



## Crucibles and Related Products

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 **CAPITAL**  
REFRACTORIES

## Introduction



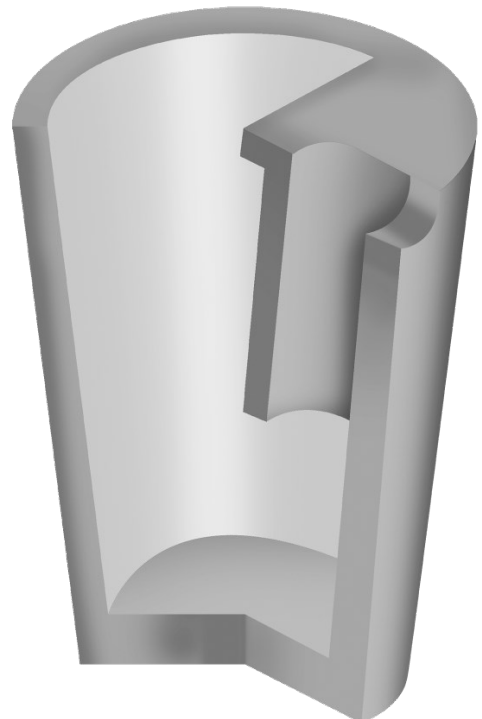
Capital Refractories has been manufacturing and supplying refractory products for 50 years, and operates in over 40 countries.

We have a modern purpose-built facility in the Czech Republic where we press, cast and fire various materials into crucibles. We have utilised our knowledge and experience in the steel industry to develop a full range of products that will cope with today's

ever increasing demands from industry.

To complement the range of Capital crucibles, we offer numerous ancillary products and materials used within the investment and related foundry industries.

The information contained within this brochure is to be used as a guide and does not constitute a specification.



## Crucibles

### Iso-pressed Crucibles

Quality	Description
<b>Alumina</b>	General purpose crucible with good resistance to acidic and basic slags. Used for wide range of alloys and stainless steels
AL97I	Superior erosion resistance
AL88I	Improved thermal shock resistance
<b>Chrome Alumina</b>	Chrome-enriched crucible has high resistance to slags. Preferred to alumina in more arduous applications
CA93I	Superior erosion resistance
CA84I	Improved thermal shock resistance
CA91I	Specially formulated to withstand the most severe thermal shock applications
<b>Magnesia</b>	High resistance to basic slags. Used in vacuum melting of Ni, Co and Fe based alloys
MG88I	Used in vacuum melting of Ni, Co and Fe based alloys
MG95I	Resistant to the special alloys used in semiconductor and sputter target industries
<b>Mullite</b>	ML72I High thermal shock resistance.
<b>Zircon</b>	ZN66I Good resistance to acidic slags. It is used for non-ferrous and precious metals
<b>Zirconia</b>	High resistance to acidic slags. Used in the vacuum melting of superalloys and precious metals
ZC93I	General applications
ZC95I	High thermal shock resistance for noble metals Available in crucible model sizes of 1016 and larger.
ZC96I	Fine grained structure for noble metals. Available in crucible model sizes up to 1427.

#### The advantages of Iso-pressed Crucibles include:

- Available in a wide range of qualities
- Available in a wide range of sizes
- A smooth internal surface giving a reduction of inclusions
- Consistent material properties throughout crucible
- Cost effective



## Iso-pressed Crucibles: Technical Data

	Chemical Analysis (Wt.%)						
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	MgO	CaO	Fe <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub> +HfO <sub>2</sub>
Alumina AL97I	97.5	1.6		0.1	<0.1		
Alumina AL88I	88.5	9.4		0.1	0.2		
Chrome Alumina CA93I	93.4	2.2		0.1	<0.1	3.6	
Chrome Alumina CA84I	84.3	9.0		0.1	0.2	4.8	
Chrome Alumina CA91I	91.5	2.2		0.1	<0.1	5.3	
Magnesia MG88I	3.5	3.8	88.0	3.8	0.2		
Magnesia MG95I	0.5	0.8	95.0	2.5	0.1		
Mullite ML72I	71.8	25.7		0.2	0.5		
Zircon ZN66I	0.8	32.5		0.2	0.1		66.6
Zirconia ZC93I	0.8	1.2		4.0	0.1		93.0
Zirconia ZC95I	1.0	1.5		3.8	<0.1		92.9
Zirconia ZC96I	0.6	0.9		4.4	0.1		94.0

	Bulk Density / g cm <sup>3</sup>	Apparent Porosity / %	Thermal Expansion / MK <sup>-1</sup>	Thermal Conductivity / W m <sup>-1</sup> K <sup>-1</sup>	Maximum Service Temp / °C
Alumina AL97I	2.95	23.8	8.0	4.2	1700
Alumina AL88I	2.59	23.8	8.0	4.2	1700
Chrome Alumina CA93I	3.05	23.0	8.2	3.4	1800
Chrome Alumina CA84I	2.85	20.0	7.6	3.4	1730
Chrome Alumina CA91I	3.10	21.5	8.2	3.4	1800
Magnesia MG88I	2.83	17.0	14.5	2.4	1700
Magnesia MG95I	2.95	15.0	13.0	2.5	1750
Mullite ML72I	2.32	21.5	4.2	1.8	1700
Zircon ZN66I	3.60	21.9	4.6	2.1	
Zirconia ZC93I	4.35	20.0	8.4	1.5	1850
Zirconia ZC95I	4.50	18.5	8.5	1.6	1850
Zirconia ZC96I	4.50	18.5	8.5	1.6	1850



## Iso-pressed Crucibles: Available Dimensions

Model	Dimensions				Steel Capacity (kg)
	D (mm)	d (mm)	H (mm)	h (mm)	
0614	55	40	135	120	1.25
0618	60	50	175	160	1.6
0718	75	65	175	160	2.8
0818	80	65	175	160	2.8
0820	90	75	200	185	6
0824	85	70	235	215	6
0825	75	65	245	225	5
0920	95	75	200	185	6
0926	90	75	260	240	8
1016	100	75	170	160	5.6
1017	100	80	170	160	5.8
1020	100	75	200	185	6
1026	100	75	260	240	8
1031	95	80	305	290	10
1124	115	95	225	215	10
1126	115	90	260	240	10
1133	115	95	330	305	13
1220	120	95	200	180	8
1226	115	100	255	235	12
1227	115	85	260	235	9
1324	130	110	235	215	12
1333	120	105	325	300	15

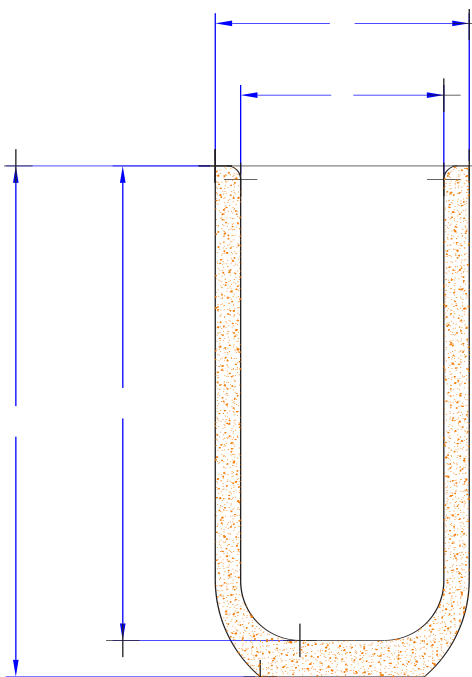


Table continued on next page.  
 Note: Metal capacity allowing for 80 % full and metal density of 7.8

Depending upon the material grade selected, actual dimensions can vary from those listed by:  
 D +/- 3mm  
 d +/- 2mm  
 H & h +/- 2%

## Iso-pressed Crucibles: Available Dimensions

Model	Dimensions				Steel Capacity (kg)
	D (mm)	d (mm)	H (mm)	h (mm)	
1416	140	120	155	140	8
1418	140	120	185	165	11
1423	140	120	225	205	14
1425	135	115	245	225	15
1427	145	120	265	245	15
1429	135	115	285	270	18
1432	140	120	315	295	21
1517	150	125	170	145	9
1520	150	125	195	175	15
1523	150	125	230	200	16
1525	150	125	250	235	17
1526	150	125	255	235	16
1528	150	125	285	260	19
1531	150	125	310	290	21
1538	150	125	380	355	26
1543	155	130	425	400	25
1624	165	140	220	200	18
1633	160	135	330	305	26
1643	165	135	425	400	35
1726	165	140	255	230	21
1728	165	140	275	250	23
1729	165	140	295	270	25
1730	170	145	300	275	28
1733	165	140	330	305	28
1731	170	140	305	280	26
1741	170	150	400	380	40
1840	180	150	400	380	43
1943	185	165	425	390	50
1949	190	160	500	465	62
2030	200	175	300	275	39
2033	200	175	330	300	43
2042	200	170	415	395	60
2127	205	180	270	245	35
2132	210	185	320	295	50
2138	210	185	380	360	58
2243	220	195	425	400	65
2248	220	190	475	455	75
2348	230	205	470	455	85
2533	245	205	325	300	65

## Crucibles

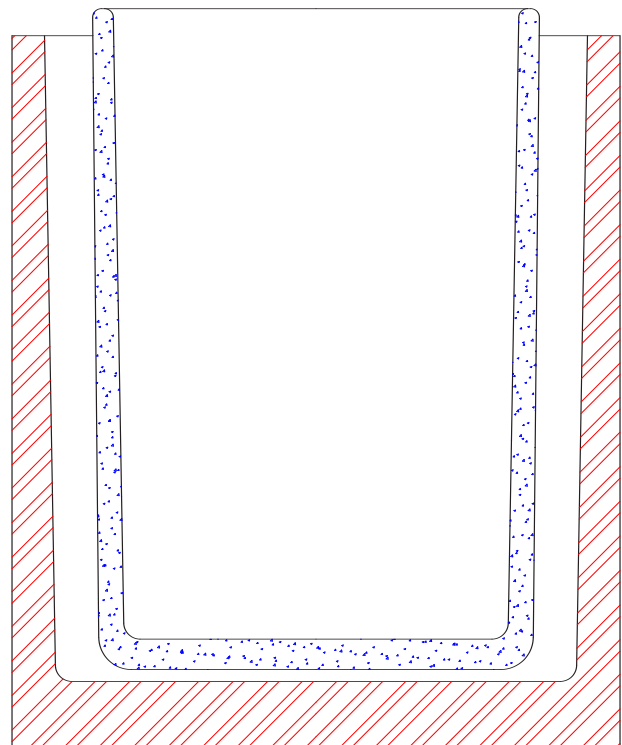
### One Shot Liner



Capital Refractories' one shot crucible system provides the quality conscious investment caster with considerable improvements in terms of product quality.

Since the liner is only used once, there is no risk of cross-contamination of alloys, and inclusions are drastically reduced.

The system comprises of a multi-use outer crucible (backup liner) and a fused silica or alumina single-use, crucible liner.



#### **The advantages One Shot Crucibles include:**

- **Inclusions are reduced**
- **No cross-contamination of alloys**

## One Shot Crucibles: Technical Data

### Properties

Qualities	Al <sub>2</sub> O <sub>3</sub> %	SiO <sub>2</sub> %	Ca/MgO %	Fe <sub>2</sub> O <sub>3</sub> %	Na/K <sub>2</sub> O %	Bulk Density g cm <sup>-3</sup>	Apparent Porosity %
Alumina AL68S	68	31	< 0.1	< 0.1	0.1	2.59	18.0
Silica FS70S	31.3	67.2	0.2	0.3	0.8	2.15	17.0

### Trace Element

Qualities	Pb	Zn	Ag	Sb	Bi	Sn	As	Ga
Alumina AL68S	< 0.5	2.0	< 1	< 0.5	< 0.5	< 1	< 1	35
Silica FS70S	<10	<40	< 25	< 10	<20	<20	<10	<1



**Crucibles**

**One Shot Crucibles: Available Dimensions**

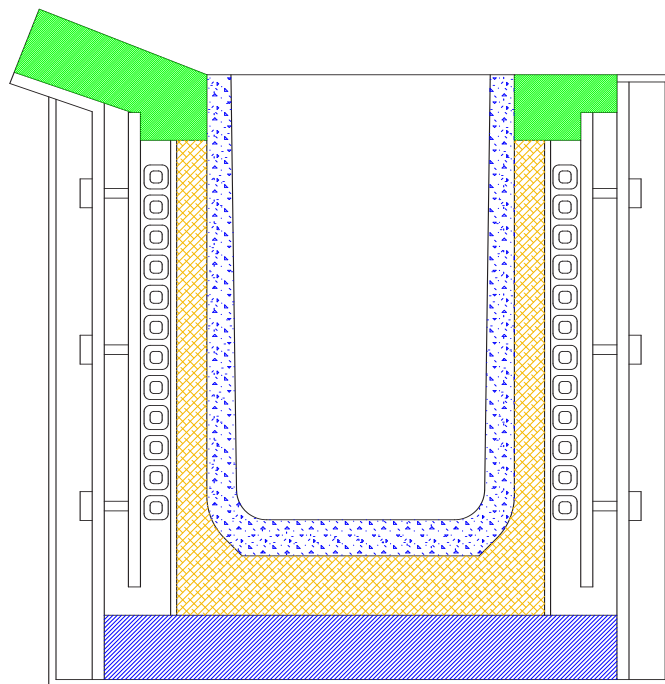
Size code	Capacity		Outside dia. (top) (mm)	Wall thickness (mm)	Overall height (mm)	Base thickness (mm)	Back-up crucible model
	Nominal (pounds)	Actual (kg) 80% full					
5034	18	8	132	8	160	9	
5002	25	12	127	9.5	259	13	1526
5026	25	12	151	10.0	183	13	1818
5005	30	13	130	9.5	241	13	1624
5010	30	13	130	10.0	241	13	1624
5030	35	14	130	10.0	261	13	1624
5008	30	13	148	8.5	203	13	1729
5021	30	13	129	8.0	244	15	
5024	38	17	147	9.5	241	13	1826 cut
5009	40	18	147	9.5	260	13	1826
5007	45	20	148	8.5	282	13	1729
5018	50	22	154	10.0	282	13	1829
5020	60	27	162	10.0	313	13	1931
5025	50	23	144	10.0	350	13	1736
5006	65	30	174	11.0	300	13	2130
5029	70	32	174	11.0	320	13	2130
5036	90	40	198	11	330	15	2333
5028	95	43	200	11.0	330	15	2333
5035	110	50	198	11	380	15	2340
5001	110	46	206	9.5	304	14	2431
5027	125	58	200	11.0	415	15	2342
5014	115	52	222	12.0	302	16	2630
5033	135	60	200	11.0	475	15	2348
5015	135	62	240	16.0	324	19	2832
5023	145	65	240	23.0	395	20	
5022	180	80	248	15.0	408	18	3041
5031	220	100	260	15.0	443	18	3246
5016	285	130	289	15.0	447	17	

## Vibro-cast Crucibles



Crucibles are produced by vibration casting (vibro-cast) when the required size or shape is uneconomical or impractical by the iso-pressing production method.

We are able to produce vibro-cast crucibles with capacities of up to 1000kg.



**The advantages of vibro-cast crucibles include:**

- **Melt capacities of up to 1 tonne.**
- **Complex shapes, e.g. internal pouring siphon.**

## Crucibles

### Vibro-cast Crucibles: Technical Data

Quality	Chemical Analysis (Wt.%)					
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO + MgO	K <sub>2</sub> O + Na <sub>2</sub> O	Cr <sub>2</sub> O <sub>3</sub>
Alumina AL97C	96.6	2.5	<0.1	0.1	0.2	
AL90C	90.7	8.7	<0,05	0.1	0.2	
Chrome Alumina CA93C	93.0	2.8	<0.1	0.1	0.2	3.5
Sillimanite SL70C	70.6	27.1	0.7	0.2	0.2	
AL98C	96.7	0.02	0.04	2.07		

Quality	Bulk Density (g cm <sup>-3</sup> )	Apparent Porosity (%)	Thermal Expansion (MK <sup>-1</sup> )	Thermal Conductivity (W m <sup>-1</sup> K <sup>-1</sup> )	Maximum Service Temp / °C
Alumina AL97C	3.1	19.6	8.0	4.06	1800
AL98C	96.7	0.02	0.04	2.07	
Chrome Alumina CA93C	3.14	19.3	8.2	3.0	1750
Sillimanite SL70C	2.45	19.5	4.5	1.6	1700
AL90C	96.7	0.02	<0,05	0.1	0.2

## Vibro-cast Crucibles: Available Dimensions

Model	Dimensions				Steel Capacity (kg)
	D (mm)	d (mm)	H (mm)	h (mm)	
2539	245	200	385	360	75
2750	270	220	500	460	120
2956	290	240	560	520	140
3359	330	280	590	555	240
3863	380	325	625	590	315
4782	470	385	815	765	550
5593	530	430	925	865	930
5592	550	450	915	855	800
6092	600	500	915	855	1000
6099	600	500	1000	940	1100



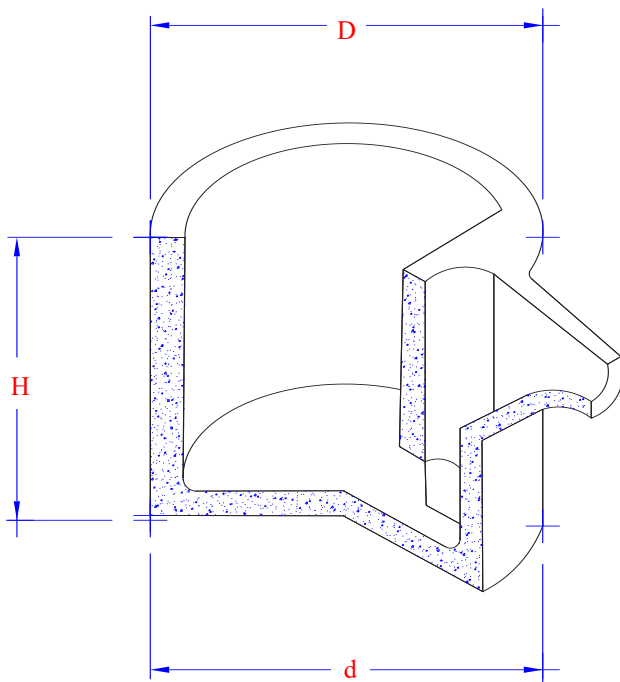
## Vibrocast Crucibles: T-Pot Ladles

We manufacture precast and fired T-Pot ladles in our dedicated modern factory.

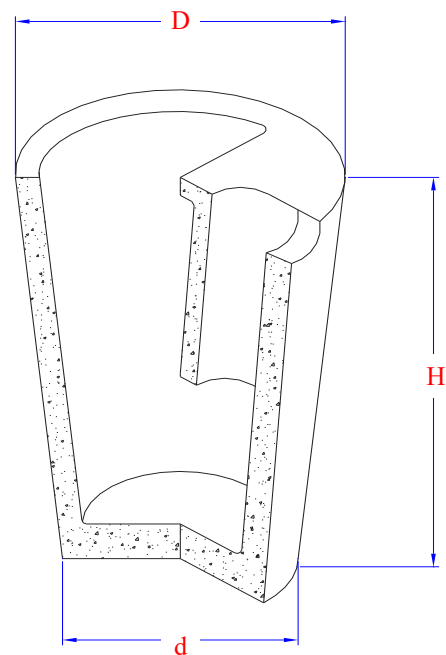
If you require a T-Pot ladle that is not listed below, please contact the office and we shall endeavour to cater for your requirements.

### T-Pot Ladle Dimensions

Model 6038, 6073



Models 6134, 6009, 6032, 6069, 6045



Model	Dimensions (mm)			Steel Capacity (kg)
	D	d	H	
6134	205	170	210	30
6009	318	203	308	65
6032	349	251	440	150
6069	390	260	470	175
6038	415	415	380	200
6045	456	331	595	300
6073	515	450	500	300

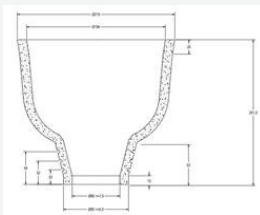
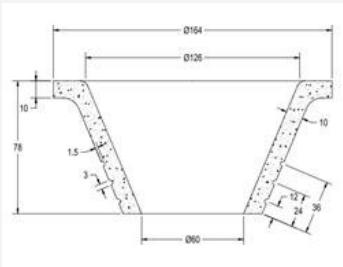
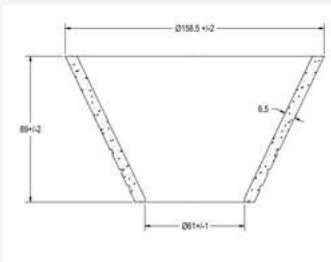



## Pouring Cups

We have a standard range of pouring cups (listed below), but can manufacture to bespoke requirements.



	Chemical Analysis (Wt.%)		
	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>
Fused Silica FS 76J	21.9	76.4	0.60

Type	Model	Height (mm)	Top Diameter (mm)	Bottom Diameter
Bell 	5212	202	218	90
	5222	200	219	95
	5224	145	214	90
	5228	200	219	95
Conical With Flange 	5208	78	164	60
	5210	82	164	43
	5211	84	150	75
	5214	84	160	75
	5215	45	152	85
	5225	90	170	76
	5227	85	176	70
Conical 	5206	89	159	61
	5209	83	132	65
	5213	105	147	62
	5216	76	152	97
	5217	88	130	62
	5218	78	118	44
	5219	152	218	93
	5220	152	218	121
Parallel 	5205	85	116	100
	5207	90	74	70

## Ancillaries

We offer numerous ancillary products to complement the crucible range, from patching and toppings to insulation and plastics.

### Shell Moulds

We can supply Refracoarse, a high quality chamotte used by investment casters for shell build-up. We are able to offer materials such as fused silica and fused mullite for more specialist applications.



### Linings and Backing Material

We offer a range of dry vibration linings suitable for all temperatures and numerous applications. Backing materials are also available.

### Mica

We supply slip plane material in sheets, rolls, glass, foil and weave. Mica is essential for uninhibited reversible movement of the refractory lining caused by its thermal expansion and contraction. The mica also offers a degree of protection against metal penetration, and can give earth-leakage protection.



**Our range of ancillary products is extensive to complement our crucibles, and further includes:**

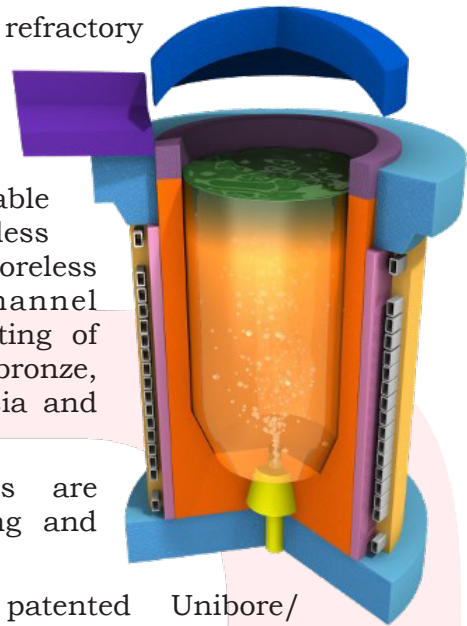
- **Topping Materials**
- **Plastics**
- **Patching Materials**

## Capital Group Overview



We specialise in the supply of refractory linings and associated products to metal melting, foundry and cement industries around the world. We manufacture a wide range of dry vibration rammable products for lining coreless induction furnaces, vacuum coreless induction furnaces and channel induction furnaces for the melting of steel and high temperature alloys, iron, copper, bronze, aluminium and masteralloys. We also supply magnesia and magnesia-chrome bricks for furnace linings.

The dry vibration induction furnace rammables are supplemented by a wide range of topping, ramming and patching refractories and other refractory products.



We supply the patented Unibore/Multicast stopper and nozzle bottom-pour system for ladles and auto-pour which improves metal flow and quality as well as offering a quick change nozzle for improved cleanliness or to easily change nozzle diameters.

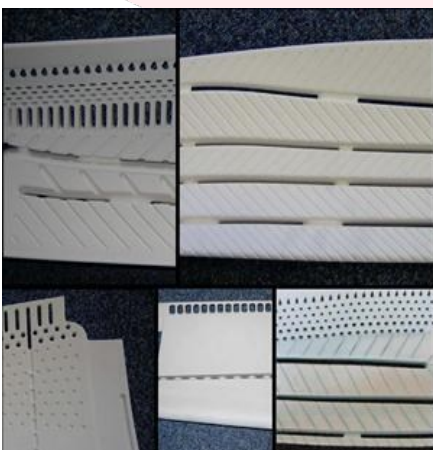
We produce a wide range of both standard and custom gas diffusers

(porous plugs) for use in the steel, aluminium and foundry industries. Gas diffusers have been shown to give significant improvements in metal quality.

We supply a range of ancillary products including mica slip plane products, coil screeds, earth leakage electrodes, vibratory installation equipment, furnace and ladle formers, ceramic fibre shapes, holloware,



ladle opening technology, sampling and temperature measuring equipment.



Capital Injection Ceramics, a subsidiary of Capital, manufactures injection moulded ceramic cores. CIC has proven its capability by producing some of the largest and most complex blades and vanes for IGT and aerospace. In addition, CIC supplies a wide range of cores to the medical, hardware, construction and automotive casting industries. CIC is accredited to AS9000 Aerospace standard for core production — believed to be the only independent company with that status.



**Contact Details**

For supply and additional information about Capital Refractories or CIC, or if your country is not listed, please contact Capital's UK Head Office, see back of brochure for details.

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