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TRAVELERS

Traveler Area: C100
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Search For: C100- (i.e. CAV-INSP)

C100-CAV-ASSY-R3 -- C100 Cavity Assembly
C100-CAV-ASSY2-R3 -- C100 Cavity Assembly, Evacuation, and Leak Test
C100-CAV-BAKE-R2 -- C100 Cavity Bake-out

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SerialNum: C100-RI-007 **Traveler ID: C100-CAV-VTRF Rev: R2 Page:0** **Traveler Seq Number: 12**

Traveler Title	**C100 (CEBAF 12 GeV cryomodule upgrade) Vertical Cavity Testing**			
Traveler Abstract	**Cryogenic RF testing of C100 7-cell cavities for 12 GeV CEBAF upgrade.**			
Traveler ID	**C100-CAV-VTRF**			
Traveler Revision	**R2**			
Traveler Author	**M. Stirbet**			
Traveler Date	**28-Jun-2010**			
NCR Emails	**mircea,kdavis,marhause,hogan**			
Approval Names	**M. Stirbet**	**C. Reece**	**J. Hogan**	**K. Davis**
Approval Date				
Approval Title	**Author**	**Reviewer**	**Project Manager**	**VTA facility 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	1497 MHz VTA RF Testing Procedure	HOM Test Procedure	**Drawing**
		Excel spreadsheet template for C100-CAV-VTRF	Excel template spreadsheet for HOM measurements	

Revision Note	
R1	**Initial release of this Traveler.**
R2	**Second traveler release with changes regarding QL measurements for HOM couplers, typical values for decay measurements and administrative limits to be applied for VTA RF testing of 7 cells LL cavities.**

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SerialNum: C100-RI-007 **Traveler ID: C100-CAV-VTRF** **Rev: R2** **Page:1** **Traveler Seq Number: 12**

Step No.	Instructions	Data Input
1	Input C100 CEBAF 7-cells cavity ID. Note any special handling, processing (chemistry or bake) or off-normal conditions associated with this cavity before test.	CAVSN C100-RI-007 SpecialHandling
2	Record if cavity has Helium vessel.	HeliumVessel ○ Yes ◉ No
3	Record if cavity is mechanically constrained (i.e. tuner attached, etc.).	TunerAttached ○ Yes ◉ No
4	Does this cavity have HOM coupler probes installed and connected to the test system? Indicate how many.	HOMsConnected 2
5	Enter the LabView file name, without special characters. (Valid example: C100_1).	LabviewFile C100-RI-007.txt
6	Record Test Date, Dewar No, Top Plate ID and Operator(s).	TestDate 30-Nov-2010 18:34 NOW (ex format 18-Jun-2005 16:30) Dewar 8 VTATSSN TS28-008 TestOperator1 KDavis TestOperator2 KDavis
7	Record cavity vacuum pressure, if so instrumented.	CavityVacuumTorr 1.1000e-5 "); (Torr)
8	Record Dewar helium bath liquid level, temperature and baratron pressure. Do not continue unless Dewar LHe level is above the end group. Start cavity testing at (29+/-0.1) Torr which correspond to about 2.07K.	DewarLHeLevel 183 (cm) DewarTempK 2.07 (K) Dewar_PressureTorr 29 (Torr)
9	Zero power meters then calibrate cables at cavity fundamental frequency as specified in 1497 MHz VTA RF Testing Procedure. If NO option is chosen launch NCR.	PowermetersZeroed ◉ Yes ○ No CableCalibrationOK ◉ Yes ○ No
10	Conform: 1497 MHz VTA RF Testing Procedure perform low power measurements using a network analyzer (measure the seven cavity mode frequencies). Record the cavity mode frequencies at the right. Example of cavity mode frequencies:	
	7_7Pi = 1496.7075 MHz	Freq_7_7Pi 1496.6703 (MHz)
	6_7Pi = 1495.4688 MHz	Freq_6_7Pi 1495.4895 (MHz)
	5_7Pi = 1492.0414 MHz	Freq_5_7Pi 1492.3373 (MHz)
	4_7Pi = 1487.1299 MHz	Freq_4_7Pi 1487.7752 (MHz)
	3_7Pi = 1481.7767 MHz	Freq_3_7Pi 1482.6851 (MHz)
	2_7Pi = 1476.9200 MHz	Freq_2_7Pi 1478.1015 (MHz)
	1_7Pi = 1473.6405 MHz	Freq_1_7Pi 1474.9384 (MHz)

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SerialNum: C100-RI-007 **Traveler ID: C100-CAV-VTRF** **Rev: R2** **Page:2** **Traveler Seq Number: 12**

Step No.	Instructions		Data Input
11	At 2.07K measure key HOM frequencies and Q_L per HOM Test Procedure. Pass/fail criterion: Loaded Qs (or Q_L externals) which are less than the listed values in the Excel template HOM_QA_template.xlsx will be acceptable. If chosen TestOperatorHOMs is Other, input operator name in the text box provided.		TestOperatorHOMs Grenoble TestOperatorHOMs_Other
	Upload Excel file with HOMs measurement data at 2.07K using file name as CavID_VTA HOM data_yyyy-mm-dd.xlsx.		Attach Files: Attach Files C100_RI_007_HOM_data_2010_12_01.xlsx HOM_VTA_2010-12-01_RI-007.xlsx Must refresh screen to see newly attached files.
	Notes on HOM measurements-record information about HOM measurements, performances, limitations and other observations.		HOMsComment no issues (F.M)
12	Cavity meets Q_L for HOM couplers as specified in HOM Test Procedure and HOM_QA_template.xlsx? If not, launch NCR.		CavityMeetsHOMsSpecifications (•) Yes ( ) No
13	At 2.07 K determine and record Dewar pressure (baratron) and cavity Pi-mode lock frequency precisely with LLR frequency counter conform: 1497 MHz VTA RF Testing Procedure. Lock frequency specifications: Low: 1496.400MHz High: 1496.700 MHz If option NO is checked, launch NCR.		LockFrequency 1496.6684 (MHz) DewarPressure_Torr 29 (Torr) LockFreqMeetsSpec (•) Yes ( ) No
14	At 2.07 K and cavity field of 4-5MV/m, determine cavity coupling conform: 1497 MHz VTA RF Testing Procedure. Upload Tektronics oscilloscope screen (TDS_.txt) data file.		CavityCoupling Overcoupled Attach Files: Attach Files C100_RI_007_113010_182202.txt Must refresh screen to see newly attached files.
15	Perform decay measurements and record Eacc, Qo, Qext2, Qext1, %error, radiation, QextHOMa and QextHOMb, chosen for CW high power tests as specified in: 1497 MHz VTA RF Testing Procedure. More information regarding these parameters can be found in CavID raw data.txt or CavID processed data.xlsx. Typical values during decay measurements for:		
	Eacc	(5+/-1) MV/m	Eacc 4.86 (MV/m)
	Qo	1.2-1.6 e10	Qo 1.2600e+10 ");
	Qext1	0.8-1.2 e10	Qextin 1.0200e+10 ");
	Qext2	0.8-1.8 e12	Qextfp 5.0500e+11 ");
	%error	8-13	Qextfperror 11.7 (%)
	Radiation	1 e-3 mR/hr	Rad 3.0000e-3 "); (mR/hr)
	QextHOMa	>=3e12	QextHOMa
	QextHOMb	>=3e12	QextHOMb

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SerialNum: C100-RI-007 Traveler ID: C100-CAV-VTRF Rev: R2 Page:3 Traveler Seq Number: 12

Step No.	Instructions	Data Input
16	In Pi mode, test the cavity performance over its full dynamic range at 2.07K observing the administrative limits as specified in 1497 MHz VTA RF Testing Procedure. Be sure to capture a clean final-state data set from which to generate the post-processing Qo-vs-Eacc , Rad-vs-Eacc and f-vs-Eacc2 curves.	
17	At 2.07K record:	
	Maximum cavity gradient achieved Emax.	EmaxMVm 26.46 (MV/m)
	Q_o value at maximum cavity gradient.	QoAtEmax 7.0000e+9
	Q_o at (20+/-0.3) MV/m. Acceptance criteria Q_o >= 8e9.	QoAt20MVm 1.0000e+10 (MV/m)
	Radiation at (20+/-0.3) MV/m.	RadAt20MVm 1.2500e-1 (mR/h)
	FEonset: onset of field emission (FE onset, defined to be the first measured gradient (regardless of whether final power rise) where measured radiation is >= 1e-2 mR/hr).	FEonsetMVm 18.6 (MV/m)
	Rmax value for the highest radiation level inside Dewar lid.	Radmax 9.0900e+2 (mR/h)
	Qo at Eacc= (4 +/-0.3)MV/m.	QoAt4MVm
18	Record performance limitation at 2.07K. If cavity PerformanceLimitAt2_07K is selected Other, record pertinent information in the Comment box at the right.	PerformanceLimitAt2_07K Other PerformanceLimitAt2_07K_Other Test aborted due to cavity vacuum leak. Helium discharging at 1W Pinc by end of
19	At 2.07K, was cavity RF processed (conform specifications in 1497 MHz VTA RF Testing Procedure) to achieve performances over 25 MV/m? Record pertinent information at the right and lunch NCR.	RFProcessing ○ Yes ◉ No RFProcessingComment
20	At 2.07K, if cavity is quench limited below Eacc 25MV/m, keeping the same Qextfp as used for the Pi mode, attempt to find the related unscaled Quench fields for each member of the fundamental passband. Launch NCR.	EaccUnscaledQuench_6_7Pi (MV/m) EaccUnscaledQuench_5_7Pi (MV/m) EaccUnscaledQuench_4_7Pi (MV/m) EaccUnscaledQuench_3_7Pi (MV/m) EaccUnscaledQuench_2_7Pi (MV/m) EaccUnscaledQuench_1_7Pi (MV/m) QuenchStudyComment
21	At (20+/-0.3) MV/m, conform specifications in 1497 MHz VTA RF Testing Procedure, measure and record Qo-vs-T data at:	

HeP (Torr)	Dewar T (K)	Example typical Qo values		
29 +/-0.1	2.07	1.0 e10	QoAt20MVm_2_07K	(K)
25 +/-0.1	2.02	1.2 e10	QoAt20MVm_2_02K	(K)
23 +/-0.1	1.99	1.5 e10	QoAt20MVm_1_99K	(K)
19 +/-0.1	1.93(optional)	1.9 e10	QoAt20MVm_1_93K	(K)

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SerialNum: C100-RI-007 Traveler ID: C100-CAV-VTRF Rev: R2 Page:4 Traveler Seq Number: 12

Step No.	Instructions	Data Input
22	Performance note: record information about cavity performance, limitations and other pertinent observations.	
23	Conform specifications in 1497 MHz VTA RF Testing Procedure process and upload the VTA RF testing results, using the Excel file template.	
24	Upload the raw data file with VTA RF testing results using file name: CavID raw data.txt.	Attach Files: Attach Files C100_RI_007 processed_data.xlsx C100_RI_007.txt Must refresh screen to see newly attached files.
25	Upload processed (Excel) data file results using file name: CavID processed data.xlsx	Attach Files: Attach Files C100_RI_007 processed_data.xlsx Must refresh screen to see newly attached files.
26	Upload processed Qo-vs-Eacc figure (in PDF format) using file name: CavID_ QovsEacc.pdf	Attach Files: Attach Files C100_RI_007 Qo vs Eacc.pdf Must refresh screen to see newly attached files.
27	Upload processed Rad-vs-Eacc figure (in PDF format) using file name: CavID_RadvsEacc.pdf	Attach Files: Attach Files C100_RI_007 Rad vs Eacc.pdf Must refresh screen to see newly attached files.
28	Upload processed HOMa and HOMb vs Eacc (in PDF format) using file name: CavID_HOMaHOMbvsEacc.pdf	Attach Files: Attach Files You have attached no files.
29	Upload processed f-vs-Eacc2 figure (in PDF format) using file name: CavID_FreqvsEacc2.pdf	Attach Files: Attach Files C100_RI_007 FreqvsEacc2.pdf Must refresh screen to see newly attached files.
30	Upload any additional processed data files collected during this test, in the test at the right (e.g. HOM power as a function of gradient, data mining) using file name: CavID_QoandRvsEacc.pdf or any other file name properly describing the CavID and the graph content.	Attach Files: Attach Files C100_RI_007 QoandRadvsEacc.pdf Must refresh screen to see newly attached files.
31	Inform the HOM checkers once the HOM Q_L measurements are completed.	GO Hold Point has been cleared by: MARHAUSE Date:2010-12-07 17:50:00.0
32	Cavity passed all specifications for this traveler: 12, 13, 15, 16 and 17? If NO option is chosen issue an NCR from this traveler.	CavityMeetsSpecifications (•) Yes ( ) No

Close Traveler? ( ) Yes (•) No

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