

t-ceramics

Advanced Technical Ceramics

HIGH PURITY CRYSTALLIZED ALUMINA CRUCIBLES

99.7% Alumina - Max. Usable Temperature 1750 °C

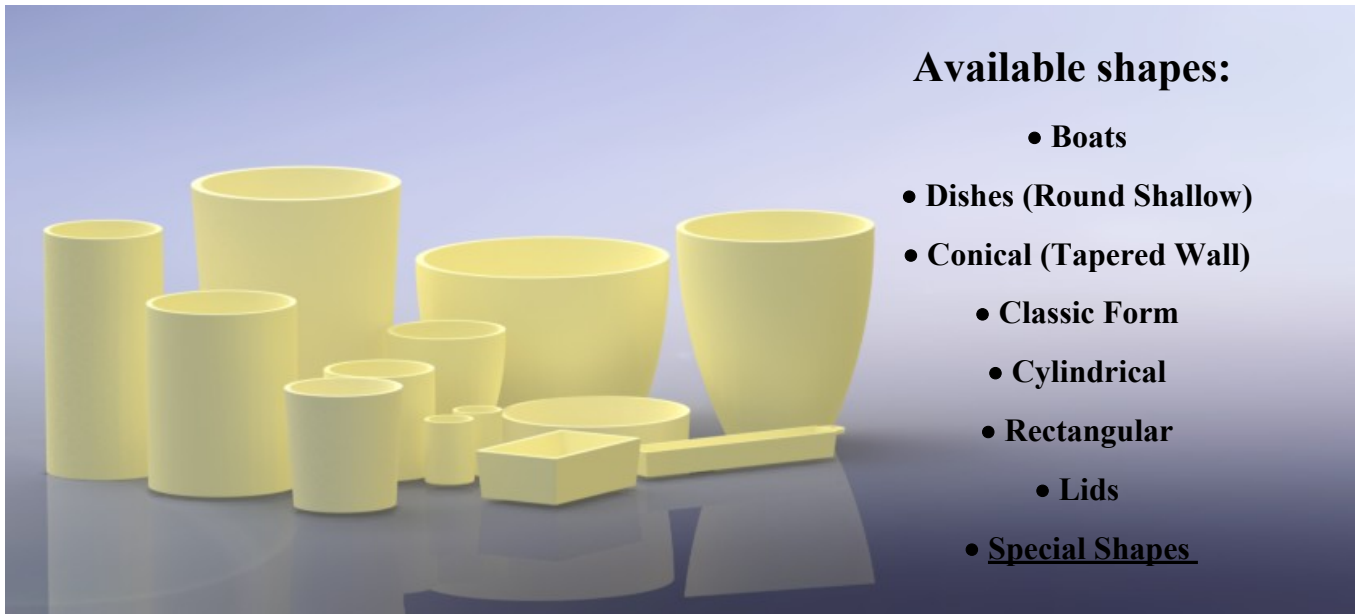
Description.

Alumina (Al₂O₃) is one of the most important ceramic oxides which is widely used for structural, electronics, medical and electrical fields. Alumina has wide application as engineering technical ceramic due to its high hardness value, high abrasion (wear) resistance and low cost. It has high melting point (2054 °C), and boiling point (2977 °C) low thermal expansion and high compressive strength which provides good thermal shock resistance. Alumina is one the best electrical insulations at high temperatures making it excellent choice as a thermodielectric refractory and is transparent to microwave radio frequencies. It's fairly high chemical stability, make Alumina a good material to withstand chemical corrosion.

Thermansys is producing a broad range of analytical grade, recrystallized, dense Alumina crucibles in various sizes and forms. Custom solutions available upon request.

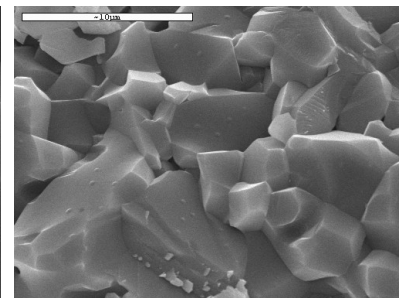
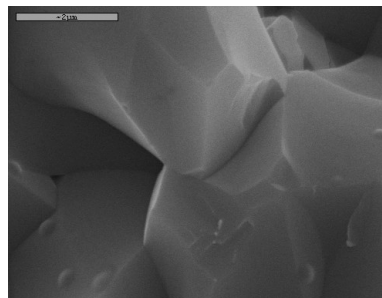
Applications.

Analytical applications, metals melting, ceramic powders heat treatment, material acid treatment even at elevated temperature, crucibles for annealing, crucibles for fusion processes, crucibles for crystal growing, crucibles for extremely corrosive environments, like plasma etching



Chemical Composition.

• Al ₂ O ₃ % wt	99.7
• Fe ₂ O ₃ % wt	0.03
• SiO ₂ % wt	0.05
• MgO % wt	-
• Na ₂ O % wt	0.10
• Other % wt	0.12



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Properties.

• Max. Operating Temperature, °C.....	1750	• Dielectric Strength, AC-KV/mm.....	16.9
• Porosity, % vol.	<0.5	• Dielectric Constant, 1 MHz.....	9.8
• Density, gr/cm ³	3.8	• Compressive Strength, MPa.....	2600
• Color.....	Ivory	• Flexural Strength, MPa.....	380
• Thermal Conductivity at 20°C, W/mK....	30	• Elastic Modulus, GPa.....	375
• Thermal Conductivity at 800°C, W/mK...	8	• Shear Modulus, GPa.....	152
• Coefficient of Thermal Expansion, 10 ⁻⁶ /°C	8.4	• Hardness, kg/mm ²	1440

NOTE: The values listed on properties table above are intended to illustrate typical material properties. Property values vary with size, and shape of part. The material properties values contained herein should not construed as absolute or engineering data and does not constitute a representation or warranty for which Thermansys assumes legal responsibility.

Heating and Cooling Suggestions.

Recrystallized Alumina crucibles are sensitive to thermal shock.

Heat up: Warm up the furnace chamber gradually. Heating rate of 3-4 °C per minute is recommended for the first 1-2 hours to reduce the impact of thermal shock. Maximum recommended heating rate 6 °C per minute.

Cool down: Lower the temperature as gradually as possible. Recommended cooling down rate is more severe than corresponding heating rate and should be retained below 5 °C per minute. It is better to remove the crucibles from the hot zone only if the temperature drops below 100 °C. When taking the crucibles out of furnace and bring them into room temperature to pour the melted material try to make the process as gradual as possible. A better practice is after pouring the melted metal to restore the crucible back into the furnace and leave it cool down inside the furnace.

Atmosphere - Chemical Compatibility - Corrosion.

Alumina crucibles can be used at high temperature under oxidizing (air), reduced, or inert (Nitrogen, Argon) conditions with no restriction. It resists attack by all gases except wet Fluorine. Can also be used under vacuum conditions, although exhibit a rate 10⁻⁷ to 10⁻⁶ g/cm².sec of weight loss.

Alumina crucibles have very good chemical resistance against diluted or concentrated Acids (with the exception of hydrofluoric acid and phosphoric acid), Alkalis, Melted Metals and Halogens. Alumina is insoluble in water and has negligible solubility in strong acid and alkaline solutions. The low chemical solubility of alumina ceramics components makes them highly resistant to chemical corrosion. The ultra-high final firing temperature that Alumina crucibles are exposed during manufacturing process improves even further this behavior. The almost zero porosity and excellent smoothness of Thermansys crucibles surface prevents chemical attack. Generally, Alumina crucibles are the material of choice for a wide range of general purpose laboratory and industrial applications.

Chemical erosion of ceramic materials is not easy to be measured and determined in a way that will lead to accurate and represented scientific data for all shapes and sizes.

Health and Safety.

Our ceramic materials, as it is delivered, do not contain substances dangerous to health, or create them during use. They are produced using natural inert raw materials. Any organic binder or other substances used during manufacturing are burned through production firing. Thermansys however cannot guarantee that ceramic crucibles exposed to conditions that could produce residual material or create material transformations retain its health and safety properties upon reuse.

The product at its final delivery form is fully dense and do not produce dust during normal handling and operation. However, if the customer desire to proceed with further product processes like cutting or drilling inert dust might be created. Workers therefor should be provided with suitable dust protection equipment.

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Standard Crucible Delivery Forms and Dimensions Tables.

Tables below are listing dimensions and capacity data for all standard shapes and sizes that are available from Thermansys. All data quoted are nominal values. Dimensional tolerances in the order of $\pm 3\%$ are apply to all our products.

Special shape or size Alumina engineering ceramics are available upon request. Thermansys can provide a detailed quote even for low volume order. Please send as a detailed drawing of the desired product and we will provide you with a quote.

Conical Form

t-ceramics High Alumina Conical Form crucibles are available in three forms:

- Tall Form with *Top I.D. $\cong 0.6 \times$ Internal Height*
- Balanced Form with *Top I.D. \cong Internal Height*
- Short Form with *Top I.D. $\cong 2 \times$ Internal Height*

Custom sizes available upon request



Conical Tall Form

Capacity (ml)	Top O.D. (mm)	Top I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
0.4	10	8	1	13	CA-CO-T 0.4	4.7
1.0	12	10	1	16	CA-CO-T 1.0	6.3
1.8	14	12	1	20	CA-CO-T 1.8	7.8
4.2	19	16	1.5	26	CA-CO-T 4.2	11.1
8.2	23	20	1.5	33	CA-CO-T 8.2	14.9
16	28	25	1.5	42	CA-CO-T 16	20.2
28	33	30	1.5	50	CA-CO-T 28	26.3
48	40	36	2	60	CA-CO-T 48	34.1
76	48	42	3	70	CA-CO-T 76	42.8
130	56	50	3	84	CA-CO-T 130	55.9
196	64	58	3	94	CA-CO-T 196	68.8
268	70	64	3	106	CA-CO-T 268	80.6
350	76	70	3	116	CA-CO-T 350	92.3
488	84	78	3	130	CA-CO-T 488	109.2
564	89	82	3.5	136	CA-CO-T 564	117.7
750	98	90	4	150	CA-CO-T 750	136.2
1024	110	100	5	166	CA-CO-T 1024	159.7

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Conical Balanced Form

Capacity (ml)	Top O.D. (mm)	Top I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
0.3	10	8	1	8	CA-CO-B 0.3	4.3
0.7	12	10	1	10	CA-CO-B 0.7	5.6
1.2	14	12	1	12	CA-CO-B 1.2	6.8
2.8	19	16	1.5	16	CA-CO-B 2.8	9.4
5.5	23	20	1.5	20	CA-CO-B 5.5	12.4
11	28	25	1.5	25	CA-CO-B 11	16.7
18	33	30	1.5	30	CA-CO-B 18	21.5
32	40	36	2	36	CA-CO-B 32	28
50	48	42	3	42	CA-CO-B 50	34.9
85	56	50	3	50	CA-CO-B 85	45.3
133	64	58	3	58	CA-CO-B 133	56.6
178	70	64	3	64	CA-CO-B 178	65.6
234	76	70	3	70	CA-CO-B 234	75.2
299	84	78	3	78	CA-CO-B 299	85.2
375	89	82	3.5	82	CA-CO-B 375	95.6
496	97	90	3.5	90	CA-CO-B 496	110.2
680	108	100	4	100	CA-CO-B 680	129.5
906	120	110	5	110	CA-CO-B 906	148.8

Conical Short Form

Capacity (ml)	Top O.D. (mm)	Top I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
0.8	19	16	1.5	8	CA-CO-S 0.8	5.9
3.0	23	20	1.5	10	CA-CO-S 3.0	9.7
5.0	27	24	1.5	12	CA-CO-S 5.0	12
12	36	32	2	16	CA-CO-S 12	17.7
24	46	40	3	20	CA-CO-S 24	24.5
46	56	50	3	25	CA-CO-S 46	33.5
79	66	60	3	30	CA-CO-S 79	43.6
136	78	72	3	36	CA-CO-S 136	57.2
216	90	84	3	42	CA-CO-S 216	72.2
366	107	100	3.5	50	CA-CO-S 366	94.4
571	124	116	4	58	CA-CO-S 571	118.5
767	138	128	5	64	CA-CO-S 767	137.7
1004	150	140	5	70	CA-CO-S 1004	158.1

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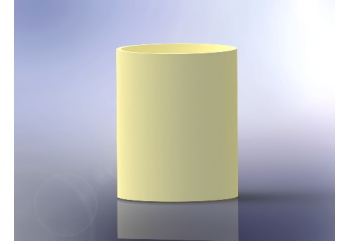
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Cylindrical Form

t-ceramics High Alumina Cylindrical crucibles are available in three forms:

- Tall Form with $I.D. \cong 0.6 \times \text{Internal Height}$
- Balanced Form with $I.D. \cong \text{Internal Height}$
- Short Form with $I.D. \cong 2 \times \text{Internal Height}$

Custom sizes available upon request



Cylindrical Tall Form

Capacity (ml)	O.D. (mm)	I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
0.7	10	8	1	13	CA-CY-T 0.7	5.5
1.3	12	10	1	17	CA-CY-T 1.3	7.1
2.3	14	12	1	20	CA-CY-T 2.3	8.8
5.4	19	16	1.5	27	CA-CY-T 5.4	12.8
10.5	23	20	1.5	33	CA-CY-T 10.5	17.6
20	28	25	1.5	42	CA-CY-T 20	24.6
35	33	30	1.5	50	CA-CY-T 35	32.5
61	40	36	2	60	CA-CY-T 61	43.2
97	48	42	3	70	CA-CY-T 97	55.2
164	56	50	3	83	CA-CY-T 164	72.8
255	64	58	3	97	CA-CY-T 255	92.5
343	70	64	3	107	CA-CY-T 343	108.5
449	76	70	3	117	CA-CY-T 449	125.4
621	84	78	3	130	CA-CY-T 621	149.5
721	89	82	3.5	137	CA-CY-T 721	162.2
954	98	90	4	150	CA-CY-T 954	188.8
1308	110	100	5	167	CA-CY-T 1308	224.2
3028	156	144	6	186	CA-CY-T 3028	354.4

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Cylindrical Balanced Form

Capacity (ml)	O.D. (mm)	I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
0.4	10	8	1	8	CA-CY-B 0.4	4.6
0.8	12	10	1	10	CA-CY-B 0.8	5.8
1.4	14	12	1	12	CA-CY-B 1.4	7.1
3.2	19	16	1.5	16	CA-CY-B 3.2	10.2
6.3	23	20	1.5	20	CA-CY-B 6.3	13.8
12	28	25	1.5	25	CA-CY-B 12	19
21	33	30	1.5	30	CA-CY-B 21	25
37	40	36	2	36	CA-CY-B 37	33.2
58	48	42	3	42	CA-CY-B 58	42.2
98	56	50	3	50	CA-CY-B 98	55.6
153	64	58	3	58	CA-CY-B 153	70.4
206	70	64	3	64	CA-CY-B 206	82.3
269	76	70	3	70	CA-CY-B 269	95.2
373	84	78	3	78	CA-CY-B 373	113.4
433	89	82	3.5	82	CA-CY-B 433	122.9
572	97	90	3.5	90	CA-CY-B 572	143
785	108	100	4	100	CA-CY-B 785	169.8
935	116	106	5	106	CA-CY-B 935	186.7
1045	120	110	5	110	CA-CY-B 1045	198.3

Cylindrical Short Form

Capacity (ml)	O.D. (mm)	I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
1.6	19	16	1.5	8	CA-CY-S 1.6	7.6
3.1	23	20	1.5	10	CA-CY-S 3.1	10.1
5.4	27	24	1.5	12	CA-CY-S 5.4	12.9
13	36	32	2	16	CA-CY-S 13	19.5
25	46	40	3	20	CA-CY-S 25	27.3
49	56	50	3	25	CA-CY-S 49	38.5
85	66	60	3	30	CA-CY-S 85	51.4
146	78	72	3	36	CA-CY-S 146	68.7
233	90	84	3	42	CA-CY-S 233	87.9
393	107	100	3.5	50	CA-CY-S 393	116.7
613	124	116	4	58	CA-CY-S 613	148.3
823	138	128	5	64	CA-CY-S 823	174.2
1077	150	140	5	70	CA-CY-S 1077	201.7

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Classic Form

t-ceramics High Alumina Classic Form crucibles are available in two forms:

- Balanced Form with $I.D. \cong 1.04 \times \text{Internal Height}$
- Short Form with $I.D. \cong 0.55 \times \text{Internal Height}$

Custom sizes available upon request



Classic Balanced Form

Capacity (ml)	Top O.D. (mm)	Top I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
5.5	23	20	1.5	21	CA-HF-B 5.5	12.8
12	29	25	2	26	CA-HF-B 12	18.5
17	34	30	2	31	CA-HF-B 17	21.9
27	40	35	2.5	36	CA-HF-B 27	27.5
45	45	40	2.5	42	CA-HF-B 45	35.5
55	49	44	2.5	45	CA-HF-B 55	40.0
80	56	50	3	52	CA-HF-B 80	47.8
105	60	54	3	54	CA-HF-B 105	55.0
132	66	60	3	63	CA-HF-B 132	61.9
210	76	70	3	73	CA-HF-B 210	79.1
310	86	80	3	83	CA-HF-B 310	97.0
440	97	90	3.5	94	CA-HF-B 440	116.8
600	107	100	3.5	104	CA-HF-B 600	137.7
700	112	105	3.5	109	CA-HF-B 700	149.5
815	118	110	4	115	CA-HF-B 815	162.2
1000	128	118	5	123	CA-HF-B 1000	180.9

Classic Short Form

Capacity (ml)	Top O.D. (mm)	Top I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
22	45	40	2.5	22	CA-HF-S 22	24.9
46	56	50	3	28	CA-HF-S 46	35.9
78	66	60	3	33	CA-HF-S 78	47.1
125	76	70	3	39	CA-HF-S 125	60.2
184	86	80	3	44	CA-HF-S 184	73.8
262	97	90	3.5	50	CA-HF-S 262	88.8
356	107	100	3.5	55	CA-HF-S 356	104.4
476	118	110	4	61	CA-HF-S 476	121.9
625	128	120	4	66	CA-HF-S 625	140.8
800	138	130	4	72	CA-HF-S 800	160.6
1000	150	140	5	77	CA-HF-S 1000	180.9

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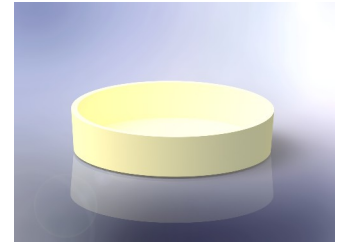
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Dishes (Round Shallow Form)

t-ceramics High Alumina Dishes are available in one form:

- Round shallow crucibles with $I.D. \cong (3 \text{ to } 5) \times \text{Internal Height}$

Custom sizes available upon request



Dishes

Capacity (ml)	O.D. (mm)	I.D. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
1.9	23	20	1.5	6	CA-DH- 1.9	8.1
5.7	33	30	1.5	8	CA-DH- 5.7	13.3
13	44	40	2	10	CA-DH- 13	19.8
24	56	50	3	12	CA-DH- 24	27.2
40	66	60	3	14	CA-DH- 40	35.7
62	76	70	3	16	CA-DH- 62	45.2
90	86	80	3	18	CA-DH- 90	55.6
127	96	90	3	20	CA-DH- 127	66.7
173	107	100	3.5	22	CA-DH- 173	78.8
228	117	110	3.5	24	CA-DH- 228	91.8
294	128	120	4	26	CA-DH- 294	105.5
371	138	130	4	28	CA-DH- 371	120
462	148	140	4	30	CA-DH- 462	135.2
565	160	150	5	32	CA-DH- 565	151.2
683	170	160	5	34	CA-DH- 683	167.9
817	182	170	6	36	CA-DH- 817	185.4
966	192	180	6	38	CA-DH- 966	203.5

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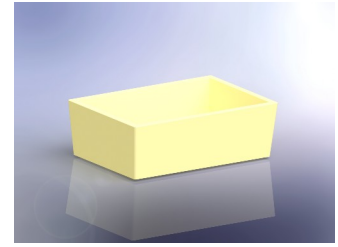
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Rectangular Form

t-ceramics High Alumina rectangular crucibles are available in two forms:

- Square Form with $Length. \cong Width$
- Oblong Form with $Length. \cong 1.5 \times Width$

Custom sizes available upon request



Rectangular Square Form

Capacity (ml)	Length Int. (mm)	Width Int. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
4.0	20	20	2	10	CA-RC-S 4.0	11.6
22	40	40	2	14	CA-RC-S 22	29.4
65	60	60	2	18	CA-RC-S 65	54.1
141	80	80	3	22	CA-RC-S 141	85.2
260	100	100	3	26	CA-RC-S 260	122.4
432	120	120	3	30	CA-RC-S 432	165.4
666	140	140	4	34	CA-RC-S 666	213.9
973	160	160	4	38	CA-RC-S 973	268
1008	142	142	4	50	CA-RC-S 1008	273.8

Rectangular Oblong Form

Capacity (ml)	Length Int. (mm)	Width Int. (mm)	Wall Th. (mm)	Height Int. (mm)	Part No.	Price (Euro)
2.7	20	13	1.5	10	CA-RC-O 2.7	9.5
13	40	24	1.5	14	CA-RC-O 13.4	22.1
39	60	36	2	18	CA-RC-O 39	40.3
84	80	48	3	22	CA-RC-O 84	63.2
156	100	60	3	26	CA-RC-O 156	90.5
259	120	72	3	30	CA-RC-O 259	122.1
400	140	84	3	34	CA-RC-O 400	157.9
584	160	96	3	38	CA-RC-O 584	197.8
816	180	108	4	42	CA-RC-O 816	241.5
1104	200	120	4	46	CA-RC-O 1104	289
1414	186	152	4	50	CA-RC-O 1414	334.9

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Boats

t-ceramics High Alumina boats are available in two forms:

- With tail and hole
- Without tail and hole

Custom sizes available upon request



Boats with Tail and Hole

Capacity (ml)	Length Int. (mm)	Width Int. (mm)	Height Int. (mm)	Wall Th. (mm)	Part No.	Price (Euro)
4.5	40	14	8	2	CA-BT-T 4.5	17.6
6.7	60	14	8	2	CA-BT-T 6.7	21.5
9.0	80	14	8	2	CA-BT-T 9	24.9
11	100	14	8	2	CA-BT-T 11	28
12	110	14	8	2	CA-BT-T 12	29.4
10	60	14	12	2	CA-BT-T 10	26.4
13	80	14	12	2	CA-BT-T 13	30.9
17	100	14	12	2	CA-BT-T 17	35
18	110	14	12	2	CA-BT-T 18	37
20	120	14	12	2	CA-BT-T 20	38.8
20	80	16	16	2	CA-BT-T 20C	39.2
32	100	20	16	2	CA-BT-T 32	51
38	120	20	16	2	CA-BT-T 38	57
45	140	20	16	2	CA-BT-T 45	62.7
62	120	26	20	3	CA-BT-T 62	77.1
73	140	26	20	3	CA-BT-T 73	84.9

Boats without Tail and Hole

Capacity (ml)	Length Int. (mm)	Width Int. (mm)	Height Int. (mm)	Wall Th. (mm)	Part No.	Price (Euro)
4.5	40	14	8	2	CA-BT 4.5	16.3
6.7	60	14	8	2	CA-BT 6.7	19.2
9.0	80	14	8	2	CA-BT 9	21.8
11	100	14	8	2	CA-BT 11	24.1
12	110	14	8	2	CA-BT 12	25.1
10	60	14	12	2	CA-BT 10	22.9
13	80	14	12	2	CA-BT 13	26.2
17	100	14	12	2	CA-BT 17	29
18	110	14	12	2	CA-BT 18	30.5
20	120	14	12	2	CA-BT 20	31.8
20	80	16	16	2	CA-BT 20C	31.6
32	100	20	16	2	CA-BT 32	40.1
38	120	20	16	2	CA-BT 38	44.1
45	140	20	16	2	CA-BT 45	47.8
62	120	26	20	3	CA-BT 62	57
73	140	26	20	3	CA-BT 73	61.9

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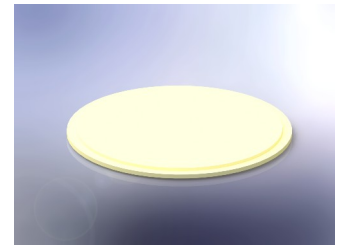
Lids

t-ceramics High Alumina Lids are available for Conical, Cylindrical and Classic Form Crucibles.

Match the Crucible's Top I.D. value with Lid Fit Diameter.

For example: Lid with Part No. **CA-LD-C70** having Fit diameter 70mm is suitable for use with crucibles with I.D. 70mm, e.g. **CA-CY-T 449**

Custom sizes available upon request



Lids (For Conical, Cylindrical and Classic Form Crucibles)

Fit Diameter (mm)	Outside Diameter (mm)	Height Int. (mm)	Part No.	Price (Euro)
8	10	2.0	CA-LD-C 8	4.3
10	12	2.0	CA-LD-C 10	4.7
12	14	2.0	CA-LD-C 12	5.1
16	19	2.0	CA-LD-C 16	6.4
20	23	2.0	CA-LD-C 20	7.5
25	28	2.0	CA-LD-C 25	8.9
30	33	2.0	CA-LD-C 30	10.4
32	36	3.0	CA-LD-C 32	14.1
36	40	3.0	CA-LD-C 36	15.9
40	46	3.0	CA-LD-C 40	18.8
42	48	3.0	CA-LD-C 42	19.7
50	56	3.0	CA-LD-C 50	23.8
58	64	3.0	CA-LD-C 58	28.1
60	66	3.0	CA-LD-C 60	29.2
64	70	3.0	CA-LD-C 64	31.4
70	76	3.0	CA-LD-C 70	34.9
72	78	3.0	CA-LD-C 72	36.1
78	84	3.0	CA-LD-C 78	39.7
80	86	3.0	CA-LD-C 80	41
82	88	3.0	CA-LD-C 82	42.2
84	90	3.5	CA-LD-C 84	48
90	97	3.5	CA-LD-C 90	53.1
100	108	3.5	CA-LD-C 100	61.1
110	120	3.5	CA-LD-C 110	70.5
116	124	4.0	CA-LD-C 116	80.5
120	128	4.0	CA-LD-C 120	84.2
128	138	4.0	CA-LD-C 128	93.1
130	138	4.0	CA-LD-C 130	93.1
140	148	4.0	CA-LD-C 140	102.4

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Vacuum Hot Plates and Refractory Technical Ceramics.

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