Cell Geometry Measurement Summary

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- Diameter measurement for the Cells:

The diameter's measurements were done by taking five consecutive measurements in each point's zone, and the final diameter's value was averaged over them. However, the extraction of the water cell's diameter was done by taking only one measurement in different points along the cell.

Water Cell: Aqua										
Points	A	B	C	D	E	F	G	H	I	J
Diam. (mm)	18.62	18.77	19	18.95	19.66	18.62	18.77	19	18.95	19.66
Average Diameter: 19±0.38 mm										

Reference Cell: GMB2(Target Chamber Diameter)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
A	19.20	19.10	19.08	19.18	19.13
B	19.13	19.18	19.15	19.18	19.20
C	19.22	19.22	19.20	19.08	19.15
D	19.18	19.13	19.08	19.13	19.10
E	19.41	19.43	19.43	19.43	19.48
Average Diameter: 19.21±0.12 mm					

3He Cell: Dominic(Target Chamber Diameter)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
A	19.08	19.02	19.02	19.02	18.95
B	18.62	18.67	18.67	18.69	18.72
C	18.77	18.80	18.82	18.82	18.87
D	18.92	19.00	19.10	19.08	19.13
E	18.87	18.85	18.77	18.59	18.62
Average Diameter: 18.86±0.17 mm					

3He Cell: Dominic(Geometry)				
Item	Hight (mm)	Top Width (mm)	Bottom Width (mm)	Length (mm)
Pull Off	31.75h/38.10v	8.28	13.72	
Pumping Chamber	76.73	76.81		
Transfer Tube	88.90	12.27		
Target Chamber				398.78

3He Cell: Dominic(Pumping Chamber Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	3.175	2.963	3.197	3.352	2.873
Points	M6 (mm)	M7 (mm)	M8 (mm)	M9 (mm)	M10 (mm)

Thickness	3.072	2.957	3.385	3.364	3.210
Average Wall Thickness: 3.16±0.18 mm					

3He Cell: Dominic(Transfer Tube Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	1.604	1.527	1.965	1.314	1.732
Points	M6 (mm)	M7 (mm)	M8 (mm)		
Thickness	1.782	2.143	1.991		
Average Wall Thickness: 1.76±0.27 mm					

3He Cell: Dominic(Target Chamber Wall Thickness)					
Points	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
Thickness	1.691	1.702	1.716	1.691	1.656
Points	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)
Thickness	1.598	1.710	1.695	1.662	1.654
Average Wall Thickness: 1.68±0.04 mm					

Dominic cell has the pull off divided to 2 parts: horizontal and vertical. So I measured the length of both parts.

3He Cell: Moss(Target Chamber Diameter)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
A	18.67	18.75	18.72	18.69	18.67
B	18.67	18.77	18.72	18.69	18.72
C	18.69	18.75	18.75	18.75	18.77
D	18.80	18.80	18.80	18.82	18.85
E	18.80	18.77	18.82	18.80	18.77
Average Diameter: 18.75±0.05 mm					

3He Cell: Moss(Geometry)				
Item	Hight (mm)	Top Width (mm)	Bottom Width (mm)	Length (mm)
Pull Off	38.10	7.32	14.43	
Pumping Chamber	76.73	76.56		
Transfer Tube	93.98	12.47		
Target Chamber				398.78

3He Cell: Moss (Pumping Chamber Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	2.315	2.708	2.521	2.343	2.852

Points	M6 (mm)	M7 (mm)	M8 (mm)	M9 (mm)	M10 (mm)
Thickness	2.361	2.813	2.536	2.862	3.062
Average Wall Thickness: 2.64±0.26 mm					

3He Cell: Moss (Transfer Tube Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	1.390	1.362	1.320	1.652	1.621
Points	M6 (mm)				
Thickness	1.573				
Average Wall Thickness: 1.49±0.15 mm					

3He Cell: Moss(Target Chamber Wall Thickness)					
Points	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
Thickness	1.607	1.606	1.625	1.601	1.698
Points	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)
Thickness	1.678	1.633	1.651	1.596	1.679
Average Wall Thickness: 1.64±0.04 mm					

^{3}He Cell: Samantha					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
A	19.25	19.2	19.15	19.18	19.23
B	19.05	18.8	18.72	18.8	18.72
C	18.77	18.67	18.7	18.67	18.67
D	18.75	18.67	18.72	18.67	18.72
E	18.8	19	19.13	19.13	19.05
Average Diameter is: 18.95 ± 0.537 mm					

3He Cell: Samantha(Geometry)				
Item	Hight (mm)	Top Width (mm)	Bottom Width (mm)	Length (mm)
Pull Off	36.83	5.99	13.28	
Pumping Chamber	78.31	76.2		
Transfer Tube	93.98	12.75		
Target Chamber				398.78

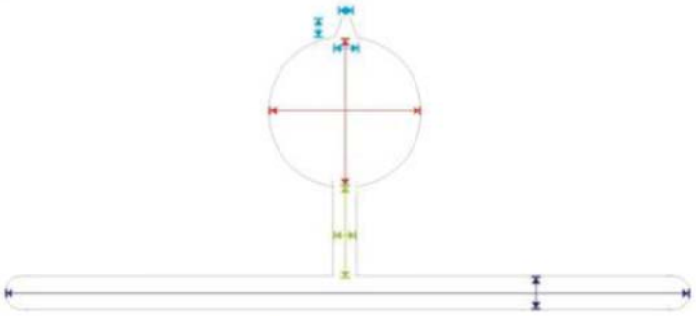
3He Cell: Samantha (Pumping Chamber Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	2.757	2.674	3.005	3.023	3.152
Points	M6 (mm)	M7 (mm)	M8 (mm)	M9 (mm)	M10 (mm)
Thickness	2.854	2.647	2.723	2.854	3.098
Average Wall Thickness: 2.88±0.18 mm					

3He Cell: Samantha (Transfer Tube Wall Thickness)					
Points	M1 (mm)	M2 (mm)	M3 (mm)	M4 (mm)	M5 (mm)
Thickness	1.353	1.227	1.462	1.727	1.676
Points	M6 (mm)				
Thickness	1.554				
Average Wall Thickness: 1.50±0.19 mm					

3He Cell: Samantha(Target Chamber Wall Thickness)					
Points	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
Thickness	1.563	1.556	1.75	1.7	1.7
Points	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)
Thickness	1.7	1.67	1.671	1.614	1.678
Average Wall Thickness: 1.66±0.06 mm					

Calculation of the internal cell volume

Cell name: Aqua
Fill date: 3/18/2008



Pulloff:
Height, meas.: 40.0
Top width: 7.9
Bottom width: 15.5
Wall thickness: 2.5 (2.5)*

Pumping chamber:
Height: 74.5
Width: 76.4
Wall thickness: 4.0 (1.1)*

All measurements are external in units of mm.

Transfer tube:
Height: 98.0
Width: 11.9
Wall thickness: 2.3 (2.3)*

Target chamber:
Diameter: 19.0
Length: 393.0
Wall thickness: 1.00 (given avg. value: 0.85)

* = These values are measurements of an old cut cell.

Internal Volumes:

Pulloff:

Volume is estimated by a truncated cone. The total height of the cone is given by the measured height plus an addition of 5.0 mm for the truncation.

Cone volume = 1/3 * pi * r^2 * h

Truncated cone volume = $\{ 1/3 * pi * (r_{bottom})^2 * h_{total} \} - \{ 1/3 * pi * (r_{top})^2 * (h_{total} - h_{measured}) \}$
= 1288 mm^3
= 1.288 ml

Pumping chamber:

For this calculation the diameter of the sphere is estimated by the mean value of its height and width.

Sphere volume = $4/3 * pi * r^3$
= 160674 mm^3
= 160.674 ml

Transfer tube:

Cylinder volume = $pi * r^2 * h$
= 4102 mm^3
= 4.102 ml

Target chamber:

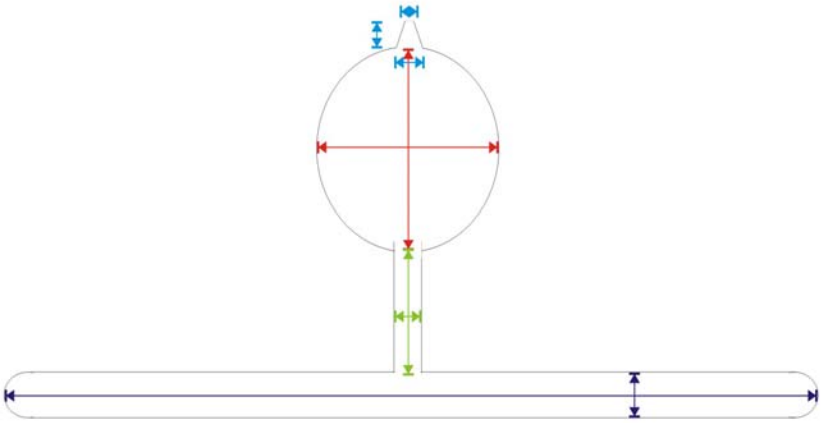
The volume of the target chamber consits of a cylindrical volume whose length is decreased by two times its radius with an addition of the volume of a sphere with the same radius.

Target chamber = $\{ pi * r^2 * (h - 2*r) \} + \{ 4/3 * pi * r^3 \}$
= 87917 mm^3
= 87.917 ml

Internal cell volume = 253.98 ml

Calculation of the internal cell volume

Cell name: Dominic
Fill date: 3/9/2012



Pulloff:
Height, meas.: 31.8
Top width: 13.7
Bottom width: 13.7
Wall thickness: 1.7 (2.5)*

Pumping chamber:
Height: 76.7
Width: 76.8
Wall thickness: 3.2 (1.1)*

All measurements are external in units of mm.

Transfer tube:
Height: 88.9
Width: 12.3
Wall thickness: 1.8 (2.3)*

Target chamber:
Diameter: 18.9
Length: 398.8
Wall thickness: 1.68 (given avg. value: 0.85)

* = These values are measurements of an old cut cell.

Internal Volumes:

Pulloff:

Volume is estimated by a truncated cone. The total height of the cone is given by the measured height plus an addition of 5.0 mm for the truncation.

Cone volume = 1/3 * pi * r^2 * h

Truncated cone volume = $\{ 1/3 * pi * (r_{bottom})^2 * h_{total} \} - \{ 1/3 * pi * (r_{top})^2 * (h_{total} - h_{measured}) \}$
= 885 mm^3
= 0.885 ml

Pumping chamber:

For this calculation the diameter of the sphere is estimated by the mean value of its height and width.

Sphere volume = $4/3 * pi * r^3$
= 183080 mm^3
= 183.080 ml

Transfer tube:

Cylinder volume = $pi * r^2 * h$
= 5248 mm^3
= 5.248 ml

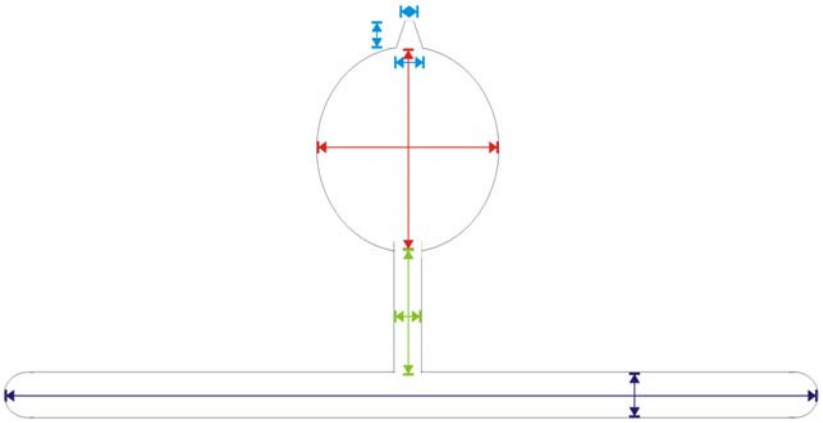
Target chamber:

The volume of the target chamber consits of a cylindrical volume whose length is decreased by two times its radius with an addition of the volume of a sphere with the same radius.

Target chamber = $\{ pi * r^2 * (h - 2*r) \} + \{ 4/3 * pi * r^3 \}$
= 74272 mm^3
= 74.272 ml

Calculation of the internal cell volume

Cell name: Samantha
Fill date: 3/13/2012



Pulloff:

Height, meas.:	36.8	
Top width:	6.0	
Bottom width:	13.3	
Wall thickness:	2.5	(2.5)*

Pumping chamber:

Height:	78.3	
Width:	76.2	
Wall thickness:	2.9	(1.1)*

All measurements are external in units of mm.

Transfer tube:

Height:	94.0	
Width:	12.8	
Wall thickness:	1.5	(2.3)*

Target chamber:

Diameter:	19.0	
Length:	398.8	
Wall thickness:	1.66	(given avg. value: 0.85)

* = These values are measurements of an old cut cell.

Internal Volumes:

Pulloff:

Volume is estimated by a truncated cone. The total height of the cone is given by the measured height plus an addition of 5.0 mm for the truncation.

Cone volume = 1/3 * pi * r^2 * h

Truncated cone volume = $\{ 1/3 * pi * (r_{bottom})^2 * h_{total} \} - \{ 1/3 * pi * (r_{top})^2 * (h_{total} - h_{measured}) \}$

= 750 mm^3

= 0.750 ml

Pumping chamber:

For this calculation the diameter of the sphere is estimated by the mean value of its height and width.

Sphere volume = $4/3 * pi * r^3$

= 191349 mm^3

= 191.349 ml

Transfer tube:

Cylinder volume = $pi * r^2 * h$

= 7017 mm^3

= 7.017 ml

Target chamber:

The volume of the target chamber consits of a cylindrical volume whose length is decreased by two times its radius with an addition of the volume of a sphere with the same radius.

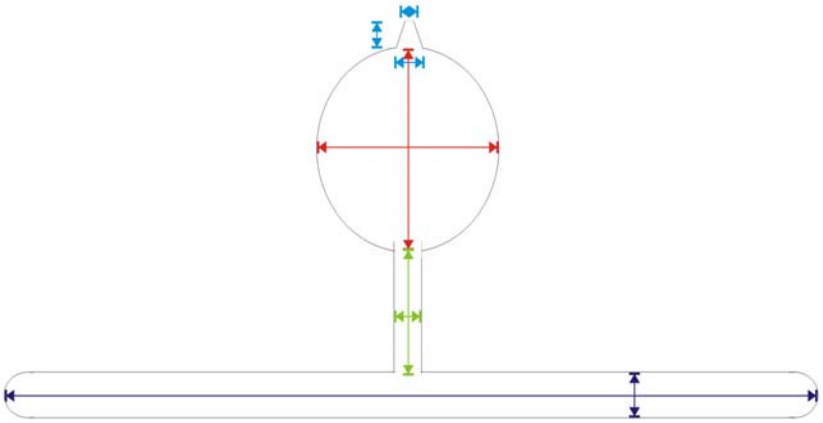
Target chamber = $\{ pi * r^2 * (h - 2*r) \} + \{ 4/3 * pi * r^3 \}$

= 75514 mm^3

= 75.514 ml

Calculation of the internal cell volume

Cell name: Moss
Fill date: 3/13/2012



Pulloff:
Height, meas.: 38.1
Top width: 7.3
Bottom width: 14.4
Wall thickness: 2.5 (2.5)*

Pumping chamber:
Height: 76.7
Width: 76.6
Wall thickness: 2.6 (1.1)*

All measurements are external in units of mm.

Transfer tube:
Height: 94.0
Width: 12.5
Wall thickness: 1.5 (2.3)*

Target chamber:
Diameter: 18.8
Length: 398.8
Wall thickness: 1.64 (given avg. value: 0.85)

* = These values are measurements of an old cut cell.

Internal Volumes:

Pulloff:

Volume is estimated by a truncated cone. The total height of the cone is given by the measured height plus an addition of 5.0 mm for the truncation.

Cone volume = 1/3 * pi * r^2 * h

Truncated cone volume = $\{ 1/3 * pi * (r_{bottom})^2 * h_{total} \} - \{ 1/3 * pi * (r_{top})^2 * (h_{total} - h_{measured}) \}$

= 996 mm^3

= 0.996 ml

Pumping chamber:

For this calculation the diameter of the sphere is estimated by the mean value of its height and width.

Sphere volume = $4/3 * pi * r^3$

= 190307 mm^3

= 190.307 ml

Transfer tube:

Cylinder volume = $pi * r^2 * h$

= 6647 mm^3

= 6.647 ml

Target chamber:

The volume of the target chamber consits of a cylindrical volume whose length is decreased by two times its radius with an addition of the volume of a sphere with the same radius.

Target chamber = $\{ pi * r^2 * (h - 2*r) \} + \{ 4/3 * pi * r^3 \}$

= 73990 mm^3

= 73.990 ml