MICE - CM30 Meeting
University of Oxford

He / vacuum window

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Design guide for windows,

Wing Lau and Stephanie yang, University of Oxford

The design of the bellow window is such that it is possible to scale the standard design linearly to suit any window dimension and still keeping the same pressure rating, i.e. **burst pressure at 120 psi**. Here is the design table that we have devised to provide the Window designer with a set of concave and convex radii and centre coordinates that will guarantee the required pressure rating.

Specify Window diameter in Cell B2, machining tolerance in Cell D2 & state "V" or "A" in Cell F2

Window diameter in mm:-	220	Machining tolerance (mm):-	0	Is it the Vacuum [V] or Absorber [A] Window?	a

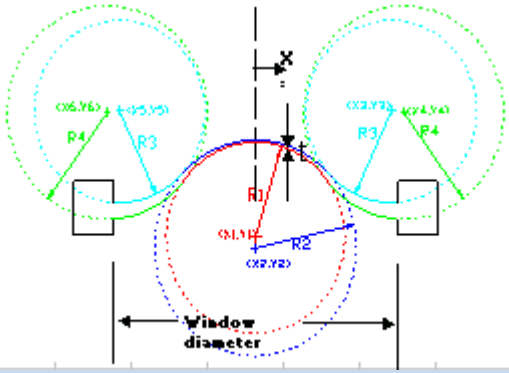
Information on the Window geometry (see attached diagram for notation):-

R1= ####	R2= ####	R3= 69.357	R4= 74.851
X1= 0.000	X2= 0.000	X3= 102.667	X4= 110.000
Y1= 0.000	Y2= -1.643	Y3= 139.333	Y4= 139.333

Tangent pt. at Concave surface	X= 63.615	Y= 80.583
Tangent pt. at Convex surface	X= 61.484	Y= 84.426

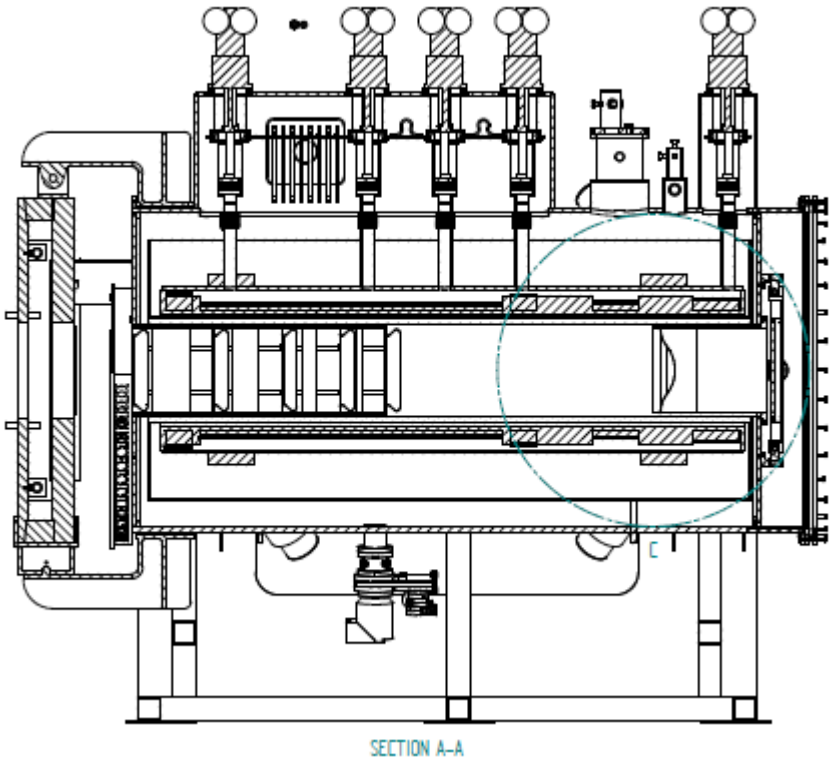
Coordinates (Xi, Yi) at the Window concave and the convex surfaces

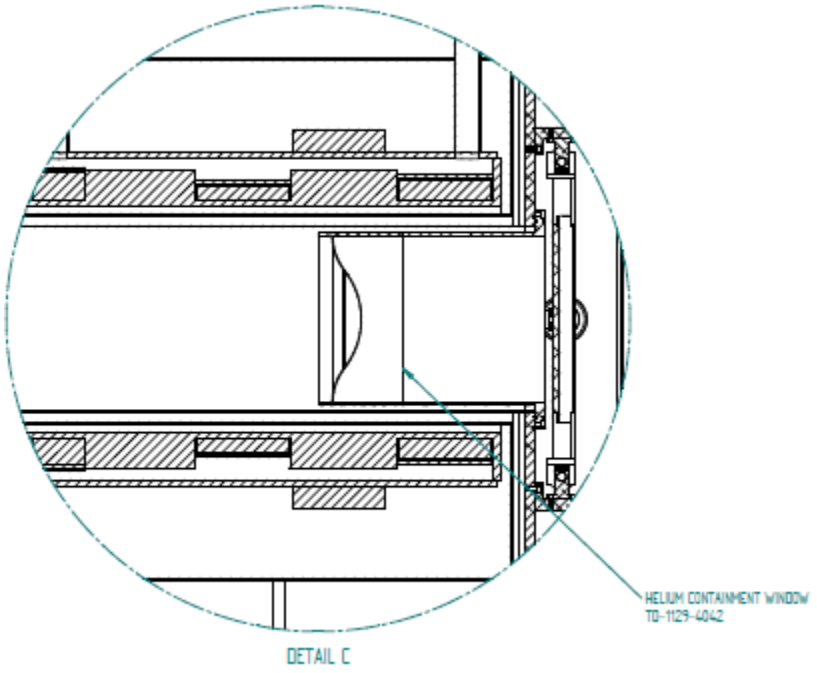
Xi	Concave Surface yi (mm)	Convex Surface yi (mm)	thickness // to beam t (mm)
0	102.667	102.799	0.132
5	102.545	102.679	0.134
10	102.178	102.319	0.140
15	101.565	101.716	0.151
20	100.700	100.866	0.166
25	99.576	99.762	0.186
30	98.186	98.397	0.212
35	96.517	96.760	0.243
40	94.554	94.835	0.281
45	92.279	92.607	0.328
50	89.669	90.052	0.384
55	86.692	87.144	0.452
60	83.309	83.844	0.535
65	79.519	80.383	0.864
70	76.066	77.472	1.406
75	73.169	75.080	1.911
80	70.757	73.151	2.394
85	68.780	71.644	2.864
86	68.434	71.391	2.957
87	68.103	71.153	3.050
88	67.788	70.931	3.143
89	67.488	70.725	3.236
90	67.203	70.533	3.329
95	66.000	69.798	3.798
100	65.153	69.427	4.274
105	64.649	69.416	4.766
110	64.482	69.762	5.280



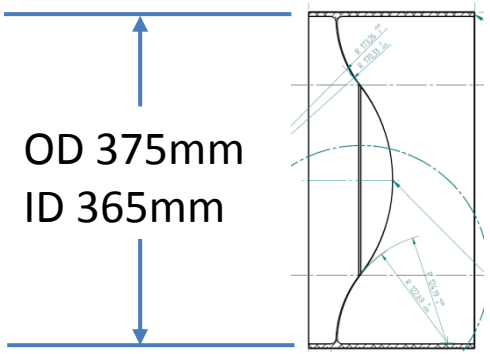
Profile of the He / vacuum window taken from this spreadsheet, 120 psi burst pressure means factor of safety is high at 8, more analysis could reduce the window thickness.

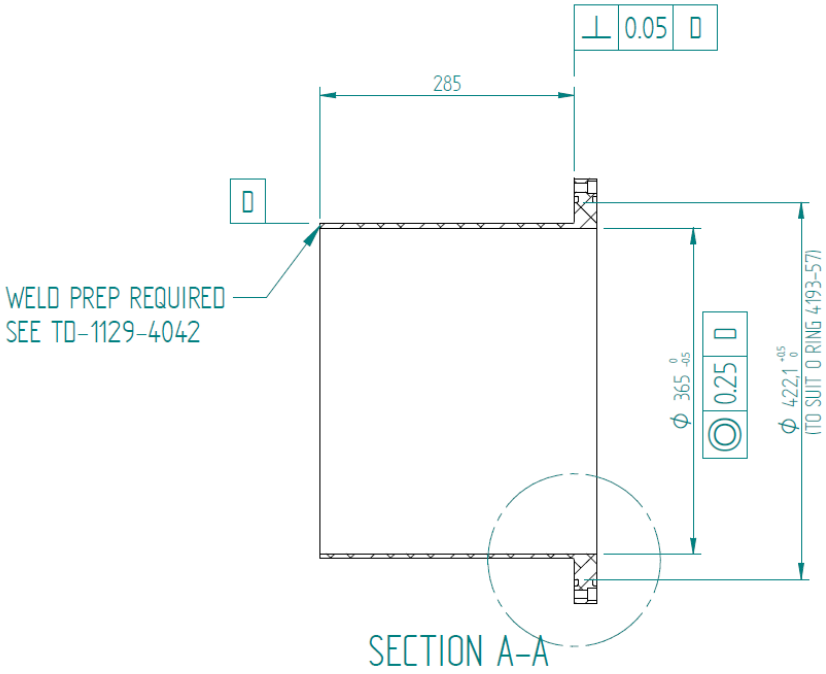
He / vacuum window extends inside the bore
Between the matching coils 1 and 2

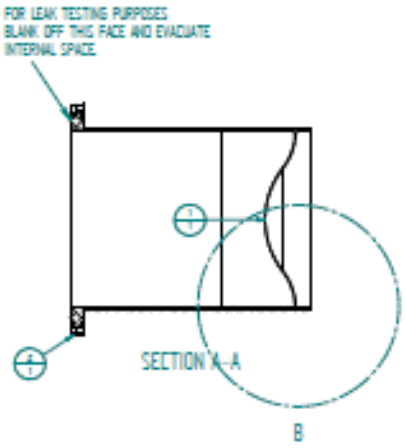


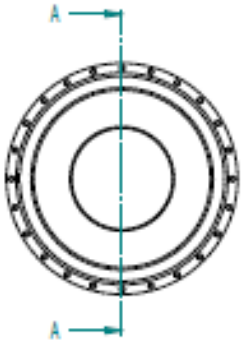


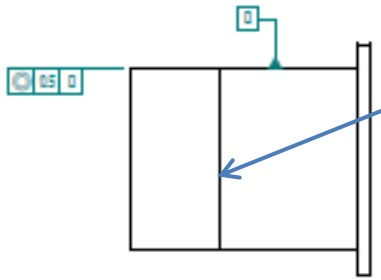
Vacuum window assembly made of two parts, requires a welded seam around the diameter





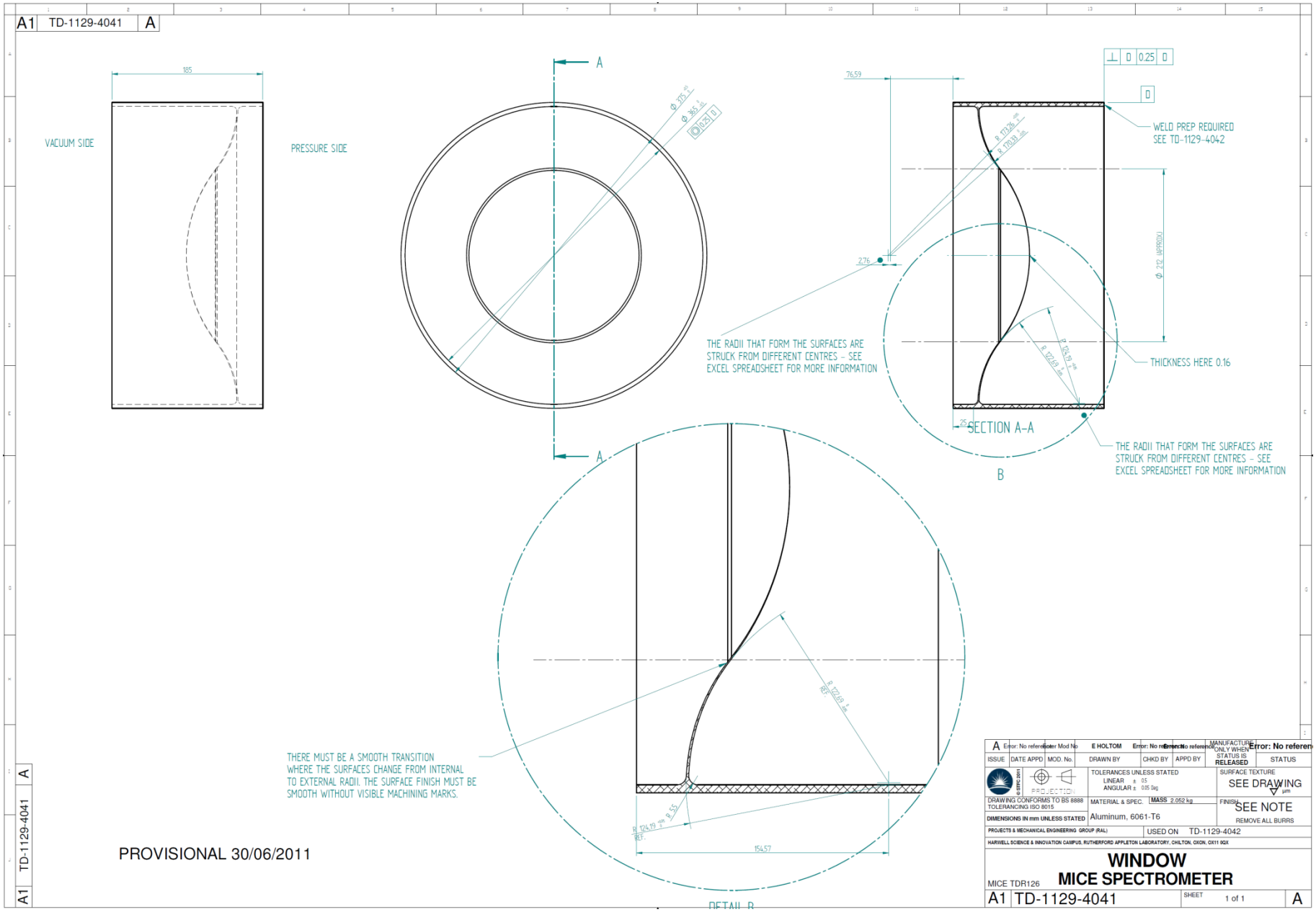




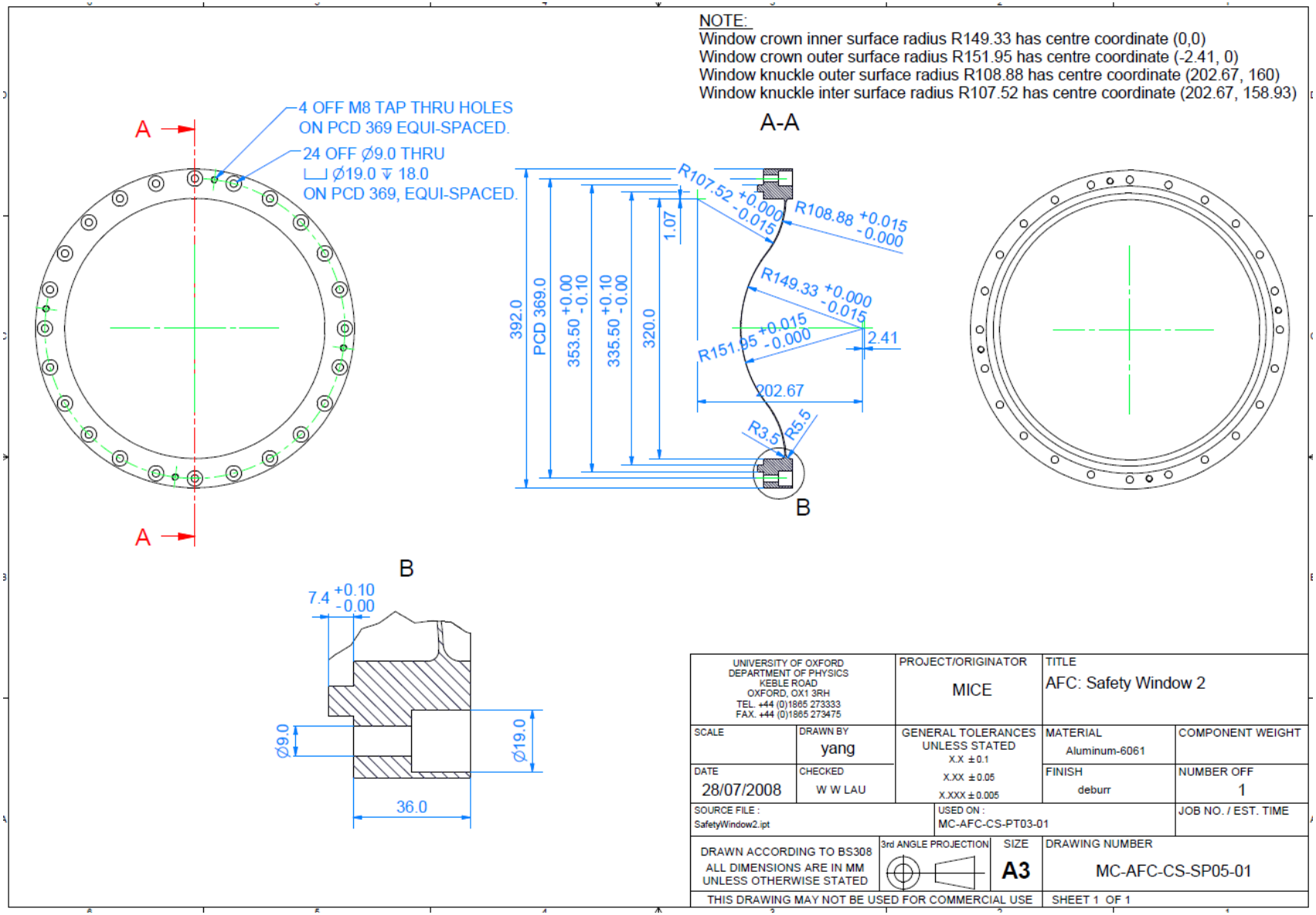


Welded seam on diameter

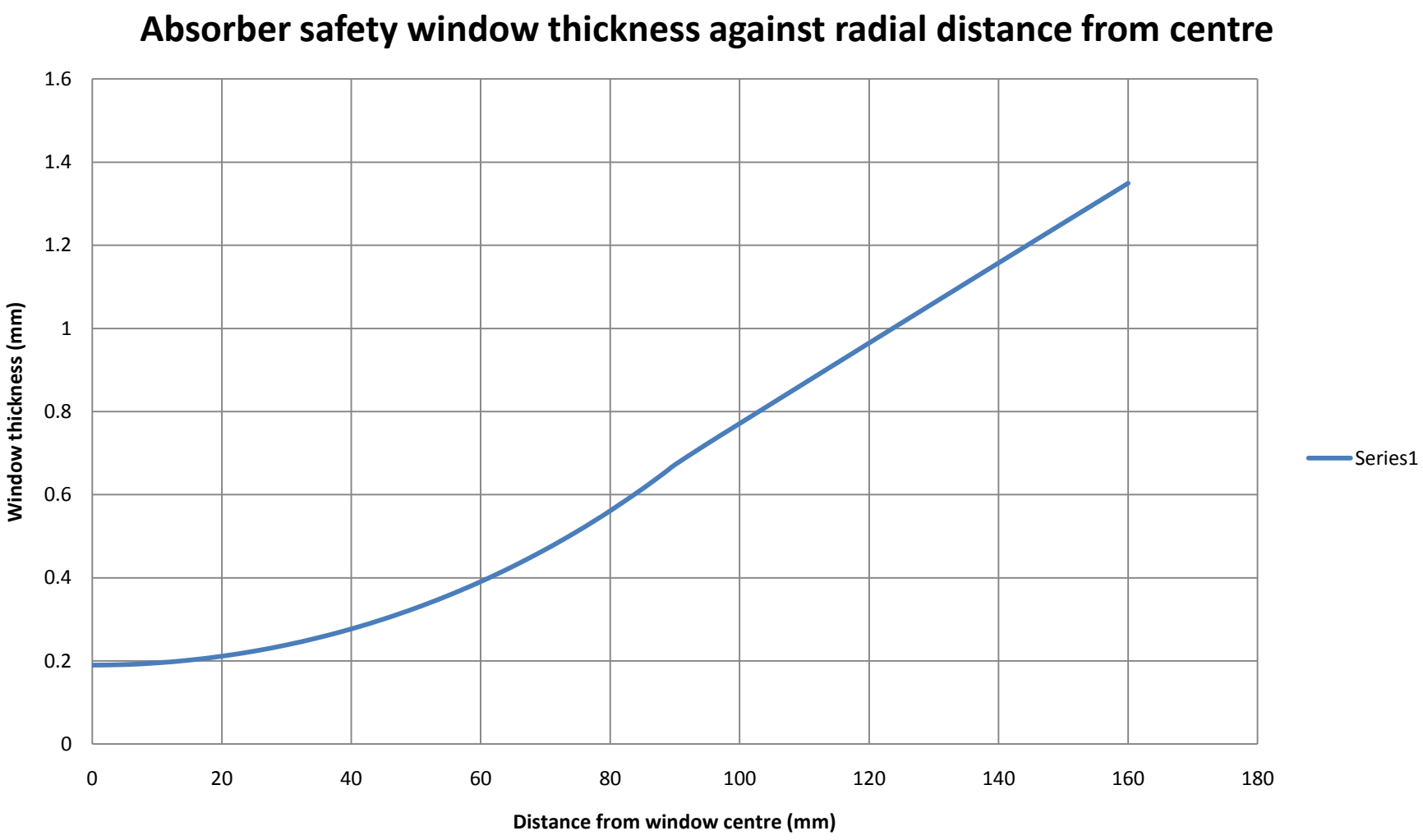
Vacuum window profile



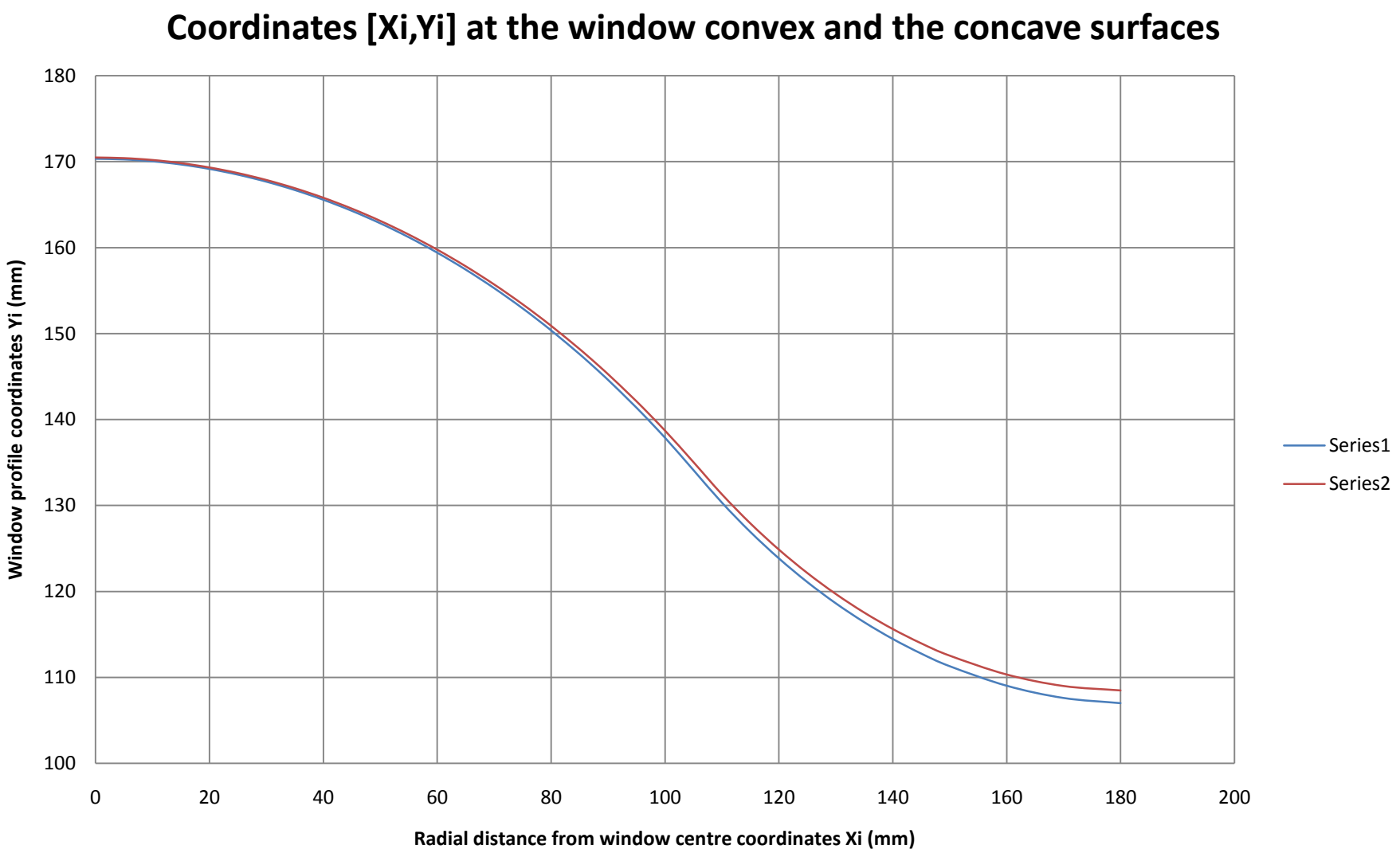
AFC Safety window



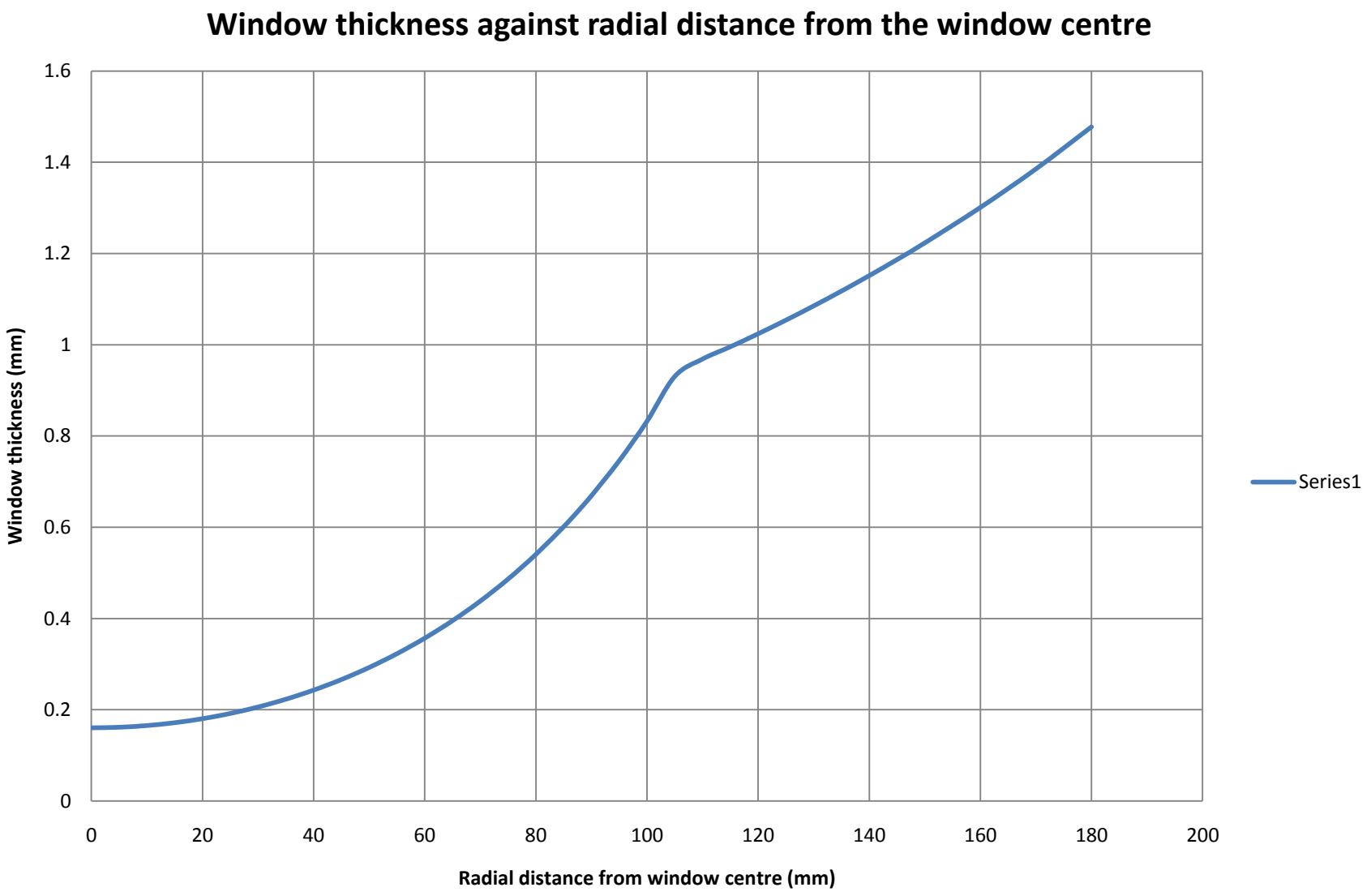
AFC safety window Ø320



He / Vacuum window profile Ø365



He / Vacuum window Ø365



Technical board please confirm that:

- The OD at 375mm is OK ?
- The ID at 365mm is OK ?
- The depth of the window profile into the bore at 285mm is OK ?
- The window thickness is OK ?