



# Jefferson Lab Alignment Group

## Data Transmittal

**TO:** J. Fischer, J. Hogan

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**FROM:** J. Dahlberg

**Checked:** kt

**# :** M1215

**DETAILS:**

Data: Inspection\Testlab\081105a, 090126a, 090127a

Below are the results from the AES Injector cryomodule end flange and fiducialization surveys. The coordinate system used for fiducial data and the end flange alignment is based on a "best fit" line (Z axis) constructed through the cavity pair flanges. A +X is to the beam left, a +Z is downstream, and a +Y is up. Values are in millimeters. As requested, an outline of the survey tasks is also listed.

**SURVEY TASKS**

- 1) Nov 4<sup>th</sup> 2008: Using the laser tracker, a survey was carried out to establish local control on the beam left side of the cryomodule. Temporary control points along with fiducial points on the top and beam left side were measured. This survey was based on the SRF alignment piers.
- 2) Nov 5<sup>th</sup> 2008: Using the portable CMM and the local control, the XY location of the eight cavity pair flanges along with the three outside flanges at each end were measured. Refer to **DT # F1195** for these flange locations.
- 3) Nov 26<sup>th</sup> 2008: The upstream and downstream end flanges were aligned onto the XY centerline for welding. A transformation from the original coordinates based on the piers into a coordinate system based on the cavity pair flanges was used to align the flanges. This yielded slightly more accurate fiducial data and positioning of the flanges.
- 4) Jan 27<sup>th</sup> 2009: The remaining two fiducial points on the beam right side were tied into the existing fiducials on the left side. The extreme upstream and downstream flanges were also measured.

**FINAL LOCATION OF FIDUCIALS AND OUTSIDE FLANGES BASED ON THE BEST FIT LINE THROUGH THE CAVITY PAIR FLANGES**

LOCATION	Z	X	Y
TBA	416.08	544.74	1.33
TBB	415.43	0.27	545.74
TBC	417.64	-541.41	-1.85
TBD	-488.00	541.78	1.27
TBE	-487.84	-2.68	544.60
TBF	-486.51	-544.64	-2.31
US Flange	-1705.64	0.44	-1.15
US XY Flange (set for weld)	-1572.73	0.58	-0.66
US Valve	-1689.93	0.21	0.01
DS XY Flange (set for weld)	1572.73	0.09	-0.06
DS Valve	1861.15	2.00	-1.07
DS Flange	1985.46	3.23	-1.80