

**Fiducials for BM1 Std. Vac. Chamber**

**BM1006**

Date:

4/19/02

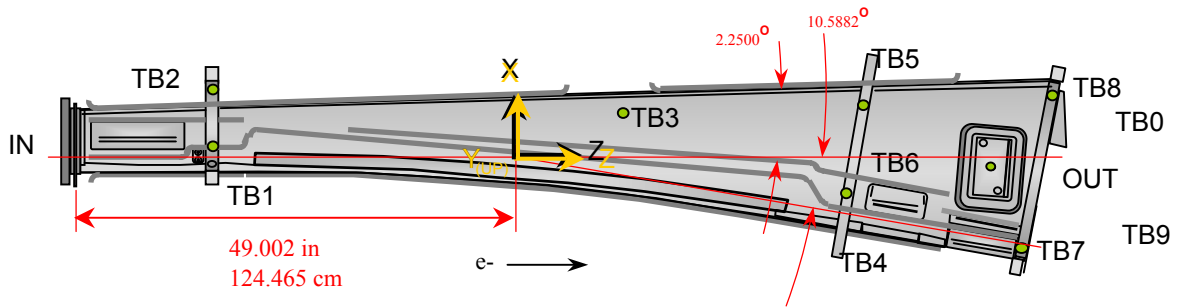
Chamber:

BM1006

Operator(s):

F. Gaudreault  
L. Griffin

Notes:



**Fiducial Coordinates for BM1 Standard Vacuum Chamber: (inches)**

Fiducial	Z	X	Y
TB1	-34.856	1.538	4.390
TB2	-34.882	8.432	4.428
TB3	11.086	3.958	2.363
TB4	34.395	-4.874	4.376
TB5	36.507	6.210	4.369
TB6	52.465	-1.863	2.287
TB7	55.610	-11.188	3.070
TB8	59.444	9.021	3.019
TB9 (V4)	74.631	-20.288	4.353
TB0 (V4)	76.907	-8.244	4.361

inches      inches      inches

Nominal Deltas For H3 Absorber (TB6)		
Z	X	Y
52.467	-1.878	2.281
52.493	-1.891	2.242
<b>-0.026</b>	<b>0.013</b>	<b>0.039</b>

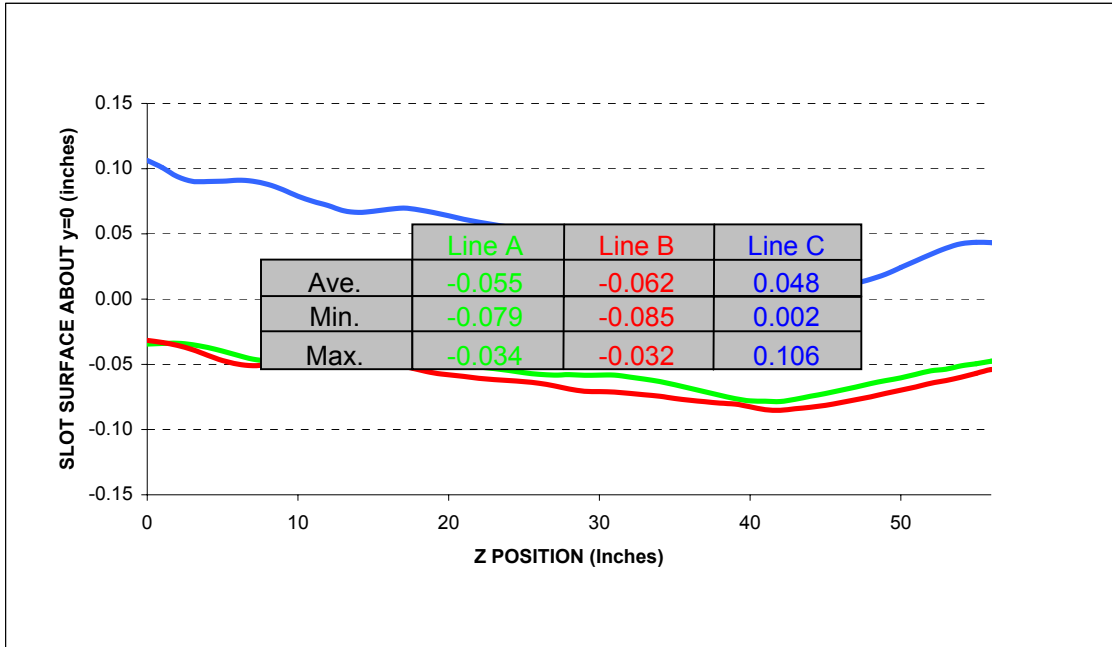
Source **V4 Step**

**Description:**

Fid. vals based on internal chamber datum. Source="V4 Step" indicates final data.

Fiducialization Step: (Traveler Step # 1380)

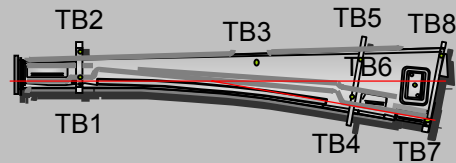
Slot Calibration	
Ideal	0.511
Meas.	0.133
Delta	-0.378



BM1006

**Step 1: Fiducial Coordinates for BM1 Std. Vac. Chamber**

Fiducial	Z	X	Y
TB1	-34.853	1.539	4.390
TB2	-34.881	8.431	4.428
TB3	11.089	3.971	2.359
TB4	34.392	-4.873	4.376
TB5	36.510	6.208	4.369
TB6	52.467	-1.878	2.281
TB7	55.661	-11.220	3.043
TB8	59.451	9.002	3.022
	inches	inches	inches

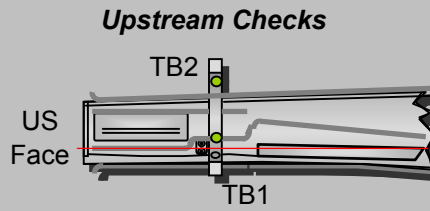


**Description:**

Fiducial values based on internal chamber datum.

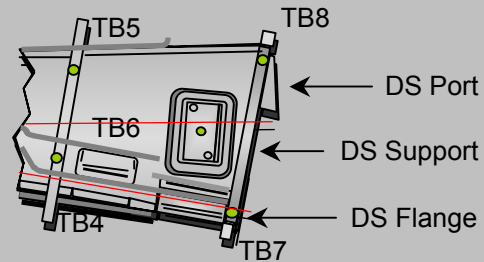
End Surface Attitudes for BM1 Std. Vac. Chamber

Upstream Face		
	yaw	pitch
Measured	2.7	0.5
<b>Nominal</b>	<b>0.0</b>	<b>0.0</b>
<b>Difference</b>	<b>2.7</b>	<b>0.5</b>
	mrad	mrad



Downstream Port		
	yaw	pitch
Measured	24.5	1.1
<b>Nominal</b>	<b>25.3</b>	<b>0.0</b>
<b>Difference</b>	<b>-0.8</b>	<b>1.1</b>

**Downstream Checks**



Downstream Support		
	yaw	pitch
Measured	-185.6	2.9
<b>Nominal</b>	<b>-184.8</b>	<b>0.0</b>
<b>Difference</b>	<b>-0.8</b>	<b>2.9</b>

Downstream Flange		
	yaw	pitch
Measured	-191.5	3.4
<b>Nominal</b>	<b>-184.8</b>	<b>0.0</b>
<b>Difference</b>	<b>-6.7</b>	<b>3.4</b>
	mrad	mrad

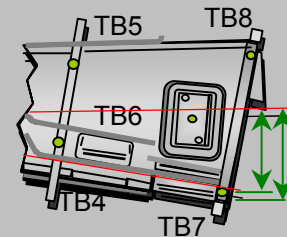
**Description:**

Orientation of the upstream and downstream surfaces compared to nominal values. Tol +/- 3 mrad

Datum Verification

DS Support	
	x
Measured	-11.900
<b>Nominal</b>	<b>-11.912</b>
<b>Diff.</b>	<b>0.012</b>
	inches

DS Flange	
	x
Measured	-11.944
<b>Nominal</b>	<b>-11.958</b>
<b>Diff.</b>	<b>0.015</b>
	inches

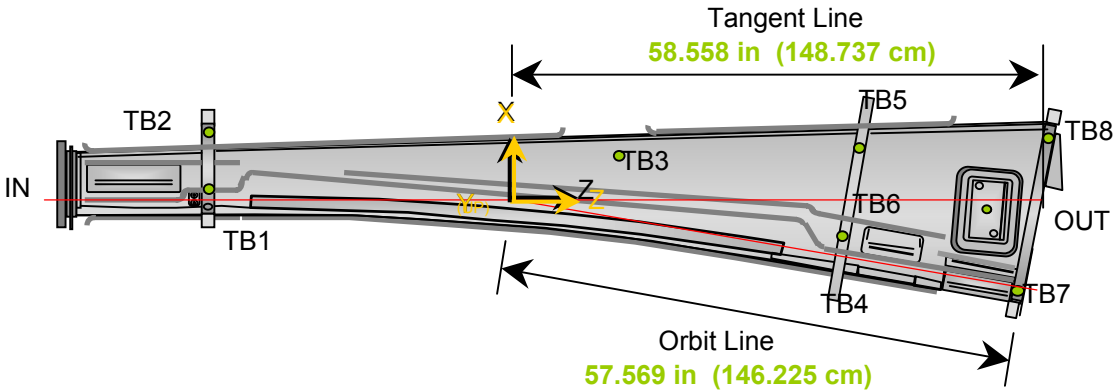


**Description:**

The x-distance from the center-line to the projection of the measured DS inside curve point on either of the DS surfaces. Tolerance values +/- 0.020 in.

BM1006  
Status

<u>BM1 Chamber Lengths</u>			Nominal Length
Tangent Line:	Length 58.566 inches	without SMR	58.558 <span style="background-color: green; color: white; padding: 2px;">OK</span>
Orbit Line:	Length 57.497 inches	without SMR	57.569 <span style="background-color: green; color: white; padding: 2px;">OK</span>
<b>Description:</b> Both lengths are to the faces of the weld flanges. Length tolerance +/- 0.125 in.			



**V4 Step A: Survey and Check of BM1 Standard Vacuum Chamber Fiducials Before Attaching V4 and the Exit Port:**

**Step A-1: Remeasurement of Fiducial Coordinates for BM1 Std. Vac. Chamber**

Fiducial	Z	X	Y	del Z	del X	del Y
TB1	-34.856	1.538	4.389	-0.003	-0.001	-0.001
TB2	-34.879	8.433	4.429	0.002	0.002	0.001
TB3	11.087	3.957	2.361	-0.002	-0.013	0.002
TB4	34.396	-4.875	4.377	0.004	-0.002	0.001
TB5	36.508	6.209	4.368	-0.002	0.001	-0.001
TB6						
TB7	55.610	-11.190	3.083	-0.050	0.031	0.040
TB8	59.439	9.023	3.028	-0.012	0.021	0.006

inches      inches      inches

Compared to Step 1 Fiducial Coords.		

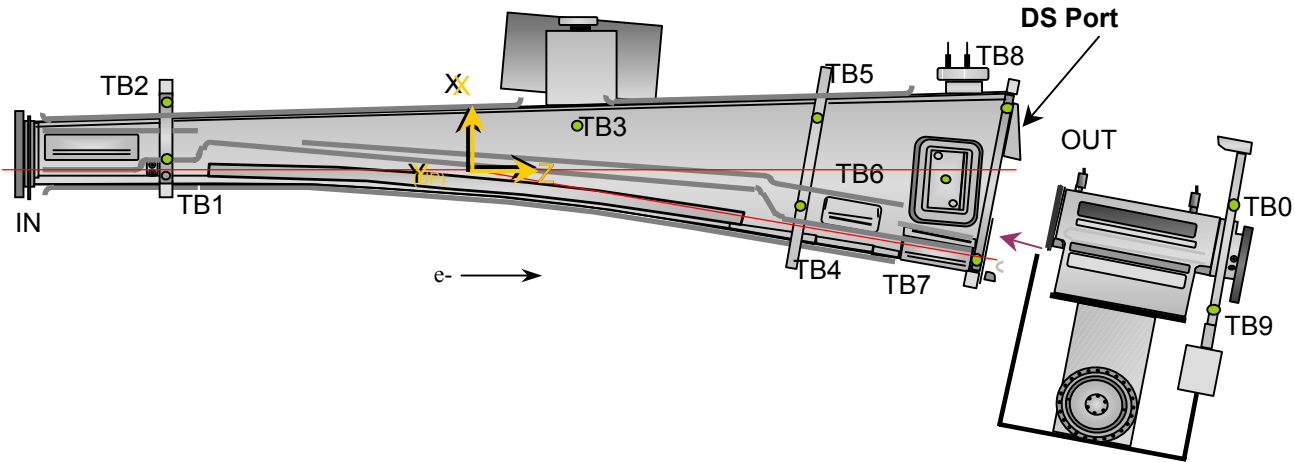
**DS Port Level Check**      Level Status: **OK**

OK ?    Yes    (YES or NO)

**US Flange Roll Check**      Roll Status: **OK**

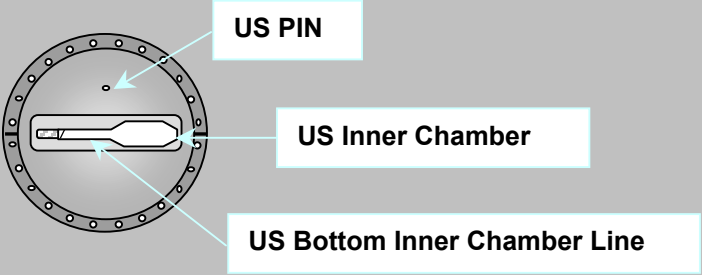
OK ?    Yes    (YES or NO)

**Description:**  
Fid. vals based on internal chamber datum.



**V4 Step A:** Check of US Flange Prior to V4 Installation

**Step A-2: Pre-Installation Check of UpStream Flange Postion**



The diagram shows a top-down view of a circular flange with a central rectangular chamber. A small dot is labeled 'US PIN'. The central chamber is labeled 'US Inner Chamber'. A horizontal line at the bottom of the inner chamber is labeled 'US Bottom Inner Chamber Line'.

US PIN	Z	X	Y
Measured	-50.869	1.845	2.329
Nominal	-51.000	1.836	2.282
Difference (inches)	0.131	0.009	0.047

US Inner Chamber	Z	X	Y
Measured	-50.556	-1.403	-0.047
Nominal	-51.000	-1.404	0.000
Difference (inches)	0.444	0.001	-0.047

US Bottom Inner Chamber Line	ROLL	(FINAL)
Measured	-0.595	
Nominal	0.000	
Difference (mrads)	-0.595	

Roll Status **OK**

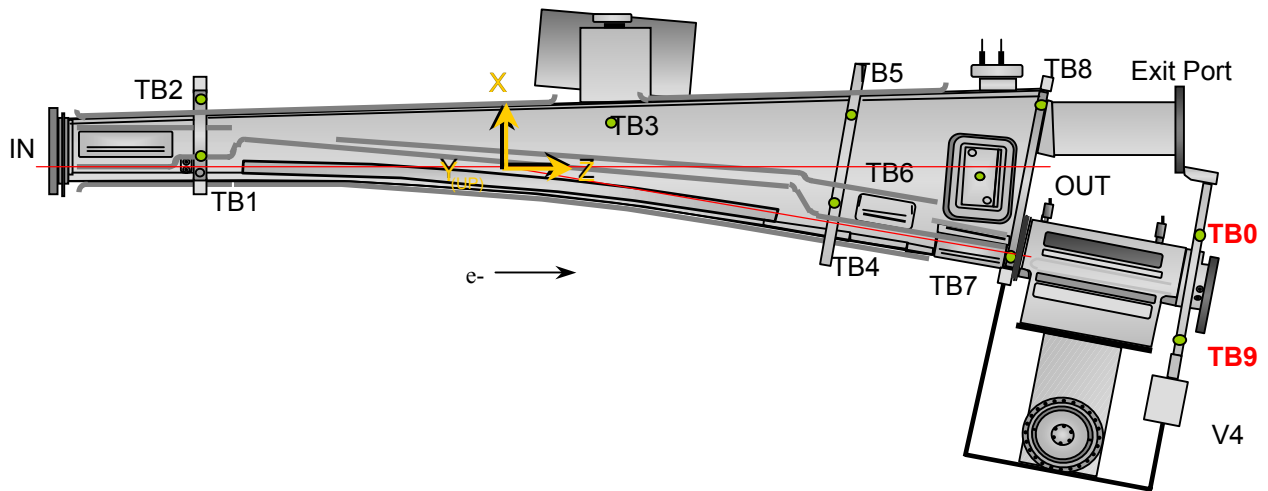
**Description:**  
 Measured vs. nominal values for US flange expressed in the PART coordinate system.  
 Fiducial values are updated (using those from Step A-1) if ROLL delta is not within 1 mrad.

**V4 Fiducialization Step: Survey of Fiducial Coordinates for BM1 Standard Vacuum Chamber with V4 and the Exit Port Attached:**

**Step Fid-1: Position of Added Tooling Balls TB9 and TB0**

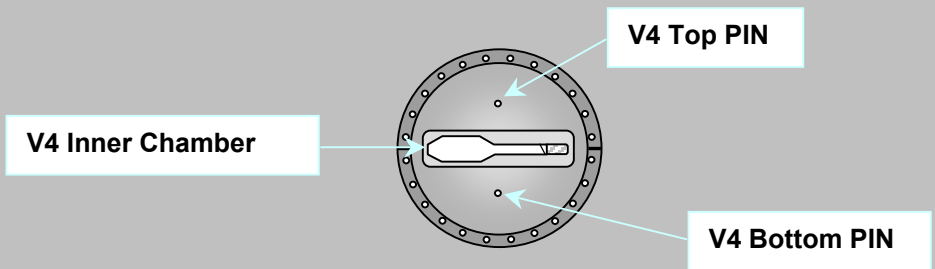
Fiducial	Z	X	Y
TB9 (V4)	74.648	-20.295	4.361
TB0 (V4)	76.920	-8.250	4.368
	inches	inches	inches

**Description:**  
 Fid. vals after V4 and exit port attached.



**V4 Fiducialization Step: V4 Flange**

**Step Fid-2: Set Position of V4 Flange Position**



V4 Top PIN	Z	X	Y
Measured	80.198	0.001	2.284
Nominal	80.000	0.000	2.282
Difference (inches)	0.198	<b>0.001</b>	<b>0.002</b>

V4 Bottom PIN	Z	X	Y
Measured	80.206	-0.004	-2.278
Nominal	80.000	0.000	-2.282
Difference (inches)	0.206	<b>-0.004</b>	<b>0.004</b>

V4 Inner Chamber	Z	X	Y
Measured	79.937	-1.412	0.053
Nominal	80.000	-1.404	0.000
Difference (inches)	-0.063	<b>-0.008</b>	0.053

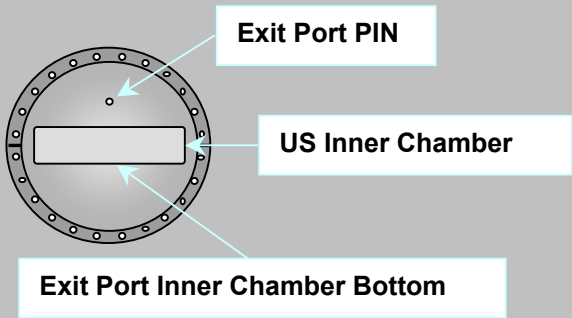
V4 Downstream Z Value	Z
Measured	80.735
Nominal	80.764
Difference (inches)	<b>-0.029</b>

**Description:**

Measured vs. nominal values for V4 flange expressed in the V4 coordinate system.  
 Tol +/- 10mils except for the V4 Z-value. Values in **BOLD** or **RED** are most critical.

**V4 Fiducialization Step: Exit Port**

**Step Fid-3: Post-Installation Check of Exit Port Flange Position**



The diagram shows a top-down view of a circular flange with a central rectangular chamber. Three callout boxes with arrows point to specific features: 'Exit Port PIN' points to a small dot on the top edge; 'US Inner Chamber' points to the central rectangular area; and 'Exit Port Inner Chamber Bottom' points to the bottom edge of the chamber.

Exit Port PIN	Z	X	Y
Measured	75.343	4.136	2.264
Nominal	75.000	4.168	2.282
Difference (inches)	0.343	<b>-0.032</b>	<b>-0.018</b>

Exit Port Inner Chamber Side	Z	X	Y
Measured	75.050	7.390	0.287
Nominal	75.000	7.418	0.000
Difference (inches)	0.050	<b>-0.028</b>	0.287

Exit Port Inner Chamber Bottom	Z	X	Y
Measured	74.970	4.004	-0.385
Nominal	75.000	0.000	-0.366
Difference (inches)	-0.031	4.004	<b>-0.019</b>

Exit Port DS Z Value (PART Frame)	Z
Measured	75.856
Nominal	75.768
Difference (inches)	<b>0.088</b>

**Description:**  
 Measured vs. nominal values for Exit Port flange expressed in the EXIT PORT coordinate system.  
 Tol +/- 10mils except for the V4 Z-value. Values in **BOLD** or **RED** are most critical.

**V4 Final Step: Re-Survey of all Ten Fiducials**

Fiducial	Z	X	Y	del Z	del X	del Y
TB1	-34.856	1.538	4.390	0.000	0.000	0.002
TB2	-34.882	8.432	4.428	-0.002	-0.001	-0.001
TB3	11.086	3.958	2.363	-0.001	0.000	0.002
TB4	34.395	-4.874	4.376	0.000	0.001	-0.001
TB5	36.507	6.210	4.369	-0.001	0.000	0.000
TB6	52.465	-1.863	2.287			
TB7	55.610	-11.188	3.070	0.000	0.001	-0.013
TB8	59.444	9.021	3.019	0.005	-0.003	-0.009
TB9 (V4)	74.631	-20.288	4.353	-0.017	0.007	-0.008
TB0 (V4)	76.907	-8.244	4.361	-0.013	0.006	-0.007
	inches	inches	inches			

**Description:**  
Final survey of BM1 standard vacuum chamber. (With V4 and exit port attached.)  
Note that all comparisons are relative to the most current fiducial values.  
(I.e. deltas are computed using values from Steps A-1 and Fid-1)

