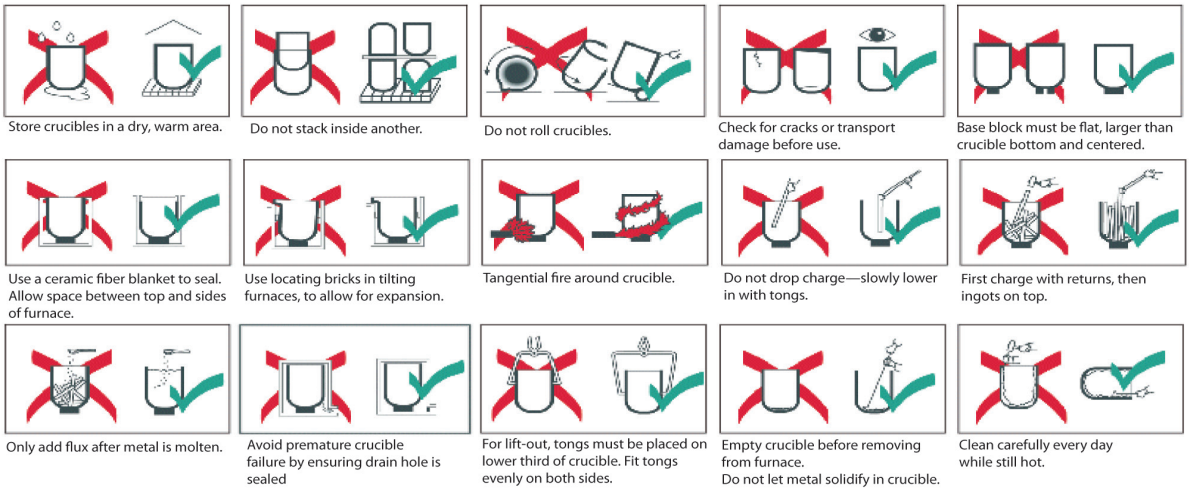
CRUCIBLE CARE, USE AND SAFETY INFORMATION

This document details the recommendations for the correct care and use procedures, and safety precautions that should be adopted for utilisation of the range of Morgan Molten Metal Systems crucibles. Detailed information about our range of products and services can be found on our web site at www.morganmms.com or can be obtained from our representatives and distributors. Our products are manufactured from premium grade raw materials under an ISO 9001:2000 quality management system.

CRUCIBLE CARE



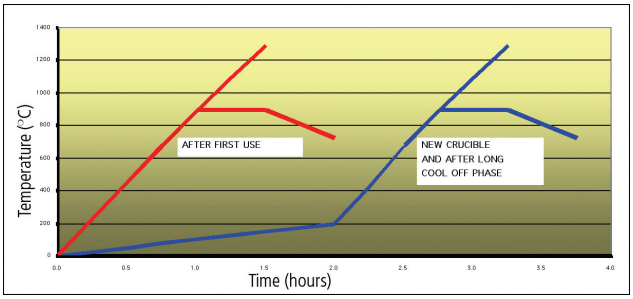
SAFETY

Proper safety clothing and equipment must be worn at all times in the vicinity of molten metal.
Any residual moisture must be removed slowly from the crucible and/or furnace refractories before use.
Ensure that no moisture or volatile materials are introduced into the melt.
Provision should be made underneath the furnace to safely catch any metal that may be discharged.
Crucibles used as transfer vessels must be sufficiently pre-heated before being filled with molten metal.
Hot crucibles should not be placed down on a cold surface.
Ensure that manufacturers' recommendations for maintenance of furnaces are adhered to.
Keep all inflammable material away from the furnace and ensure there is access to fire fighting equipment.
The crucible should only be used for the purpose for which it is designed or recommended.

PRE-HEATING / FIRST USE - Electric Resistance and Fuel Fired Furnaces

Silicon Carbide Crucibles:

Excel, Excel E
Himelt
Ultramelt
Amand CB
Omnimelt



New crucibles and after long cool off phase — Heat empty crucible slowly to 200°C (390°F) to eliminate any moisture, then heat on full power to bright red heat. Crucibles for aluminium holding applications should be held at this temperature for 30 minutes to develop full glaze
protection. The crucible should then be charged. Crucibles for melting applications should continue to be heated on full power until the desired temperature is reached. 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 avoid thermal stress.
After first use — The crucible should be heated on full power to the desired temperature, however the slow heating phase to 200°C (390°F) should be adopted whenever the crucible has been allowed to cool off for extended periods.

Morgan Crucible
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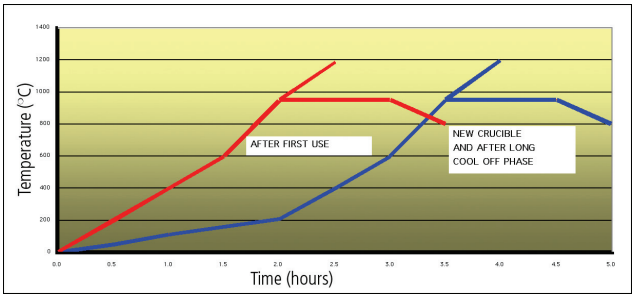
Clay Graphite Crucibles:

Iso-Alustar
Syncarb
Salamander Super



New crucibles and after long cool off phase — Heat empty crucible slowly to 200°C (390°F) to eliminate any moisture, then heat on low power to 600°C. Heat on full power to bright red heat. Syncarb and Iso-Alustar crucibles for aluminium holding applications should be held at this temperature for 60 minutes to develop full glaze protection. The crucible should then be charged. Crucibles for melting applications should continue to be heated on full power until the desired temperature is reached. 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 avoid thermal stress.
After first use — The crucible should be heated to 600°C (1110°F) on low power and then to bright red heat on full power or to the desired temperature, however the slow heating phase to 200°C (390°F) should be adopted whenever the crucible has been allowed to cool off for extended periods.

PRE-HEATING /FIRST USE - Induction Furnaces

Silicon Carbide Crucibles: (Excel, Himelt, Ultramelt)

The heat up procedure is dependant on furnace frequency, coil dimensions, and the resistivity of the metal being melted. Where possible the crucible should be pre-heated 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 normally in the range 20-40 minutes. Once one third of the crucible is full of molten metal the power can be increased. Silicon carbide crucibles absorb proportionally high levels of power from the induction field and care should be taken not to overheat the crucible. Power should be reduced once the full charge is molten.

Clay Graphite Crucibles: (Indux)

Push-up/Drop coil furnaces: The heat-up procedure is dependant on furnace frequency, coil dimensions, and the resistivity of the metal being melted.

3 kHz furnaces: It is recommended where possible to preheat the crucible empty. The furnace should initially be run at 20% of maximum power until the crucible shows signs of red heat. After 30 minutes the power can be increased to 50% of the maximum. Loosely charge the crucible with metal and maintain the power level at 50% until approximately half the crucible contains molten metal. The power should then be increased.

1 kHz furnaces: The power absorption of the empty crucible may be too poor therefore it may be necessary to pre-heat with a charge loosely in place in order to provide supplementary heating by conduction from the metal charge. Run the furnace at 20% of maximum power until the crucible shows signs of red heat. If after 1/2 hour the crucible shows no evidence of red heat, increase the power to 50% of maximum. Hold at 50% until half the crucible contains molten metal, then increase the power.

Tilting furnaces: Clay graphite crucibles will be prone to thermal shock if the rate of temperature rise of the metal charge is too rapid. It is therefore recommended that where possible the crucible is pre-heated empty from cold using a maximum of 100Kw, or 50% of maximum power, whichever is smaller. Heat the crucible until it attains red heat. This should take between 20 and 40 minutes. Once the metal charge is added the crucible itself will absorb very little power and will remain at red heat until the metal melts. On subsequent cycles the preheat procedure is unnecessary when the crucible is still red hot.

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For additional information on Morgan MMS' products & services or to find a location nearest to you, please visit:
www.morganmms.com

