

Status of the Polarized Target Vacuum Can

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- Design of OVC for **SANE**, **Semi-SANE**, and **Wide-Angle Compton Scattering (WACS)** Experiments

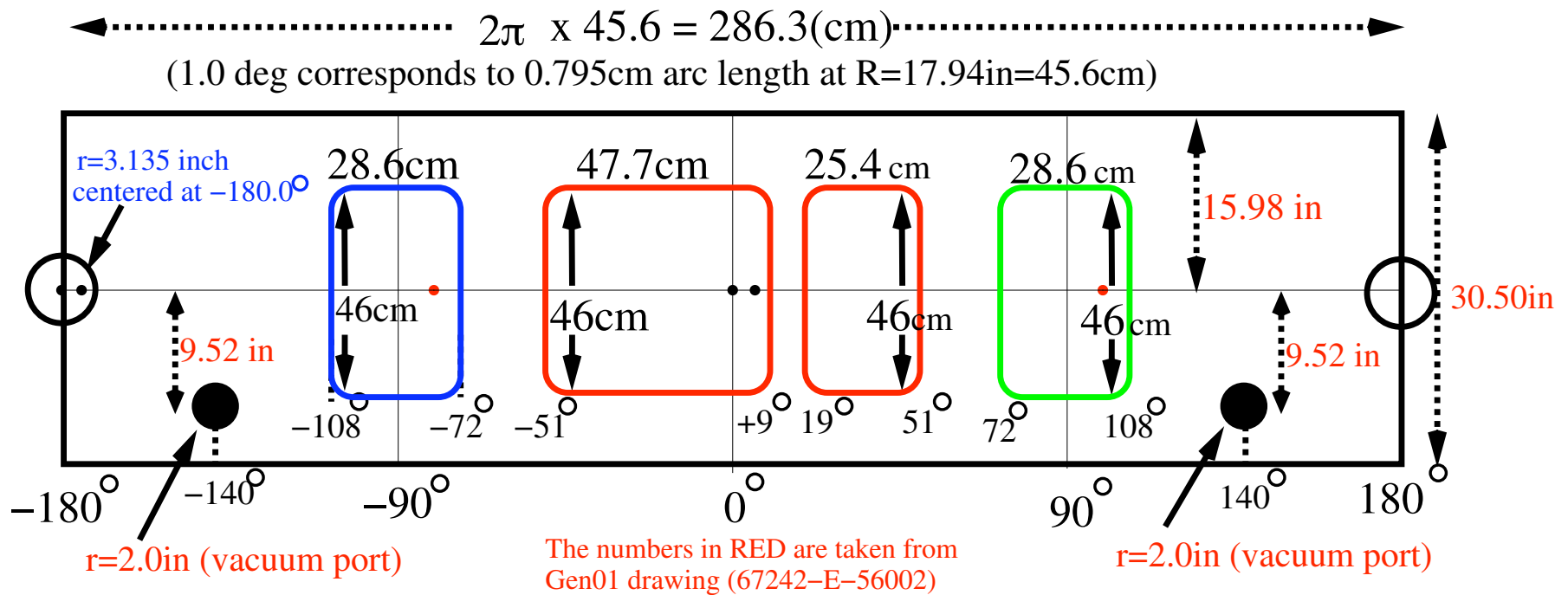
Current Status

- JLab Engineers finished the engineering drawings of the can in Sep 2006.
- The Finite-Element calculations show that the largest window does not meet a safety requirement.
- Need to modify the window design slightly based on the engineer's advice.

OVC Window locations and dimensions

(As of Nov. '06)

- Roll-out view of the OVC with the inner radius of 45.6 cm.
- Corners of square windows are rounded ($r = 5\text{cm}$)



Official Engineering Drawings (I)

(work done by Bert Metzger)

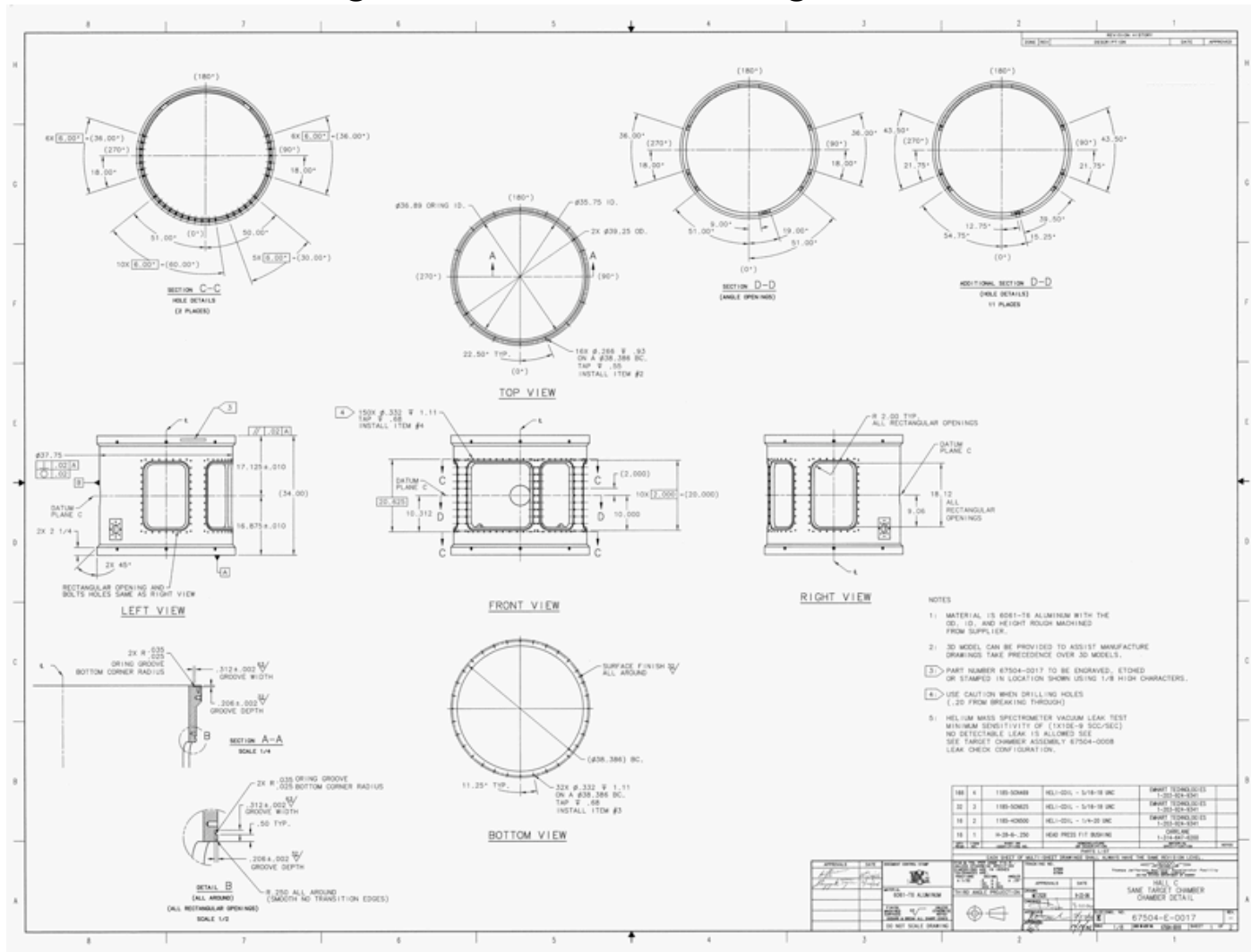
- Drawings of the SANE Target Chamber were done in September
- All 12 drawings available at the [Document Control Group web site](#)
- Drawings can be updated/modified if necessary

E	67504-0008	1	1	-	HALL C SANE TARGET CHAMBER ASSEMBLY
D	67504-0009	1	1	-	HALL C SANE TARGET CHAMBER NITROGEN SHIELD ASSEMBLY
D	67504-0010	1	1	-	HALL C SANE TARGET CHAMBER INSULATION SHEILD A/D FLAT PATTERN
D	67504-0011	1	1	-	HALL C SANE TARGET CHAMBER INSULATION SHEILD B/C FLAT PATTERN
E	67504-0012	1	1	-	HALL C SANE TARGET CHAMBER WINDOW A/D BLANK AND CLAMP
E	67504-0013	1	1	-	HALL C SANE TARGET CHAMBER WINDOW B BLANK AND CLAMP
E	67504-0014	1	1	-	HALL C SANE TARGET CHAMBER WINDOW C BLANK AND CLAMP
E	67504-0015	1	2	-	HALL C SANE TARGET CHAMBER NITROGEN SHIELD WELDMENT
E	67504-0015	2	2	-	HALL C SANE TARGET CHAMBER NITROGEN SHIELD WELDMENT
D	67504-0016	1	1	-	HALL C SANE TARGET CHAMBER BOTTOM PLATE
E	67504-0017	1	2	-	HALL C SANE TARGET CHAMBER CHAMBER DETAIL
E	67504-0017	2	2	-	HALL C SANE TARGET CHAMBER CHAMBER DETAIL
D	67504-0018	1	1	-	HALL C SANE TARGET CHAMBER CHAMBER WELDMENT
E	67504-0019	1	1	-	HALL C SANE TARGET CHAMBER WINDOWS

Official Engineering Drawings (II)

(work done by Bert Metzger)

- #67504-E-0017, Page 1/2, Hall-C SANE Target Chamber Chamber Detail

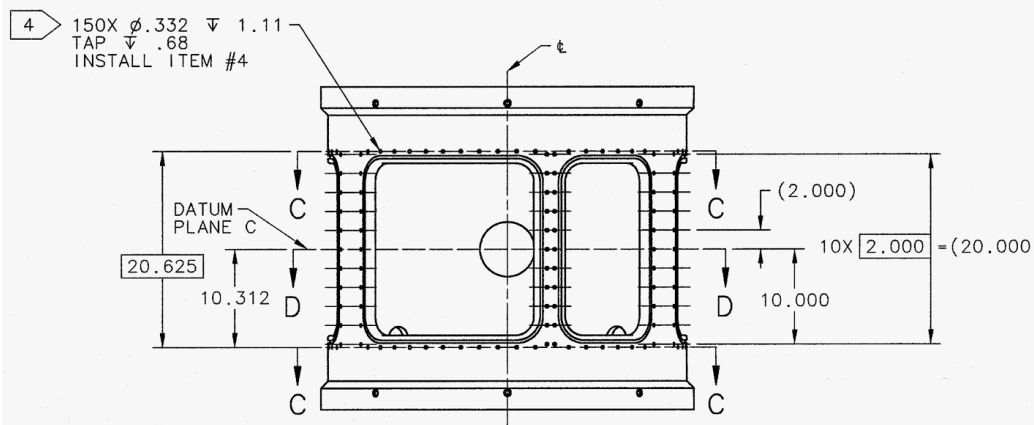


Official Engineering Drawings (III)

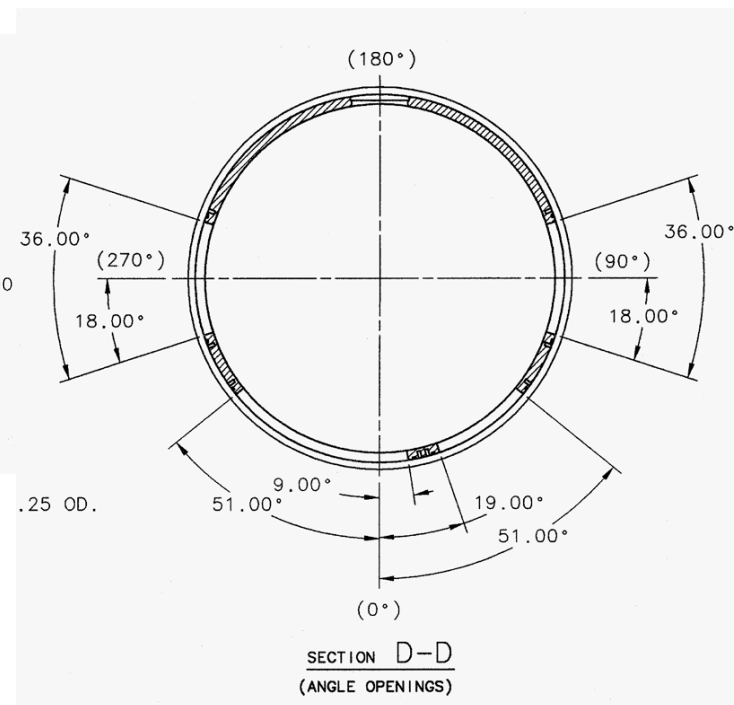
(work done by Bert Metzger)

- Close-up of the drawings from the previous slide.

Front view



Top view



Finite Element (FE) analysis

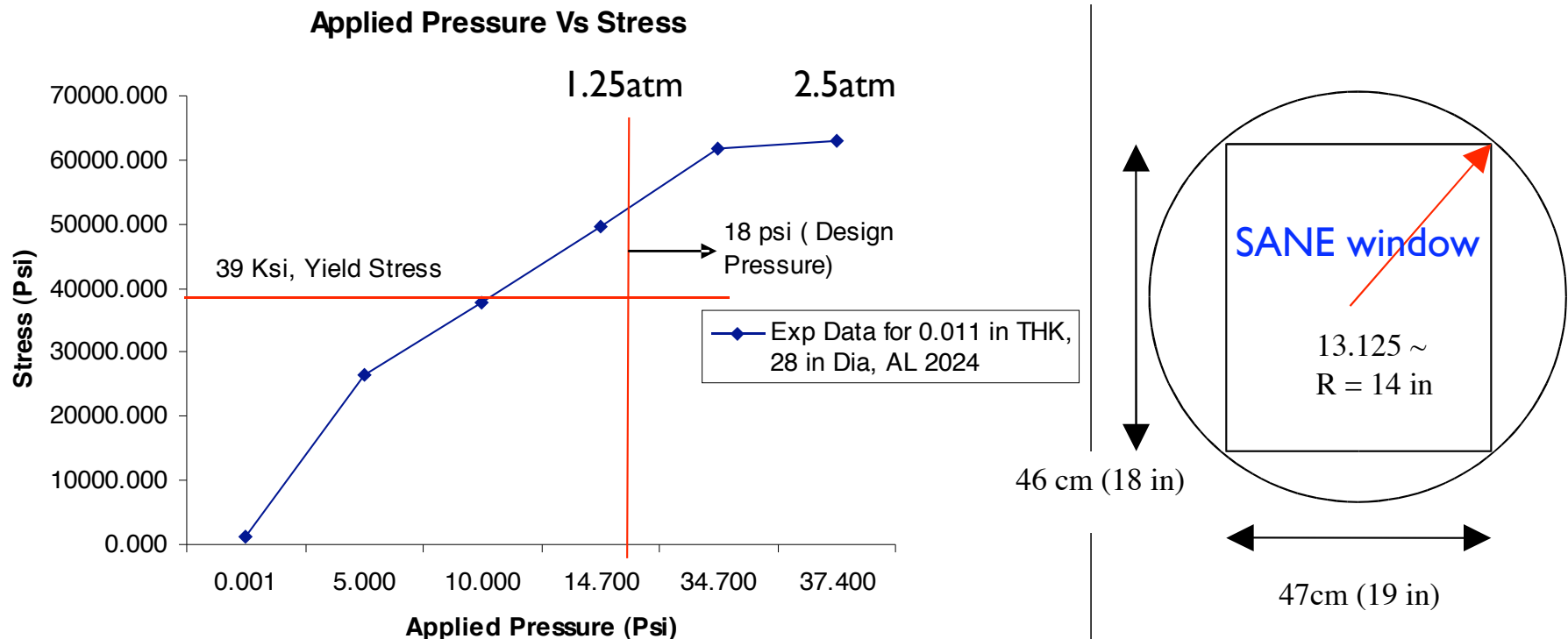
(Info below obtained from JLab Engineers)

- FE calculations by Ravi Anumagalla show that **our biggest window (46cm[H] x 47.7cm[w]) would fracture** at 4psi with 0.40 in deflection **assuming the window thickness of 0.019in**. At JLab, we require that window does not fracture at 18psi (=1.25atm).
- They are planning to perform tests using the Gep Window fixture (112cm x 43cm) **in order to determine how accurate their FE analysis is**.
- Gep Window to be delivered to JLab next week.
- Gen01 neutron window(10.5in x 10.5in) could also be used.

Results of Hall-B target window

(info below obtained from Ravi Anumagalla)

- Results of stress test on a **Hall B target window** (R=14in, 0.011-inch thick, AL 2024)
- The window is **circular** and larger than our biggest window
- At JLab, we require that a window does not fracture at 18psi (=1.25 x 1atm)



Possible modifications to window design

- Radius of curvature (currently $r=2\text{in}$) could be increased so that windows become more stable
 - Will make sure that at least 96% of the detector acceptance is covered.
 - Calculations shows that $r_{\text{max}}=5\text{in}$ for the biggest window (for SANE perp) and 3in for WACS window
- Shape and dimensions of a window can be slightly changed if necessary.
- Window thickness to be optimized
- Engineers will advise us on the modifications.

Manufacturing the OVC

(Info below obtained from JLab engineers)

- Price Quote obtained from a *medium-priced vendor*: It's **\$81K** (good for 30 days only)
- Bidding could start ~2 weeks after our window design is finalized.
- Would take 4 months to manufacture the can.

Target OVC Installation requirements

(Info below obtained from Mike Seely)

- **Pre-Installation Tests (to be done in EEL)**
 - Leak check
 - Complete check (try polarizing the target)
 - Check to see no catastrophic failure occurs when a window is punctured
 - Make sure window covers will not fail by pressurizing them at 1.5 atm
- **Installation:** 42 days are needed assuming man power of 4 people x **6 weeks**
- **Deinstallation:** 14 days are needed assuming man power of 4 people x 2 weeks

Summary / Timeline

- JLab engineers finished the engineering drawings of the can in September.
- FE calculations were performed, and window design needs to be modified. Possible modification is to increase the radius of curvature. Engineers will advise us on this.
- Bidding and Manufacturing of OVC will start as soon as the window design is finalized.
- Testing the OVC in 2007 (M.Seely)