MOLTEN METAL SYSTEMS - Crucible Troubleshooting Guide

Morgan Advanced Materials

PROBABLE CAUSE	Vertical Cracks				Lateral Cracks			Holes			Star Cracks		Wear / Erosion			Oxidation				Miscellaneous			PROBABLE REMEDY
	Crack in centre wall	Crack from top edge	Crack in chine and bottom	Cracks any where on crucible	Below spout in TP crucibles	Half way up wall in lift out crucible	Near bottom	Outside, in pits and craters	Pinholes	Large holes in wall	In side wall	In base	At the bottom and chine	Inside all over	Inside at metal level	Crucible chine	Crucible base	All over crucible	Round top edge	Spalling of crucible material	Flaking of glaze	Bottom bulged up and cracked	
Crucible thin and worn causing loss of strength				■		■		■			■												Monitor crucible and replace when worn out.
Thermal shock due to too rapid heating		■	■	■		■														■	■		Follow recommended start up routine
Thermal shock due to rapid cooling						■																	Do not stand hot crucible on cold surface (Concrete)
Top ring too tight		■																					Replace top ring with correct size or adjust properly
Dross build up on inside of crucible	■	■	■	■																			Clean crucible of dross after each use
Badly fitting tongs crushing crucible	■	■		■																			Replace tongs with correct size
A bridged or wedged charge can expand crack the crucible	■										■												Ensure that the crucible charge is loaded correctly
Mechanical damage such as ingot dropped in						■			■														Place ingots carefully using tongs
Mechanical damage during handling									■							■		■					Follow crucible care recommendations for handling
Crucible stuck to base and cracked when using tongs to free					■																		Use graphite powder on base
Spout touching furnace lining when initially installed					■																		Ensure that there is clearance around the spout
Leaks from a crack								■															Break up and look for crack then reassess
Flux attack								■	■				■	■	■								Avoid premature and excessive flux additions
Damage due to excessive cleaning											■			■									Use correct cleaning tools/Clean when hot
Stand or base block too small			■																			■	Ensure that the correct size stand is used
Crucible not placed centrally on stand (base block)						■																■	Ensure that the crucible is installed correctly
Standing hot crucible on uneven surface	■																					■	Rest crucible in a sand bed
Badly adjusted burner													■			■		■	■				Reset burner
Stand too small/ crucible set too low causing flame impingement													■										Raise crucible to stop burner flame impingement
Thermal blanket incorrectly installed at top of crucible					■														■				Blanket should be placed on top of crucible not down sides
Badly adjusted burner with too much air																■		■	■				Reset burner to correct mixture
Furnace spill door open or not airtight						■										■	■	■					Close and seal spill door
Inadequate preheating during start-up to activate the glaze																		■	■				Follow pre-heat recommendations
Moisture in crucible not dried out properly																				■	■		Ensure that the crucible is stored in dry conditions
Thermal blanket used between stand and crucible						■											■						Only use graphite/cardboard between stand and crucible
Using a non-conductiverefractory/brick stand (base block)			■			■											■						Use the correct stand for the crucible material
Support blocks in tilting furnace too tight	■	■																					Ensure that the crucible is installed correctly