTech]] <<USERNAME>> | [[C2PresSensComplete]] <<TIMESTAMP>> | [[C2PresSens]] <<FLOAT>> | [[C2PresSensFile]] <<FILEUPLOAD>> | [[C2PresSensComments]] <<COMMENT>> |
| **3** | [[C3PresSensTech]] <<USERNAME>> | [[C3PresSensComplete]] <<TIMESTAMP>> | [[C3PresSens]] <<FLOAT>> | [[C3PresSensFile]] <<FILEUPLOAD>> | [[C3PresSensComments]] <<COMMENT>> |
| **4** | [[C4PresSensTech]] <<USERNAME>> | [[C4PresSensComplete]] <<TIMESTAMP>> | [[C4PresSens]] <<FLOAT>> | [[C4PresSensFile]] <<FILEUPLOAD>> | [[C4PresSensComments]] <<COMMENT>> |
| **5** | [[C5PresSensTech]] <<USERNAME>> | [[C5PresSensComplete]] <<TIMESTAMP>> | [[C5PresSens]] <<FLOAT>> | [[C5PresSensFile]] <<FILEUPLOAD>> | [[C5PresSensComments]] <<COMMENT>> |
| **6** | [[C6PresSensTech]] <<USERNAME>> | [[C6PresSensComplete]] <<TIMESTAMP>> | [[C6PresSens]] <<FLOAT>> | [[C6PresSensFile]] <<FILEUPLOAD>> | [[C6PresSensComments]] <<COMMENT>> |
| **7** | [[C7PresSensTech]] <<USERNAME>> | [[C7PresSensComplete]] <<TIMESTAMP>> | [[C7PresSens]] <<FLOAT>> | [[C7PresSensFile]] <<FILEUPLOAD>> | [[C7PresSensComments]] <<COMMENT>> |
| **8** | [[C8PresSensTech]] <<USERNAME>> | [[C8PresSensComplete]] <<TIMESTAMP>> | [[C8PresSens]] <<FLOAT>> | [[C8PresSensFile]] <<FILEUPLOAD>> | [[C8PresSensComments]] <<COMMENT>> |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | | |
| 22 | Complete the **Static Lorentz Force Measurement** for all eight cavities. Check off the completion of the procedure at right and record requested data. See the procedure C100-CMTF-CM-CAV-SLRTZ for detailed instructions.  Copy data from the logfiles to the Static Lorentz Spreadsheet Template and process as necessary. Record the static Lorentz coefficient (in Hz/(MV/m)^2). | | | | |
| **Cavity** | **Operator** | **Time Completed** | **Static Lorents Coefficient**  **(Hz / (MV/m)2)** | **File Upload** | **Comments** |
| **1** | [[C1StatLrntzTech]] <<USERNAME>> | [[C1StatLrntzComplete]] <<TIMESTAMP>> | [[C1StatLrntzCoeff]] <<FLOAT>> | [[C1StatLrntzFile]] <<FILEUPLOAD>> | [[C1StatLrntzComments]] <<COMMENT>> |
| **2** | [[C2StatLrntzTech]] <<USERNAME>> | [[C2StatLrntzComplete]] <<TIMESTAMP>> | [[C2StatLrntzCoeff]] <<FLOAT>> | [[C2StatLrntzFile]] <<FILEUPLOAD>> | [[C2StatLrntzComments]] <<COMMENT>> |
| **3** | [[C3StatLrntzTech]] <<USERNAME>> | [[C3StatLrntzComplete]] <<TIMESTAMP>> | [[C3StatLrntzCoeff]] <<FLOAT>> | [[C3StatLrntzFile]] <<FILEUPLOAD>> | [[C3StatLrntzComments]] <<COMMENT>> |
| **4** | [[C4StatLrntzTech]] <<USERNAME>> | [[C4StatLrntzComplete]] <<TIMESTAMP>> | [[C4StatLrntzCoeff]] <<FLOAT>> | [[C4StatLrntzFile]] <<FILEUPLOAD>> | [[C4StatLrntzComments]] <<COMMENT>> |
| **5** | [[C5StatLrntzTech]] <<USERNAME>> | [[C5StatLrntzComplete]] <<TIMESTAMP>> | [[C5StatLrntzCoeff]] <<FLOAT>> | [[C5StatLrntzFile]] <<FILEUPLOAD>> | [[C5StatLrntzComments]] <<COMMENT>> |
| **6** | [[C6StatLrntzTech]] <<USERNAME>> | [[C6StatLrntzComplete]] <<TIMESTAMP>> | [[C6StatLrntzCoeff]] <<FLOAT>> | [[C6StatLrntzFile]] <<FILEUPLOAD>> | [[C6StatLrntzComments]] <<COMMENT>> |
| **7** | [[C7StatLrntzTech]] <<USERNAME>> | [[C7StatLrntzComplete]] <<TIMESTAMP>> | [[C7StatLrntzCoeff]] <<FLOAT>> | [[C7StatLrntzFile]] <<FILEUPLOAD>> | [[C7StatLrntzComments]] <<COMMENT>> |
| **8** | [[C8StatLrntzTech]] <<USERNAME>> | [[C8StatLrntzComplete]] <<TIMESTAMP>> | [[C8StatLrntzCoeff]] <<FLOAT>> | [[C8StatLrntzFile]] <<FILEUPLOAD>> | [[C8StatLrntzComments]] <<COMMENT>> |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step No** | **Instructions** | | | |
| 23 | Complete the **Swept AM Lorentz Force Transfer Function Measurement** for all eight cavities. See the procedure C100-CMTF-CM-CAV-DLRTZ for detailed instructions. Copy data from the text files into the Lorentz Force Transfer Function Spreadsheet Template and process as necessary.  Record the requested information and upload the completed spreadsheet in the table below. | | | |
| **Cavity** | **Operator** | **Time Completed** | **File Upload** | **Comments** |
| **1** | [[C1LrntzTransferTech]] <<USERNAME>> | [[C1LrntzTransferComplete]] <<TIMESTAMP>> | [[C1LrntzTransferFile]] <<FILEUPLOAD>> | [[C1LrntzTransferComments]] <<COMMENT>> |
| **2** | [[C2LrntzTransferTech]] <<USERNAME>> | [[C2LrntzTransferComplete]] <<TIMESTAMP>> | [[C2LrntzTransferFile]] <<FILEUPLOAD>> | [[C2LrntzTransferComments]] <<COMMENT>> |
| **3** | [[C3LrntzTransferTech]] <<USERNAME>> | [[C3LrntzTransferComplete]] <<TIMESTAMP>> | [[C3LrntzTransferFile]] <<FILEUPLOAD>> | [[C3LrntzTransferComments]] <<COMMENT>> |
| **4** | [[C4LrntzTransferTech]] <<USERNAME>> | [[C4LrntzTransferComplete]] <<TIMESTAMP>> | [[C4LrntzTransferFile]] <<FILEUPLOAD>> | [[C4LrntzTransferComments]] <<COMMENT>> |
| **5** | [[C5LrntzTransferTech]] <<USERNAME>> | [[C5LrntzTransferComplete]] <<TIMESTAMP>> | [[C5LrntzTransferFile]] <<FILEUPLOAD>> | [[C5LrntzTransferComments]] <<COMMENT>> |
| **6** | [[C6LrntzTransferTech]] <<USERNAME>> | [[C6LrntzTransferComplete]] <<TIMESTAMP>> | [[C6LrntzTransferFile]] <<FILEUPLOAD>> | [[C6LrntzTransferComments]] <<COMMENT>> |
| **7** | [[C7LrntzTransferTech]] <<USERNAME>> | [[C7LrntzTransferComplete]] <<TIMESTAMP>> | [[C7LrntzTransferFile]] <<FILEUPLOAD>> | [[C7LrntzTransferComments]] <<COMMENT>> |
| **8** | [[C8LrntzTransferTech]] <<USERNAME>> | [[C8LrntzTransferComplete]] <<TIMESTAMP>> | [[C8LrntzTransferFile]] <<FILEUPLOAD>> | [[C8LrntzTransferComments]] <<COMMENT>> |