# LCLS-II High Energy (HE) 1.3 GHz Nine Cell Dressed and Undressed Cavity 2K VTS Testing (RFCHE)

464504 Rev. B

| Series | Serial No. | Job No. | Task No. | Released By | Released Date | Status |
|---|---|---|---|---|---|---|
| RFCHE | CAVR137-0 | 584 | See Job Page | Fumio Furuta | 1/23/2023 5:03:25 PM | Closed |



## 1.0 Abstract Top

1.1 This traveler is to be used during the Nine Cell Dressed or Undressed Cavity 2K VTS Testing for the LCLS-II High Energy (HE).

## 2.0 General Notes Top

2.1 Follow the requirements in the appropriate General Cavity Procedures.

## 3.0 Supporting Documentation Top

3.1 Electronically attach all appropriate memos, specific instructions, digital photographs, discrepancy reports and other documentation in the appropriate step in this traveler.

**Note: Additional files can be attached to a traveler by clicking on the step number, then selecting Insert Attachment from the Traveler's Step Tools Menu**

## 4.0 Process Readiness Verification Top

4.1 Verify the current location of the cavity.

*Cavity Location:*

○ *VTS 1* ○ *VTS 2* ○ *VTS 3*

*Technician:* *Date:*

4.2 Responsible Authority MUST verify the following process has been completed and signed-off by the process Authority.


Verify the cavity process has been completed in Traveler 464240 and signed-off by the process Authority.

☐ *Verified*

*Comments:*

*Responsible Authority/Designee:* *Date:*

4.3 Is this a re-test?

○ *Yes* ◉ *No*

If yes explain in comment box.

*Comment:*

## 5.0 Testing and Results Top

5.1 Test Operator, and Date.

*Principal Test Operator:* ***Alex Melnychuk***

*Test Date:* ***1/24/2023***

5.2 Cool down Parameters.

Enter the temperature gradient between top and bottom when bottom transitions trough Tc.

*Temperature Gradient* [ ] **K**

5.3 Test Parameters.

*Dewar Number* ***2***
*Top Plate Number:* ***1***
*Top Plate Ports: Pi* ***3***
*Pt* ***sma3***
*HOM A* ***N5***
*HOM B* ***N6***
*Dewar Bath Temperature is 2K* ☐
*Dewar Bath Temperature if different from 2K:* [ ] **K**

| *Isolated from stand?* | *HOM Feedthroughs?* | *He vessel?* |
|---|---|---|
| ◉ *Yes* | ◉ *Yes* | ◉ *Yes* |
| ○ *No* | ○ *No* | ○ *No* |

**Cavity Flange type:**

| Flange at FP side | Flange at FPC side |
|---|---|
| ○ *NbTi* | ○ *NbTi* |
| ◉ *SS* | ◉ *SS* |

**Magnetic Fluxgate:**

*Standard location of Fluxgates* ☐

*If not comment:* [ ]
*Maximum field at room temperature before cool-down* [ ] **mG**

5.4 Network Analyzer.

*Cavity Frequency:* ***1300.211042 MHz***
*8/9 Cavity Frequency:* ***1299.461892 MHz***
*7/9 Cavity Frequency:* ***1297.263453 MHz***
*6/9 Cavity Frequency:* ***1293.909782 MHz***
*5/9 Cavity Frequency:* ***1289.84897 MHz***
*4/9 Cavity Frequency:* ***1285.515103 MHz***
*3/9 Cavity Frequency:* ***1281.468294 MHz***
*2/9 Cavity Frequency:* ***1278.135627 MHz***

*1/9 Cavity Frequency:* ***1276.046009 MHz***

5.5 Calibration.

*Calibration constants:*

*Ci:* ***3503***

*Cr:* ***14525***

*Ct:* ***214.8***

*CHOMA* ***821.1***

*CHOMB* ***816***

*Comment if Ci, Cr, Ct were re-measured during the test:*

5.6 Decay Measurement.

If BETA>1 cavity is overcoupled. If BETA<1 cavity is undercoupled.

*Cavity Coupling:*

◉ *Overcoupled*

○ *Undercoupled*

*Qext1* ***2.3E10***

*Qext2* ***1.19E12***

*Q HOM A* ***4.7E13***

*Q HOM B* ***1.3E13***

*Comment if Qext1, Qext2, Q HOM A, Q HOM B were remeasured during the test:*

The accepted ranges for antennas Q-factors are:
o 1.1e10 <= Q1 <= 1.9e10
o 7.5e11 <= Q2 <= 2.5e12
o QHOM >= 2.7e11

5.7 CW Measurement. at 2K.

*Check if radiation was detected* ☐

**Select all that applies:**

• *Field emission* ☐

*Eacc @ FE onset:* **MV/m**

• *Multipacting* ☐

*Eacc @ MP onset:* **MV/m**

*Check if measurement was stopped because radiation could not be processed away* ☐

NOTE: No field-emission-induced radiation should be detected up to the maximum gradient. Any multipacting must be fully processed before the final Q vs Eacc measurement.

*$E_{acc}$ @ quench* ***27.3***

*Highest Eacc @ Q = 2.5e10* ***27***

*The usable gradient (the lowest of the above $E_{acc}$* [ ]

NOTE: Max gradient must be >= 23 MV/m

**$Q_0$ , $10^{10}$**

*Maximum* ***3.45***

*Eacc at Maximum Q0* ***17***

*At $E_{acc}$ of 20.8 MV/m* ***3.43***

*P_HOM_A When $E_{acc}$ = 20.8 MV/m* ***0.01***

*P_HOM_B When $E_{acc}$ = 20.8 MV/m* ***0.036***

NOTE: The accepted values @ Eacc = 20.8 MV/m are:
- Q0 >= 2.5e10
- PHOM <= 1.7 W

5.8 Cavity Performance Summary.

***Maximum radiation*** *(after all processing):*

*$Rad_{max}$:* [ ] **mR/hr**

*Comment on Performance Limitation:* ***quench 27.3 ; 7PI/9 from 18.9MV/m, "pulsed" mode after that.***

*Comment on Multipacting, if Applicable:* ***no MP, no FE, no X-rays***

5.9 Upload Files.

*RF data (text file):* Link

*AUX Data File 1:* Link

*AUX Data File 2:* Link

*AUX Data File 3:* Link

*Responsible Authority/Designee:* ***Oleksandr Melnychuk*** *Date:* ***1/24/2023***

## 6.0 Process Completeness Verification Top

6.1 Responsible Authority MUST ensure this Traveler is complete, all specifications are met and the device is ready for the next process.


◉ *Qualified* ○ *Need reproccessing* ○ *Rejected*

*Comment* **-**

*Responsible Authority/Designee:* ***Daniel Bafia*** *Date:* ***1/24/2023***

6.2 Select the next destination for the cavity. If the option "Other" is chosen from the drop box, please type the location in the text field below the drop box.

*Cavity Destination:*

*Other*

*Technician:* *Date:*

## 7.0 Process/Production Complete Top

**Note: This section to be filled out by Process Engineering.**

7.1 Verify the Traveler is accurate and complete. Personnel shall conduct a review of all steps to ensure all operations required have been completed/signed off by required personnel. Ensure all Discrepancy Reports, Non-Conformance Reports , Repair/Rework forms, Deviation Index and dispositions have been reviewed and followed by the Responsible Authority before being approved/completed.

*Comments:* **-**

*Process Engineering/Designee:* ***Richard Motill*** *Date:* ***2/22/2023***