

Product Information

## EXCEL and HIMELT crucibles

### DESCRIPTION

EXCEL and HIMELT are high quality carbon-bonded silicon carbide crucibles manufactured using the latest roller-forming techniques and are designed to cater for a range of non-ferrous melting applications.

### APPLICATIONS

EXCEL: Intended for aluminium melting in oil-fired furnaces, melting copper-based alloys in gas and oil-fired furnaces, melting precious metals and non-ferrous alloys in low to medium frequency induction furnaces.

HIMELT: Provides enhanced performance in those applications where more arduous service conditions exist.

### TYPICAL METAL CASTING TEMPERATURE

EXCEL: 850—1250°C (1562—2280°F)

HIMELT: 1000—1400°C (1830—2550°F)

### PERFORMANCE CHARACTERISTICS

- Fast melting speed through high consistent thermal conductivity.
- Excellent thermal shock resistance.
- High resistance to oxidation.
- Good erosion resistance.
- Good resistance to corrosive attack by chemical treatment agents.

### IDENTIFICATION

EXCEL crucibles are coloured dark red and utilise the code X, e.g. AX800. HIMELT crucibles are bright red and utilise the code HM e.g. AHM800.



### PATTERN RANGE

EXCEL and HIMELT crucibles are available in a comprehensive range of shapes and sizes to suit most end user requirements. Custom sizes can be supplied by special request. Heavy wall (HW) versions can be supplied for increased life in arduous applications and a selection of fixed pouring spouts with optimised profiles is offered where required.

EXCEL and HIMELT crucibles can be supplied with Morganite's unique PD coating system, which can assist with metal cleanliness and prevention of dross adhesion.

### QUALITY

EXCEL and HIMELT crucibles are manufactured from premium grade raw materials under an ISO 9001:2008 quality management system.

### PREHEATING/FIRST USE

FUEL-FIRED FURNACES: Crucibles should be pre-heated empty until they reach a uniform bright red colour (circa 900°C) in order to pre-condition the glaze. The pre-heating time will depend on the size of the crucible.

In the case of large capacity crucibles and furnaces with high output burners the rate of temperature rise should be controlled in the initial stages to minimise thermal stress. The typical time taken from ambient to red heat is up to 1 hour. Avoid direct flame impingement on the crucible surface.

INDUCTION FURNACES: The heat-up procedure is dependant on furnace frequency, coil dimensions, and the resistivity of the metal being melted. It is recommended where possible to preheat the crucible empty. The power input rate should initially be limited until the crucible becomes bright red over its entire surface. The time taken to pre-heat will depend on the size of the crucible, but is usually in the range 20 – 40 minutes. Once one third of the crucible is full of molten metal the power can be increased to a higher level. Silicon carbide crucibles absorb proportionally high levels of power from the induction field. Care should be taken not to overheat the crucible. The actual maximum power setting should be assessed from experience and will be dependant on the capacity of the crucible. The appearance of the inside wall of the crucible should be monitored for signs of over-heating and the power reduced once the full charge is molten.

### CHARGING

As soon as the crucible has been pre-heated as specified, charge and melt immediately. Charge light scrap and returns first in order to form a cushion for heavier material. Use tongs to charge ingots and place large pieces and ingots vertically allowing space for expansion. Only add flux once the metal is molten and use the minimum quantity required to obtain good metal quality.

### INSTALLING THE CRUCIBLE

The stand should be made from the same material as the crucible to ensure uniform heating of the crucible base and provide sufficient mechanical support. The diameter of the stand should be at least the same as the base of the crucible and the height should be such that the base of the crucible is level with the centre line of the burner in fuel-fired furnaces. The stand and crucible should be installed centrally in the furnace.

**LIFT-OUT FURNACES** A thin layer of coke dust or other carbonaceous material should be sprinkled on to the stand to prevent the crucible sticking to it.

**BALE OUT FURNACES** The crucible should be installed with an 8mm gap between the upper wall of the crucible and the furnace lining to allow for expansion. Failure to leave a sufficient gap can lead to cracking.

A layer of ceramic fibre insulating material should be placed across the top of the furnace lining and the top surface of the crucible rim in order to seal the chamber and insulate the metal top plates. Ceramic fibre material must not be pushed down between the furnace lining and crucible wall as this would insulate the crucible, prevent the glaze from functioning, and lead to a rapid weakening by oxidation. Where a flanged metal top ring is fitted to the furnace a 9mm gap should be present between the top ring and crucible wall to allow for expansion. Too small a gap can result in cracking of the crucible.

**TILTING FURNACES** Cement the stand on the floor of the furnace and ensure that it is central and level. Place the crucible centrally on the stand and use a thin layer of Morcem 900 cement to bond the crucible and stand together.

Use three equi-spaced grip bricks positioned 75mm below the rim of the crucible, leaving a 6-10mm gap between these and the crucible wall for expansion. Insert cardboard spacers in the gap.

Leave a clear 38mm space under the spout to prevent the crucible from "hanging up" on the spout. After the crucible and accessories have been installed, initially fire the furnace slowly in order to release moisture and to set the cement.

**INDUCTION FURNACES** Cylindrical crucibles are installed in tilting furnaces with a protective layer of back-up material, which should be refractory in composition (e.g. magnesite) with no sintering additives. Back-up thickness is determined by crucible size. A slip plane of mica or glass fibre wool should first be installed against the furnace wall. A layer of back-up is placed in the base of the furnace to support the crucible and establish it at the correct height. The "star wires" are

positioned to make contact with the crucible base in order to provide earth leakage protection. The crucible is lowered and centred in the furnace and back-up material is then added in layers approximately 50mm thick, de-aired and compacted using a forked tool, with each layer scored to provide a key for the next layer. The top of the crucible and back-up lining are sealed in position using plastic refractory. Ultramelt crucibles can be supplied with an integral spout, or alternatively a pouring spout can be fashioned using plastic refractory.

### CLEANING OUT

Crucibles should be cleaned out carefully between melts or at least once per day in holding applications while hot in order to remove build-up of oxide dross. In tilting furnaces crucibles should be cleaned in the horizontal position where possible.

### SAFETY

Proper safety clothing must be worn at all times, refer to AFS Standards. Ensure that no moisture is introduced into the melt.



Store crucibles in a dry, warm area.

Do not stack inside another.

Do not roll crucibles.



Check for cracks or transport damage before use.



Base block must be flat larger than crucible bottom and centred.



Use ceramic fiber blanket to seal. Allow space between top and sides of furnace



Use locating bricks in tilting furnaces, to allow for expansion.



Tangential fire around crucible.



Do not drop charge, slowly lower in with tongs.



First charge with returns, then ingots on top.



Only add flux after metal is molten.



Avoid premature crucible failure by ensuring drain hole is sealed.



For lift-out, tongs must be placed on lower third of crucible. Fit tongs evenly on both sides.



Empty crucible before removing from furnace. Do not let metal solidify in crucible.



Clean carefully every day while still hot



For additional information on our MMS' products and services or to find a location nearest to you, please visit: [www.morganmms.com](http://www.morganmms.com)

All dimensions are subject to normal manufacturing tolerances. Molten Metal Systems reserves the right to change specifications at any time.