

Refno: PS/ML/Technical note/86-11
Revised: 10 June 1986
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Subject: Positions of the elements in the ACOL-ring.

1. SCOPE

This note gives the positions of the magnets and of their vacuum chambers in the ACOL-ring. The coordinates of the central orbit and of the elements have been calculated. The positioning of all elements in the CAD-system is based on the same coordinates.

2. DEFINITIONS

2.1 Coordinate system

The origin is located in the center of magnet QDN01. The positive X-axis is pointing towards the center of the ring and the positive Y-axis towards the center of magnet QFN02.

2.2 Length

The length of the magnet given in the following table is the magnetic length, not the physical.

2.3 Offset

The offset value given in the table is defined positive towards the center of the ring.

2.4 Angles

For each magnet is the bending angle (ϕ_b), the total angle (ϕ_t) and the actual angle (ϕ_a) given.

ϕ_b is the angle between the central orbit before and after the magnet.

ϕ_t is the angle between the Y-axis and the central orbit after the magnet.

ϕ_a is the angle between the Y-axis and the magnet.

$$\text{The following relation is valid: } \phi_a = \phi_t - \phi_b/2$$

2.5 Coordinates

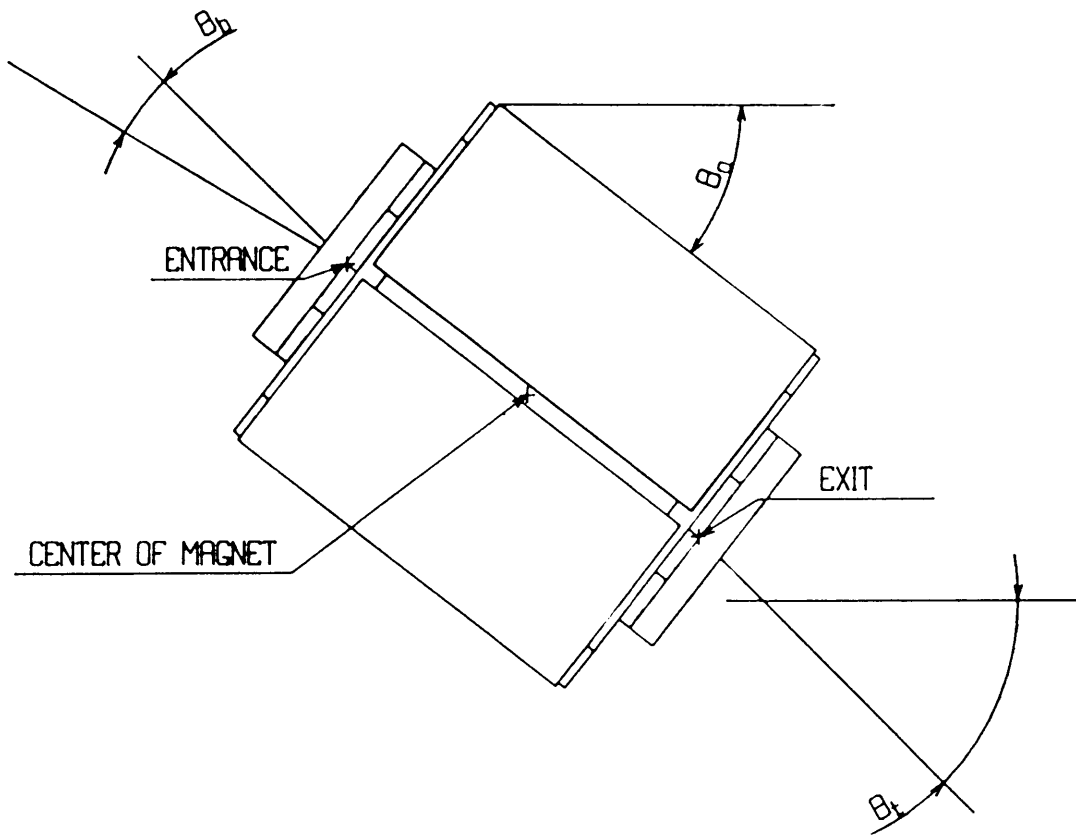
Magnets:

The coordinates of the entrance- and of the exit-points on the central orbit are given. The coordinate of the center together with the angle ϕ_a then gives the exact position of the magnet.

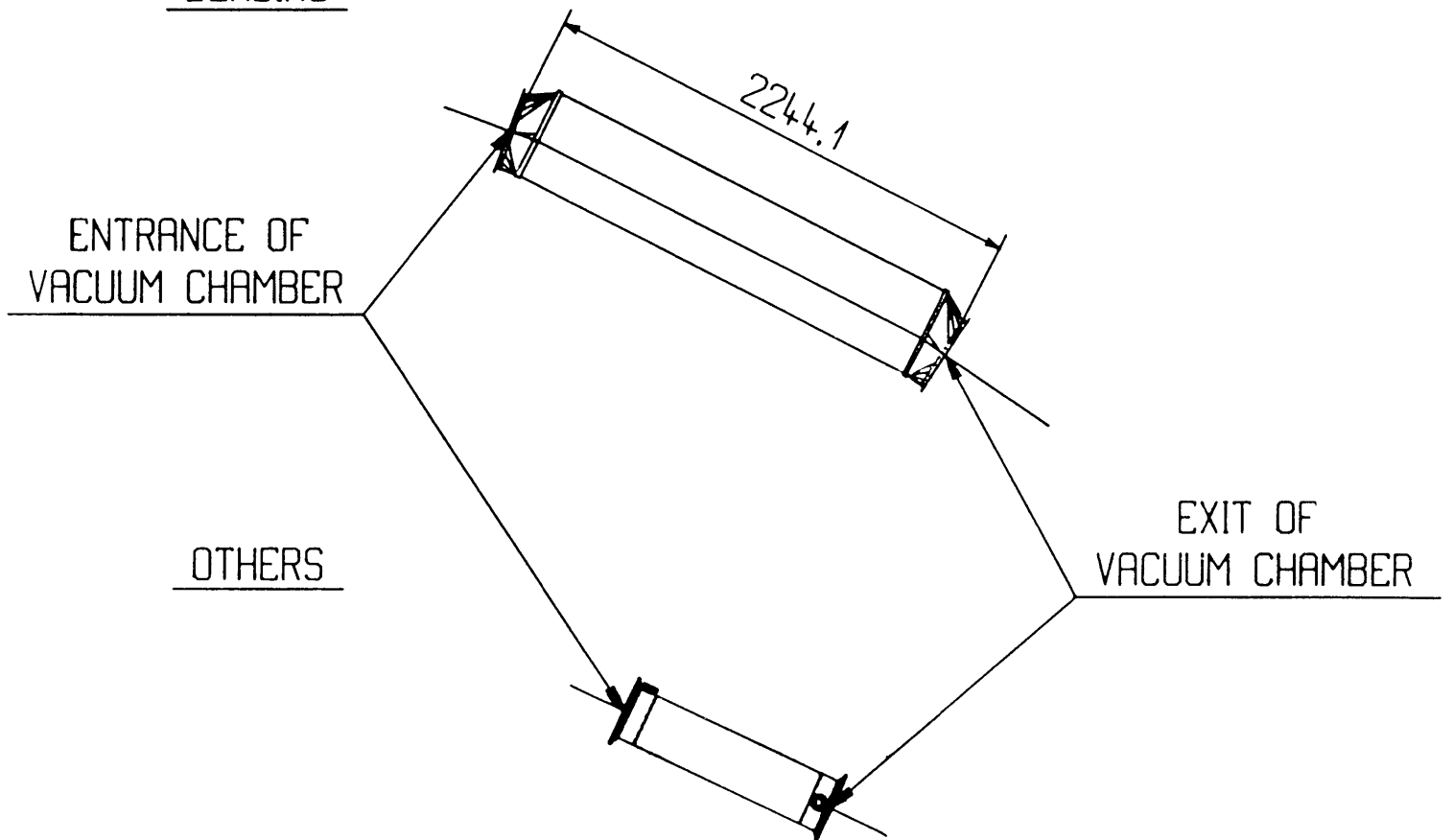
Vacuum chambers:

The coordinates of the entrance – and of the exit – points are given. This gives directly the exact position of the chamber.

Distribution: AA,E. Boltezar,H. Horisberger,F. Malthouse, S. Milner,P. Oreberg,P. Riboni,M. Zanolli



BENDING



This table gives the magnetic length, the bending angle, the X- and Y-coordinates of the entrance and of the exit, of each element in the ring. The origin is located in the center of magnet QDN01. The positive X-axis is pointing towards the center of the ring and the positive Y-axis towards magnet QFN02.

SECT	NAME	LENGTH (m)	OFFSET (m)	BEN ANGL (rad)	TOT ANGL (rad)	ACT ANGL (rad)	COORDINATE OF ENTR X(m) Y(m)		COORDINATE OF EXIT X(m) Y(m)		COORDINATE OF CENT X(m) Y(m)	
01	QDN01	0.70000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.35000	0.00000	0.35000	0.00000	0.00000
	chamb		0.00000					0.00000	-0.50000	0.00000	0.50000	
02	QFN02	0.70000	0.00000	0.00000	0.00000	0.00000	0.00000	2.95000	0.00000	3.65000	0.00000	3.30000
	chamb		0.00000					0.00000	2.80000	0.00000	3.80000	
03	QDN03	0.70000	0.00000	0.00000	0.00000	0.00000	0.00000	6.25000	0.00000	6.95000	0.00000	6.60000
	chamb		0.00000					0.00000	6.10000	0.00000	7.10000	
04	QFN04	0.70000	0.08158	0.03000	0.03000	0.01500	0.00000	9.45000	0.01050	10.14992	0.08157	9.79882
	chamb		0.00000					0.00000	9.30000	0.01500	10.29985	
05	QDN05	0.70000	-0.04961	0.01800	0.04800	0.03900	0.08549	12.64880	0.11278	13.34826	0.04641	13.00059
	chamb		0.00000				0.08099	12.49886	0.11998	13.49809		
	BHN05	1.95130	-0.03000	0.24580	0.29380	0.17090	0.13317	13.77277	0.46419	15.69081	0.26912	14.73689
	chamb		0.00000				0.12598	13.62296	0.50763	15.83437		
06	QFN06	0.75000	0.00000	0.00000	0.29380	0.29380	0.58003	16.07367	0.79722	16.79153	0.68863	16.43260
	chamb		0.00000				0.53659	15.93010	0.84066	16.93511		
	BHN06	1.95130	-0.03000	0.24580	0.53960	0.41670	0.91306	17.17439	1.70085	18.95423	1.27952	18.07645
	chamb		0.00000				0.86962	17.03084	1.77791	19.08291		
07	QDN07	0.75000	0.00000	0.00000	0.53960	0.53960	1.90637	19.29740	2.29171	19.94084	2.09904	19.61912
	chamb		0.00000				1.82930	19.16871	2.36878	20.06952		
08	QFN08	0.75000	0.00000	0.00000	0.53960	0.53960	3.24222	21.52798	3.62757	22.17142	3.43489	21.84970
	chamb		0.00000				3.16515	21.39929	3.70463	22.30010		
	BHN08	1.95130	-0.03000	0.24580	0.78540	0.66250	3.83308	22.51458	5.03028	24.04923	4.40803	23.30036
	chamb		0.00000				3.75602	22.38591	5.13634	24.15529		
09	QDN09	0.75000	0.00000	0.00000	0.78540	0.78540	5.31313	24.33207	5.84346	24.86241	5.57829	24.59724
	chamb		0.00000				5.20706	24.22601	5.94952	24.96847		
	BHN09	1.95130	-0.03000	0.24580	1.03120	0.90830	6.12630	25.14525	7.66094	26.34245	6.87516	25.76750
	chamb		0.00000				6.02024	25.03919	7.78962	26.41952		
10	QFN10	0.75000	0.00000	0.00000	1.03120	1.03120	8.00411	26.54797	8.64755	26.93332	8.32583	26.74064
	chamb		0.00000				7.87542	26.47090	8.77623	27.01038		
11	QDN11	0.75000	0.00000	0.00000	1.03120	1.03120	10.23469	27.88383	10.87812	28.26918	10.55640	28.07651
	chamb		0.00000				10.10600	27.80676	11.00681	28.34625		
	BHN11	1.95130	-0.03000	0.24580	1.27700	1.15410	11.22129	28.47470	13.00113	29.26249	12.09906	28.89600
	chamb		0.00000				11.09261	28.39763	13.14469	29.30592		
12	QFN12	0.75000	0.00000	0.00000	1.27700	1.27700	13.38399	29.37833	14.10185	29.59552	13.74292	29.48693
	chamb		0.00000				13.24041	29.33489	14.24542	29.63896		
	BHN12	1.95130	-0.03000	0.24580	1.52280	1.39990	14.48471	29.71136	16.40274	30.04238	15.43862	29.90644
	chamb		0.00000				14.34115	29.66792	16.55256	30.04958		
13	QDN13	0.70000	-0.04961	0.01800	1.54080	1.53180	16.82725	30.06278	17.52672	30.09007	17.17493	30.12914
	chamb		0.00000				16.67743	30.05558	17.67665	30.09457		
14	QFN14	0.70000	0.08158	0.03000	1.57080	1.55580	20.02560	30.16506	20.72552	30.17557	20.37670	30.09400
	chamb		0.00000				19.87566	30.16057	20.87552	30.17557		
15	QDN15	0.70000	0.00000	0.00000	1.57080	1.57080	23.22552	30.17557	23.92552	30.17557	23.57552	30.17557
	chamb		0.00000				23.07552	30.17557	24.07552	30.17557		
16	QFN16	0.70000	0.08158	0.03000	1.60080	1.58580	26.42552	30.17557	27.12544	30.16506	26.77433	30.09399
	chamb		0.00000				26.27552	30.17557	27.27537	30.16057		
17	QDN17	0.70000	-0.04961	0.01800	1.61880	1.60980	29.62431	30.09007	30.32378	30.06278	29.97611	30.12914
	chamb		0.00000				29.47438	30.09457	30.47361	30.05558		
	BHN17	1.95130	-0.03000	0.24580	1.86460	1.74170	30.74829	30.04238	32.66633	29.71136	31.71241	29.90644
	chamb		0.00000				30.59848	30.04958	32.80989	29.66792		
18	QFN18	0.75000	0.00000	0.00000	1.86460	1.86460	33.04919	29.59552	33.76705	29.37833	33.40812	29.48693
	chamb		0.00000				32.90562	29.63896	33.91062	29.33489		
	BHN18	1.95130	-0.03000	0.24580	2.11040	1.98750	34.14991	29.26249	35.92575	28.47470	35.05197	28.89600
	chamb		0.00000				34.00635	29.30592	36.05842	28.39763		
19	QDN19	0.75000	0.00000	0.00000	2.11040	2.11040	36.27291	28.26918	36.91635	27.88383	36.59463	28.07651
	chamb		0.00000				36.14423	28.34625	37.04504	27.80676		
20	QFN20	0.75000	0.00000	0.00000	2.11040	2.11040	38.50349	26.93332	39.14693	26.54797	38.82521	26.74064
	chamb		0.00000				38.37480	27.01039	39.27561	26.47090		
	BHN20	1.95130	-0.03000	0.24580	2.35620	2.23330	39.49009	26.34245	41.02474	25.14525	40.27587	25.76751
	chamb		0.00000				39.36142	26.41952	41.13079	25.03919		
21	QDN21	0.75000	0.00000	0.00000	2.35620	2.35620	41.30758	24.86241	41.83791	24.33207	41.57275	24.59724
	chamb		0.00000				41.20152	24.96847	41.94398	24.22601		
	BHN21	1.95130	-0.03000	0.24580	2.60200	2.47910	42.12075	24.04923	43.31795	22.51458	42.74301	23.30037
	chamb		0.00000				42.01470	24.15529	43.39502	22.38591		

SECT	NAME	LENGTH (m)	OFFSET (m)	BEN ANGL (rad)	TOT ANGL (rad)	ACT ANGL (rad)	COORDINATE OF ENTR X(m) Y(m)		COORDINATE OF EXIT X(m) Y(m)		COORDINATE OF CENT X(m) Y(m)	
22	QFN22	0.75000	0.00000	0.00000	2.60200	2.60200	43.52347	22.17142	43.90881	21.52798	43.71614	21.84970
	:chamb:		0.00000				43.44640	22.30010	43.98588	21.39929		
23	QDN23	0.75000	0.00000	0.00000	2.60200	2.60200	44.85933	19.94084	45.24467	19.29740	45.05200	19.61912
	:chamb:		0.00000				44.78226	20.06952	45.32174	19.16871		
	:BHN23:	1.95130	-0.03000	0.24580	2.84780	2.72490	45.45019	18.95423	46.23798	17.17439	45.87152	18.07646
	:chamb:		0.00000				45.37313	19.08291	46.28141	17.03084		
24	QFN24	0.75000	0.00000	0.00000	2.84780	2.84780	46.35381	16.79153	46.57101	16.07367	46.46241	16.43260
	:chamb:		0.00000				46.31038	16.93511	46.61444	15.93010		
	:BHN24:	1.95130	-0.03000	0.24580	3.09360	2.97070	46.68684	15.69081	47.01786	13.77277	46.88192	14.73690
	:chamb:		0.00000				46.64341	15.83437	47.02506	13.62296		
25	QDN25	0.70000	-0.04961	0.01800	3.11160	3.10260	47.03826	13.34826	47.06555	12.64880	47.10463	13.00059
	:chamb:		0.00000				47.03106	13.49809	47.07005	12.49886		
26	QFN26	0.70000	0.08158	0.03000	3.14160	3.12660	47.14054	10.14992	47.15104	9.45000	47.06947	9.79882
	:chamb:		0.00000				47.13604	10.29985	47.15104	9.30000		
27	QDN27	0.70000	0.00000	0.00000	3.14160	3.14160	47.15104	6.95000	47.15104	6.25000	47.15104	6.60000
	:chamb:		0.00000				47.15104	7.10000	47.15104	6.10000		
28	QFN28	0.70000	0.00000	0.00000	3.14160	3.14160	47.15104	3.65000	47.15104	2.95000	47.15104	3.30000
	:chamb:		0.00000				47.15104	3.80000	47.15104	2.80000		
29	QDN29	0.70000	0.00000	0.00000	3.14160	3.14160	47.15104	0.35000	47.15104	-0.35000	47.15104	0.00000
	:chamb:		0.00000				47.15104	0.50000	47.15104	-0.50000		
30	QFN30	0.70000	0.00000	0.00000	3.14160	3.14160	47.15104	-2.95000	47.15104	-3.65000	47.15104	-3.30000
	:chamb:		0.00000				47.15104	-2.80000	47.15104	-3.80000		
31	QDN31	0.70000	0.00000	0.00000	3.14160	3.14160	47.15104	-6.25000	47.15104	-6.95000	47.15104	-6.60000
	:chamb:		0.00000				47.15104	-6.10000	47.15104	-7.10000		
32	QFN32	0.70000	0.08158	0.03000	3.17160	3.15660	47.15104	-9.45000	47.14054	-10.14992	47.06947	-9.79882
	:chamb:		0.00000				47.15104	-9.30000	47.13604	-10.29985		
33	QDN33	0.70000	-0.04961	0.01800	3.18960	3.18060	47.06555	-12.64880	47.03826	-13.34826	47.10463	-13.00059
	:chamb:		0.00000				47.07005	-12.49886	47.03106	-13.49886		
	:BHN33:	1.95130	-0.03000	0.24580	3.43540	3.31250	47.01786	-13.77277	46.68684	-15.69081	46.88192	-14.73690
	:chamb:		0.00000				47.02506	-13.62296	46.64341	-15.83437		
34	QFN34	0.75000	0.00000	0.00000	3.43540	3.43540	46.57101	-16.07367	46.35381	-16.79153	46.46241	-16.43260
	:chamb:		0.00000				46.61444	-15.93010	46.31037	-16.93010		
	:BHN34:	1.95130	-0.03000	0.24580	3.68120	3.55830	46.23798	-17.17439	45.45019	-18.95423	45.87152	-18.07646
	:chamb:		0.00000				46.28141	-17.03084	45.37313	-19.08291		

SECT	NAME	LENGTH (m)	OFFSET (m)	BEN ANGL (rad)	TOT ANGL (rad)	ACT ANGL (rad)	COORDINATE OF ENTR X(m) Y(m)		COORDINATE OF EXIT X(m) Y(m)		COORDINATE OF CENT X(m) Y(m)	
35	QDN35	0.75000	0.00000	0.00000	3.68120	3.68120	45.24467	-19.29740	44.85933	-19.94084	45.05200	-19.61912
	:chamb:		0.00000				45.32174	-19.16871	44.78226	-20.06952		
36	QFN36	0.75000	0.00000	0.00000	3.68120	3.68120	43.90881	-21.52798	43.52347	-22.17142	43.71614	-21.84970
	:chamb:		0.00000				43.98588	-21.39929	43.44640	-22.30010		
	:BHN36:	1.95130	-0.03000	0.24580	3.92700	3.80410	43.31795	-22.51458	42.12075	-24.04923	42.74302	-23.30036
	:chamb:		0.00000				43.39502	-22.38591	42.01470	-24.15529		
37	QDN37	0.75000	0.00000	0.00000	3.92700	3.92700	41.83791	-24.33207	41.30756	-24.86241	41.57275	-24.59724
	:chamb:		0.00000				41.94398	-24.22601	41.20151	-24.96847		
	:BHN37:	1.95130	-0.03000	0.24580	4.17280	4.04990	41.02474	-25.14525	39.49009	-26.34245	40.27588	-25.76751
	:chamb:		0.00000				41.13080	-25.03919	39.36142	-26.41951		
38	QFN38	0.75000	0.00000	0.00000	4.17280	4.17280	39.14693	-26.54797	38.50349	-26.93332	38.82521	-26.74065
	:chamb:		0.00000				39.27561	-26.47090	38.37480	-27.01038		
39	QDN39	0.75000	0.00000	0.00000	4.17280	4.17280	36.91635	-27.88383	36.27291	-28.26918	36.59464	-28.07651
	:chamb:		0.00000				37.04504	-27.80677	36.14423	-28.34625		
	:BHN39:	1.95130	-0.03000	0.24580	4.41860	4.29570	35.92975	-28.47470	34.14991	-29.26249	35.05198	-28.89603
	:chamb:		0.00000				36.05842	-28.39763	34.00635	-29.30592		
40	QFN40	0.75000	0.00000	0.00000	4.41860	4.41860	33.76705	-29.37833	33.04919	-29.59552	33.40812	-29.48693
	:chamb:		0.00000				33.91062	-29.33489	32.90562	-29.63896		
	:BHN40:	1.95130	-0.03000	0.24580	4.66440	4.54150	32.66633	-29.71136	30.74829	-30.04238	31.71242	-29.90645
	:chamb:		0.00000				32.80989	-29.66792	30.59848	-30.04958		
41	QDN41	0.70000	-0.04961	0.01800	4.68240	4.67340	30.32378	-30.06278	29.62431	-30.09007	29.97610	-30.12915
	:chamb:		0.00000				30.47361	-30.05558	29.47438	-30.09457		
42	QFN42	0.70000	0.08158	0.03000	4.71240	4.69740	27.12544	-30.16506	26.42552	-30.17557	26.77434	-30.09400
	:chamb:		0.00000				27.27537	-30.16057	26.27552	-30.17556		
43	QDN43	0.70000	0.00000	0.00000	4.71240	4.71240	23.92552	-30.17557	23.22552	-30.17557	23.57552	-30.17558
	:chamb:		0.00000				24.07552	-30.17557	23.07552	-30.17557		
44	QFN44	0.70000	0.08158	0.03000	4.74240	4.72740	20.72552	-30.17557	20.02560	-30.16506	20.37670	-30.09400
	:chamb:		0.00000				20.87552	-30.17557	19.87566	-30.16056		
45	QDN45	0.70000	-0.04961	0.01800	4.76040	4.75140	17.52672	-30.09007	16.82725	-30.06278	17.17493	-30.12915
	:chamb:		0.00000				17.67665	-30.09457	16.67743	-30.05558		
	:BHN45:	1.95130	-0.03000	0.24580	5.00620	4.88330	16.40274	-30.04238	14.48471	-29.71136	15.43863	-29.90645
	:chamb:		0.00000				16.55256	-30.04958	14.34115	-29.66792		
46	QFN46	0.75000	0.00000	0.00000	5.00620	5.00620	14.10185	-29.59552	13.38399	-29.37833	13.74292	-29.48693
	:chamb:		0.00000				14.24542	-29.63896	13.24041	-29.33489		
	:BHN46:	1.95130	-0.03000	0.24580	5.25200	5.12910	13.00113	-29.26249	11.22129	-28.47470	12.09906	-28.89604
	:chamb:		0.00000				13.14468	-29.30593	11.09261	-28.39763		

: SECT :	NAME :	LENGTH :	OFFSET :	BEN ANGL :	TOT ANGL :	ACT ANGL :	COORDINATE OF ENTR :		COORDINATE OF EXIT :		COORDINATE OF CENT :	
:	:	(m) :	(m) :	(rad) :	(rad) :	(rad) :	X(m) :	Y(m) :	X(m) :	Y(m) :	X(m) :	Y(m) :
: 47 :	QD47 :	0.75000 :	0.00000 :	0.00000 :	5.25200 :	5.25200 :	10.87812 :	-28.26918 :	10.23469 :	-27.88383 :	10.55640 :	-28.07651 :
:	: chamb :	:	0.00000 :	:	:	:	11.00681 :	-28.34625 :	10.10600 :	-27.80676 :	:	:
: 48 :	QF48 :	0.75000 :	0.00000 :	0.00000 :	5.25200 :	5.25200 :	8.64755 :	-26.93332 :	8.00411 :	-26.54797 :	8.32583 :	-26.74065 :
:	: chamb :	:	0.00000 :	:	:	:	8.77623 :	-27.01039 :	7.87542 :	-26.47090 :	:	:
:	: BH48 :	1.95130 :	-0.03000 :	0.24580 :	5.49780 :	5.37490 :	7.66094 :	-26.34245 :	6.12630 :	-25.14525 :	6.87517 :	-25.76752 :
:	: chamb :	:	0.00000 :	:	:	:	7.78962 :	-26.41952 :	6.02024 :	-25.03919 :	:	:
: 49 :	QD49 :	0.75000 :	0.00000 :	0.00000 :	5.49780 :	5.49780 :	5.84346 :	-24.86241 :	5.31313 :	-24.33207 :	5.57829 :	-24.59724 :
:	: chamb :	:	0.00000 :	:	:	:	5.94952 :	-24.96847 :	5.20706 :	-24.22601 :	:	:
:	: BH49 :	1.95130 :	-0.03000 :	0.24580 :	5.74360 :	5.62070 :	5.03028 :	-24.04923 :	3.83308 :	-22.51458 :	4.40802 :	-23.30037 :
:	: chamb :	:	0.00000 :	:	:	:	5.13634 :	-24.15529 :	3.75602 :	-22.38591 :	:	:
: 50 :	QF50 :	0.75000 :	0.00000 :	0.00000 :	5.74360 :	5.74360 :	3.62757 :	-22.17142 :	3.24222 :	-21.52798 :	3.43489 :	-21.84970 :
:	: chamb :	:	0.00000 :	:	:	:	3.70463 :	-22.30010 :	3.16516 :	-21.39929 :	:	:
: 51 :	QD51 :	0.75000 :	0.00000 :	0.00000 :	5.74360 :	5.74360 :	2.29171 :	-19.94084 :	1.90637 :	-19.29740 :	2.09903 :	-19.61912 :
:	: chamb :	:	0.00000 :	:	:	:	2.36878 :	-20.06952 :	1.82930 :	-19.16871 :	:	:
:	: BH51 :	1.95130 :	-0.03000 :	0.24580 :	5.98940 :	5.86650 :	1.70085 :	-18.95423 :	0.91306 :	-17.17439 :	1.27951 :	-18.07647 :
:	: chamb :	:	0.00000 :	:	:	:	1.77791 :	-19.08291 :	0.86963 :	-17.03084 :	:	:
: 52 :	QF52 :	0.75000 :	0.00000 :	0.00000 :	5.98940 :	5.98940 :	0.79722 :	-16.79153 :	0.58003 :	-16.07367 :	0.68862 :	-16.43260 :
:	: chamb :	:	0.00000 :	:	:	:	0.84066 :	-16.93511 :	0.53659 :	-15.93010 :	:	:
:	: BH52 :	1.95130 :	-0.03000 :	0.24580 :	6.23520 :	6.11230 :	0.46419 :	-15.69081 :	0.13317 :	-13.77277 :	0.26911 :	-14.73690 :
:	: chamb :	:	0.00000 :	:	:	:	0.50763 :	-15.83437 :	0.12598 :	-13.62296 :	:	:
: 53 :	QDC53 :	0.70000 :	-0.04961 :	0.01800 :	6.25320 :	6.24420 :	0.11278 :	-13.34826 :	0.08549 :	-12.64880 :	0.04641 :	-13.00059 :
:	: chamb :	:	0.00000 :	:	:	:	0.11998 :	-13.49809 :	0.08099 :	-12.49886 :	:	:
: 54 :	QFC54 :	0.70000 :	0.08158 :	0.03000 :	6.28320 :	6.26820 :	0.01050 :	-10.14992 :	0.00000 :	-9.45000 :	0.08157 :	-9.79882 :
:	: chamb :	:	0.00000 :	:	:	:	0.01500 :	-10.29985 :	0.00000 :	-9.30000 :	:	:
: 55 :	QDN55 :	0.70000 :	0.00000 :	0.00000 :	6.28320 :	6.28320 :	0.00000 :	-6.95000 :	0.00000 :	-6.25000 :	-0.00001 :	-6.60000 :
:	: chamb :	:	-0.02500 :	:	:	:	-0.02500 :	-7.10000 :	-0.02500 :	-6.10000 :	:	:
: 56 :	QFN56 :	0.70000 :	0.00000 :	0.00000 :	6.28320 :	6.28320 :	0.00000 :	-3.65000 :	0.00000 :	-2.95000 :	-0.00001 :	-3.30000 :
:	: chamb :	:	0.00000 :	:	:	:	0.00000 :	-3.80000 :	0.00000 :	-2.80000 :	:	: