

How many (outer) tubular fins of a certain size can fit around a (main) body tube of a certain size?

If both main and outer are the same size, the answer is 6.

If you're going to try something different than 6, look for entries in this table that are as close as possible to unity.

Note that just because something looks possible in this table, it might not make a good rocket!

(For example, putting 13 bt50's around a 3" tube will not result in a stable rocket!)

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		outer	bt5	bt20	bt50	24mm	29mm	bt55	bt56	38mm	bt60	54mm	bt70	bt80	2.6	3	3.9	5.38
	main		0.541	0.736	0.976	1.000	1.210	1.325	1.346	1.635	1.637	2.260	2.217	2.600	2.630	3.100	4.000	5.540
Estes	bt5	0.541	6.00	5.11	4.50	4.45	4.12	3.98	3.96	3.70	3.69	3.35	3.36	3.22	3.21	3.08	2.92	2.74
Estes	bt20	0.736	7.18	6.00	5.18	5.12	4.68	4.50	4.47	4.13	4.13	3.68	3.70	3.52	3.50	3.34	3.12	2.90
Estes	bt50	0.976	8.62	7.07	6.00	5.92	5.36	5.12	5.08	4.64	4.64	4.06	4.09	3.86	3.84	3.64	3.36	3.09
Loc 0.95	24mm	1.000	8.76	7.18	6.08	6.00	5.42	5.18	5.14	4.69	4.69	4.10	4.13	3.89	3.88	3.66	3.39	3.11
Loc 1.14	29mm	1.210	10.00	8.10	6.79	6.69	6.00	5.71	5.66	5.13	5.13	4.43	4.47	4.18	4.16	3.91	3.59	3.26
Estes	bt55	1.325	10.68	8.60	7.17	7.07	6.31	6.00	5.95	5.37	5.37	4.61	4.65	4.34	4.32	4.05	3.70	3.35
Estes	bt56	1.346	10.80	8.69	7.24	7.13	6.37	6.05	6.00	5.41	5.41	4.64	4.68	4.37	4.35	4.07	3.72	3.36
Loc 1.52	38mm	1.635	12.50	9.95	8.20	8.07	7.15	6.77	6.71	6.00	6.00	5.08	5.12	4.75	4.73	4.40	3.98	3.56
Estes	bt60	1.637	12.52	9.96	8.21	8.08	7.16	6.77	6.71	6.00	6.00	5.08	5.13	4.76	4.73	4.40	3.98	3.56
Loc 2.14	54mm	2.260	16.16	12.66	10.25	10.08	8.82	8.30	8.21	7.25	7.25	6.00	6.06	5.57	5.53	5.09	4.53	3.98
Estes	bt70	2.217	15.91	12.47	10.11	9.94	8.71	8.19	8.11	7.17	7.16	5.94	6.00	5.51	5.48	5.05	4.49	3.95
Estes	bt80	2.600	18.15	14.12	11.36	11.16	9.72	9.12	9.03	7.93	7.92	6.50	6.57	6.00	5.96	5.46	4.83	4.20
Loc 2.56	2.6	2.630	18.32	14.25	11.46	11.26	9.80	9.20	9.10	7.99	7.98	6.54	6.61	6.04	6.00	5.50	4.85	4.22
Loc 3	3	3.100	21.07	16.27	12.99	12.75	11.04	10.33	10.21	8.91	8.90	7.22	7.30	6.63	6.59	6.00	5.25	4.51
Loc 3.9	3.9	4.000	26.31	20.13	15.91	15.60	13.40	12.49	12.34	10.67	10.66	8.51	8.62	7.76	7.70	6.95	6.00	5.07
Loc 5.38	5.38	5.540	35.27	26.73	20.90	20.47	17.43	16.17	15.97	13.67	13.65	10.69	10.84	9.66	9.59	8.56	7.26	6.00

$$n = 180 / \text{asin}(r2 / (r1+r2)) \quad \text{for results of asin in degrees}$$

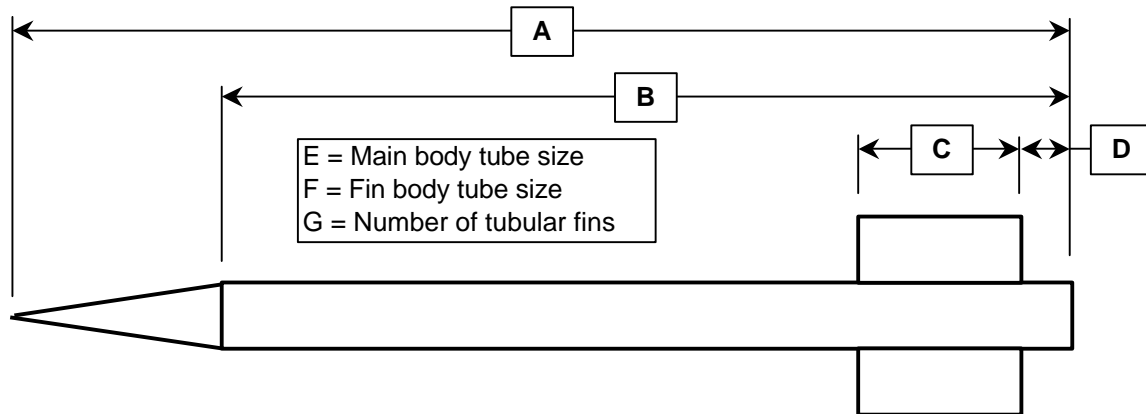
n = number of outer tubes

r1 = radius of main tube

r2 = radius of outer tubes

Dimensions of various model rocket kits that use tubular fins

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All dimensions in inches

Company	Rocket	A	B	C	D	E	F	G	MM
Centuri	Groove Tube (st-8 / st-8)	18.35	13.00	3.00	0	0.908	0.908	6	18
Custom	Razor (bt50 / bt50)	11.75	9.00	1.88	0	0.976	0.976	6	18
Custom	Serval (bt55 / bt50)	24.00	18.00	2.75	0.5	1.325	0.976	7	18
FSI	Viking I	20.00	?	?	?	0.903	?	3?	?
FSI	Viking II	16.00	?	?	?	0.903	?	3?	?
LOC / Precision	Cyclotron	56.75	47?	6.00	?	3.100	3.100	6	38
Magazine Plan	Infinite Loop (bt30 / bt30)	11.19	9.00	1.50	?	0.767	0.767	6	18
Original Rockets	Moonshiner	?	?	?	?	?	?	6	29
Quest	Totally Tubular	15.00	12.50	2.50	0	0.787	0.787	6	18
RocketVision	Six-Pack	13.38	9.13	2.00	0	1.200	1.200	6	24
Rogue Aerospace	HEX Courier	22.50	?	?	?	0.976	0.976	6	18
Shecter Rockets	Tubular Treat (bt20 / bt20)	14.50	12.00	2.75	0	0.750	0.750	6	18
Shecter Rockets	Mini Tubular Treat (bt5 / bt5)	?	12.00	1.75	0	0.541	0.541	6	13

Some of my own creations

Estenson	Eight (2.6 / 38mm)	56.00	47.00	6.50	1.0	2.630	1.635	8	29
Estenson	Golly (bt5 / bt5)	11.13	9.00	1.50	0.19	0.541	0.541	6	13
Estenson	Gopher Holes (bt60 / bt60)	58.75	54.00	6.00	1.50	1.637	1.637	6	24
Estenson	K+S Tubular	22.88	20.50	2.50	0.50	0.980	0.980	6	18
Estenson	Mobius (3.1 / 3.1)	75.25	64.00	6.75	2.00	3.100	3.100	6	38