Workshop

Uses and
Recommendations
for Corona's Products

A. CORONA'S HISTORY

Tradition, Quality and Leadership

Corona Cadinhos *is a leader in the national crucible market and internationally known for the quality of its products. With 26 years of tradition, the company offers a complete line of silicon carbide, graphite, clay graphite and isostatically pressed crucibles, high performance graphite pieces, ceramic parts and degasifiers.*

Corona Cadinhos *keeps intelligent stocks for prompt delivery so as to provide the sector with quick supply, also exporting to the five continents. The company offers technical support for its customers through a highly qualified team and workshops for technical capability.*

With a management process which is focused on results excellence, the company is ISO 9000 certified, complies with the strict environmental legislation required by the ceramic/smelters segment and by the area where the plant is situated, and has a tests laboratory fully equipped with machinery approved by INMETRO, thus ensuring the products' compliance.

Quality Policy

- *Understand and meet our customers' needs*
- *Continuously improve our processes*
- *Search for human development*
- *Aim at the continuous improvement of the system by meeting the management requirements of the quality management system.*

B. THE HISTORY OF CRUCIBLES

The crucible is one of the oldest artifacts produced by men and it was 'invented' just before the Bronze Age (9,000 BC.) when men started working with metals to produce household utensils, tools and weapons. The first crucibles were made of clay and vegetable fibers, until carbon was added to its composition, providing crucibles with higher thermal resistance.

One major technological upgrade happened when silicon carbide was added to the crucible composition, promoting high mechanical resistance.

Crucibles were produced manually (just like we produce vases nowadays). Today, they are produced in high pressure rotating presses and their production involves state-of-the-art technology.

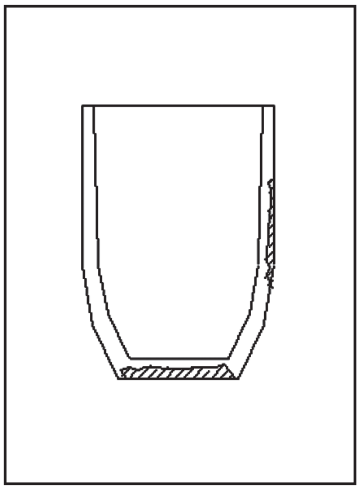
C. RECOMMENDATIONS FOR CRUCIBLES USE

1. STORAGE

All crucibles are porous, event after having received layers of varnish. Therefore, the environment humidity can penetrate the walls and the bottom of the crucibles. That is the reason why the crucibles should be stored in dry places.

If crucibles are stored in humid places, they will absorb this humidity and when placed inside the furnace, they may lose this humidity quickly, what can generate cracks or result in their complete destruction (Picture 1).

When the crucible is evidently wet or humid, it should be slowly and gradually dried before its first run.



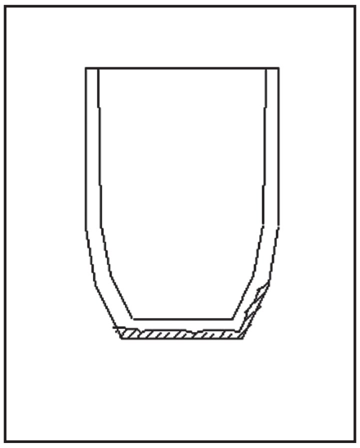
Picture 1

2. HANDLING

The crucibles should be handled with care in order to avoid damages on its body and on the varnish layer, what can shorten their life cycle.

Failures and scratches on the crucible varnish layer may result in an unprotected area, what can generate oxidation spots.

One of the most common treatments given to crucibles in the foundries is the habit of "rolling" them on the floor to transport them. This is a method that helps moving the pieces, especially the heaviest ones, but such procedure may cause serious damages, usually unnoticed ones when the crucibles are cold. (Picture 2).



Picture 2

3. FURNACE CHECK-UP

Checking the conditions of your furnace before the installation of a new crucible is vital for the improvement of its lifecycle.

Find below some details that should be taken into consideration before the furnace start-up procedures.

3.1. Electric furnaces

Check the condition of the following items:

- *Refractory bricks*
- *Electric resistors*
- *Cover*

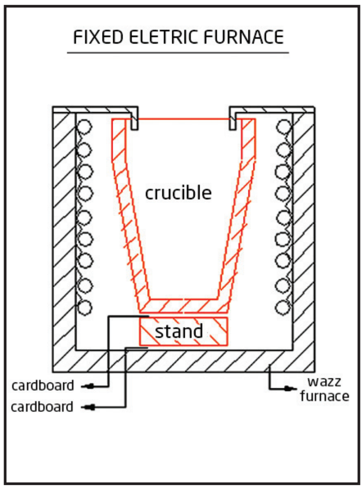
3.2.Gas and Oil Furnaces

- *Check the condition of the following items:*
- *Refractory bricks.*
- *Cover.*
- *Flame direction (it should be directed to the area between the crucible and the furnace wall).*
- *Eventual presence of encrusted oil on the wall and bottom of the furnace.*

4. CRUCIBLE INSTALLATION

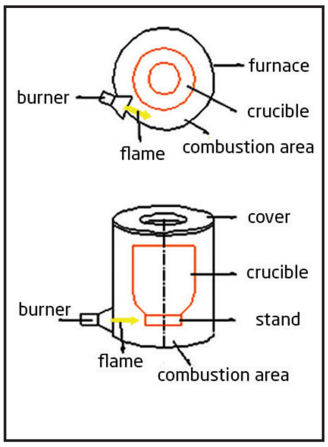
4.1. Fixed Electric Furnace (drawing 1)

- *Centralize the stand in the furnace and then the crucible on the stand.*
- *The stand diameter has to be larger than or equal to the bottom of the crucible, but never smaller!*
- *It is advisable to use only silicon carbide stands.*
- *A cardboard sheet (2mm) should be placed between the stand and the crucible bottom.*
- *Check if the distances between the crucible and the furnace wall as well as between the crucible and the ring are not shorter than 100mm.*

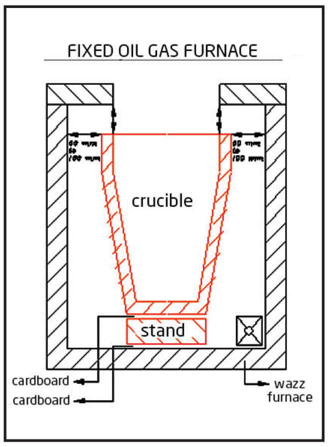


drawing 1

4.2. Fixed furnaces oil or gas



drawing 2A



drawing 2B

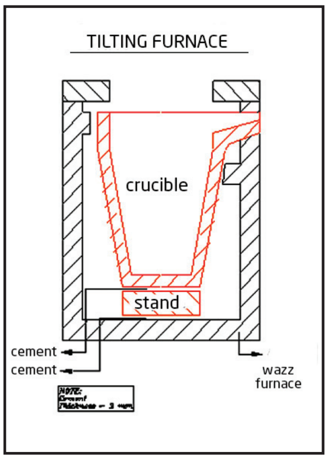
- *Centralize the stand and the crucible in the furnace.*
- *The stand top diameter has to be larger than or equal to the bottom of the crucible, but never smaller! (Photo 1).*

Photo 1

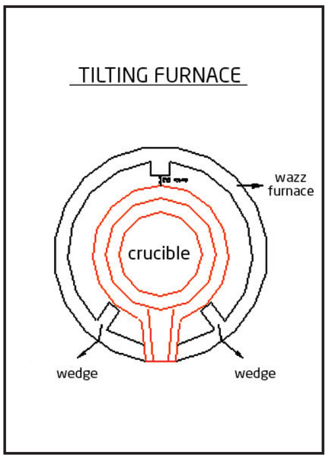
- *It is advisable to use only silicon carbide stands.*
- *Refractory stands have different expansion rate and temperature levels from the crucible! (Photo 2)*

Photo 1

- *Check if the distances between the crucible and the furnace wall as well as between the crucible and the lid are not shorter than 100mm.*
- *A cardboard sheet (2mm) should be placed between the stand and the crucible bottom.*
- *The flame should be non-oxidizing (red) and directed to the area between the crucible and the furnace wall, at the stand height (oxidizing flame is clear blue).*



drawing 3A



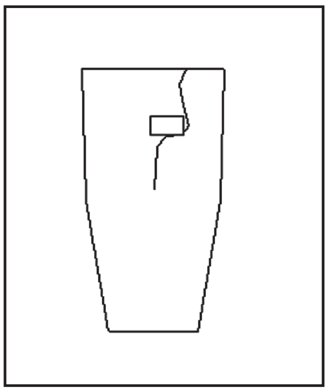
drawing 3B

4.3. Tilting Furnaces (drawings 3A and 3B)

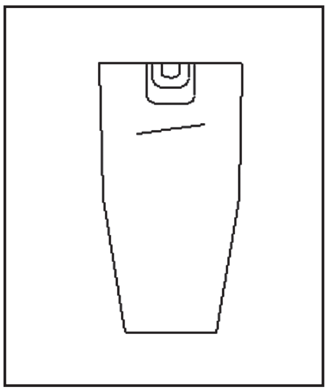
- *Centralize the stand and the crucible in the furnace.*
- *The stand top diameter has to be larger than or equal to the bottom of the crucible, but never smaller! (Photo 1).*
- *It is advisable to use only silicon carbide stands.*
- *Refractory stands have different expansion rates and temperature levels from the crucible (Photo 2).*
- *To avoid the crucible moving while the furnace is tilting, set the stand on the furnace floor and glue the*

crucible on the stand without using the cardboard sheet. To glue the stand and the stand use Corona cement, in a layer with 3mm maximum thickness.

- *Three wedges (supports) should be glued on the tilting furnace wall. Two wedges should be placed close to the crucible spout to support the crucible at the pouring state (when the furnace tilts).*
- *The third wedge should be placed on the furnace wall, opposite to the crucible spout, with a minimum distance of 2mm between the wedge and the crucible (Drawing 3B). The lack of space between the crucible and the wedge (2mm) can cause cracks.*
- *Never use the crucible spout as a support (Pictures 3 and 4) (Photo 3).*



Picture 3



Picture 4

Photo 3

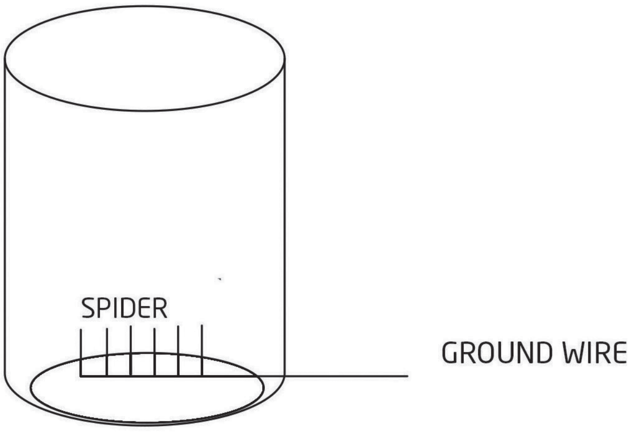
5. INDUCTION FURNACE

5.1. Crucible Installation in Induction Furnace

Customer :

First step for bottom preparation:

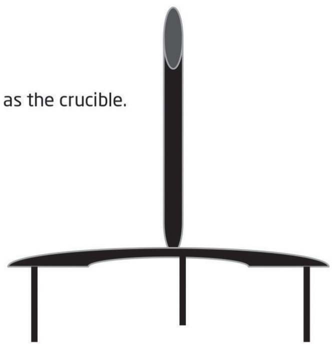
Use refractory sand for induction furnaces; the spider is set and then followed by another layer of sand, leaving the spider wires away from the sand.



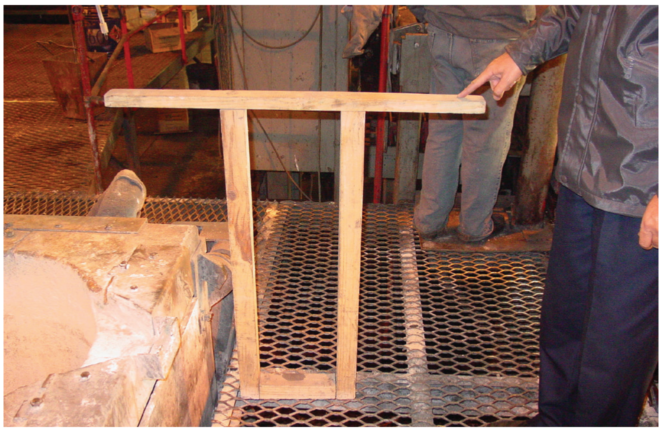
Spider: connected to the ground wiring with 06 wires touching the crucible.

5.2. The refractory sand has to be well tamped on the bottom with the use of a trident which has the same bending as the crucible's.

The trident has the same bending as the crucible.



5.3. Carry out bottom levelling with the help of a wooden template so as to have the correct height of the bottom (the crucible is 150mm from the furnace edge).



Distance from the crucible edge to the furnace edge (150mm).

5.4. Place the crucible and centralize it.

5.5. With a trident, tamp the sand into the gap between the crucible and the furnace wall (reel refractory), placing thin layers of sand and tamping accurately.

Continue with this procedure until reaching +/- 10mm from the crucible edge.

5.6. Apply plastic refractory for induction furnaces (material comes ready to be used) to fill up the 10 cm gap, up to the furnace edge in order to prevent the sand from leaving the gap.

5.7. Heat the furnace with the loaded crucible, starting at 50 Kw (+/- 15% of the furnace capacity) for 1 hour and raising the temperature from 50 kw/h to 200 kw. Increase the power up to the melting power and start the work. NOTE: furnace frequency: 1200 hz.

5.8. On average, each melting lasts 60 min, but if the furnace is at maximum power (500kw/h) this can be reduced to 40 minutes.

5.9. The remaining sand, together with the melted metal, gets stuck on the crucible wall (together with oxides) generating a crust, what lowers the volume and interferes in the induction.

6. MELTING START-UP PROCEDURES

6.1. Electric Furnace

- *For its first run, a new crucible should be gradually heated until it reaches the temperature of 900ºC or up to when the crucible gets "reddish".*
- *After this procedure, set the furnace temperature for the production start-up.*
- *Never leave the furnace at a low temperature because this will oxidize the crucible (leave the furnace at working temperature or remove the crucible if the furnace is turned off).*
- *Do not leave solidified metal inside the crucible. While the crucible is still at the working temperature, it is advisable to remove all the scraps and remaining metal from inside the crucible.*
- *Use the least amount of chemical products as possible.*

6.2. Gas and Oil Furnaces

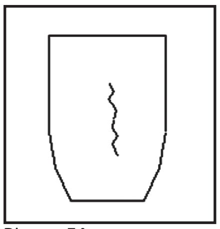
- *For its first run, heat the new crucible gradually for about 30 min. with a low flame and a homogeneous mix of air and oil or air and gas.*
- *Then, increase the temperature up to about 900ºC for more 30 min. or until the color of the crucible gets 'reddish'. After this procedure, set the temperature for the production start-up.*
- *Do not leave solidified material inside the crucible. While the crucible is still at the working temperature, it is advisable to remove all the scraps and left metal from the inside of the crucible.*
- *Use the least amount of chemical products as possible.*

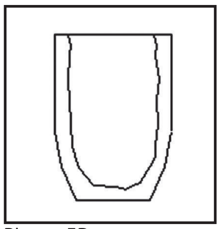
7. MAIN REASONS FOR CRUCIBLES SHORT LIFE CYCLE

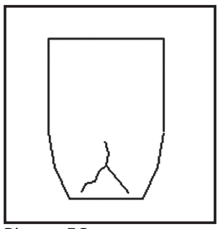
7.1. Mechanical Damages

7.1.1.Load Positioning

- *The load should be carefully and vertically positioned inside the crucible. If a cold ingot is put diagonally inside a cold crucible, the subsequent expansion of the ingot will put pressure on the crucible wall, thus generating cracks (Pictures 5A, 5B, 5C).*


Picture 5A


Picture 5B


Picture 5C

7.1.2. Loading

- *If cold pieces are inadvertently thrown inside the crucible, provoking direct impact or shock, this may result in cracks on the walls or on the bottom of the crucible (Picture 6 and Photo 4).*
- *Sometimes, the cracks are unnoticed initially. However, regardless of the crack size, it can break the piece and cause serious damages to the furnace.*

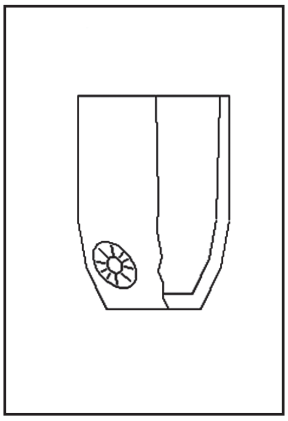
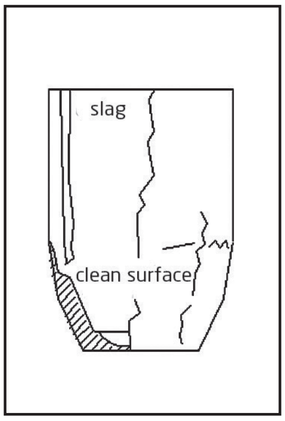

Picture 6

Photo 4

7.1.3. Metal Solidification

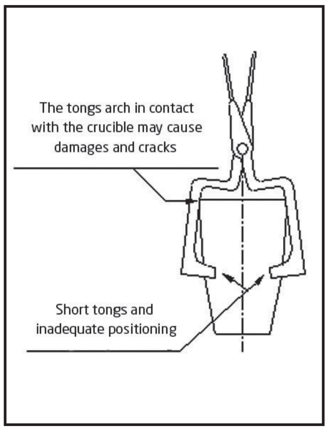
- *Diversified types of cracks: This type of fault is frequently caused by solidified metal inside the crucible, usually due to the interruption of work at the end of the day. When the crucible is re-heated, the metal expands causing multiple or vertical cracks starting from the lower part of the crucible wall and going towards the stand. When this type of crack occurs, the internal surface of the crucible, which is in contact with the metal, gets clean and free from slag. This helps distinguish the crack caused by the solidification of metal from the crack caused by thermal shock. (picture 7).*
- *Another frequent cause of metal solidification is the addition of a large quantity of cold metal to a small quantity of melted metal.*



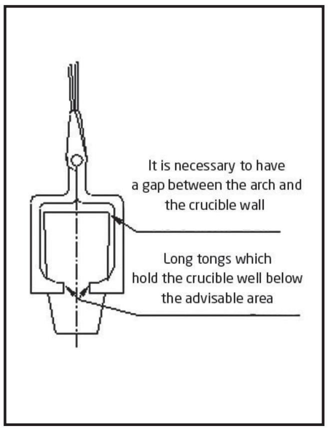
Picture 7

7.1.4. Problems caused by Tongs

- *Low quality tongs or their misuse can cause lots of cracks in crucibles when they are taken out of the furnace to be emptied.*
- *Tongs should be positioned as low as possible on the crucible sides, always on the lower half of the crucible. The clutches should be perfectly adapted to the crucible circumference and the arches of the tongs should be curved in order to prevent the contact to the crucible (pictures 8 and 9).*

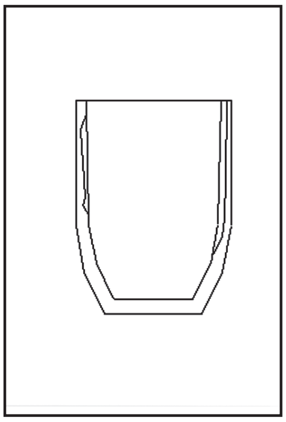


Picture 8

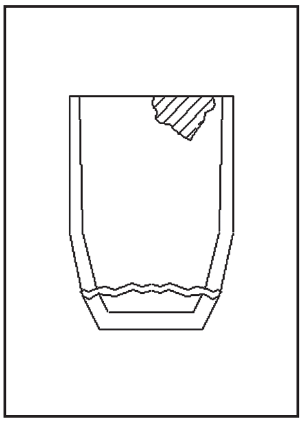


Picture 9

- *The most common damage caused by inadequately adjusted tongs is cracks from the upper edge. This can make the mouth of the crucible oval. When this happens, marks left by the tongs on the edges of the crucible are frequently found.*
- *The tongs should never touch the crucible edge.*
- *Another frequent cause of mechanical damage can occur during the crucible cleaning procedures. The tools used for this purpose can never be sharpened or pointed (picture 10).*
- *Crucibles taken out of the furnace to be emptied should not be stuck to the stand. In order to prevent this, we should always use a cardboard sheet (2mm) between the crucible and the stand. When getting back to the furnace, a cardboard sheet can be used again or another demoulding agent (such as graphite), applied with an appropriate tool. If a crucible gets stuck to the stand, the stand should be removed with extreme caution (rotating or swinging the crucible or the stand can cause damages to the crucible bottom (picture 11).*



Picture 10

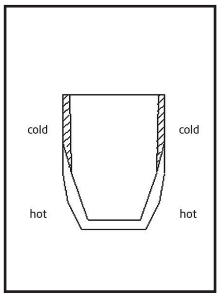


Picture 11

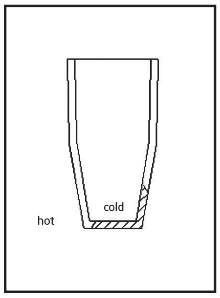
7.1.5. Damages caused by thermal shock

- *Crucibles are made to resist reasonable thermal shocks. During heating there is internal strain as some areas are heated more quickly than others.*
- *Generally, heat is more concentrated on the lower walls which are heated more quickly than the bottom and upper edges of the crucibles. Similarly, the external face is heated more quickly than the inside. Unequal thermal expansion stresses the colder areas but as heat progresses this strain tends to disappear.*
- *A very quick or direct heating increases the thermal strain, mainly in big crucibles, resulting in cracks due to thermal shock. In this case, the colder areas are the ones that tend to crack.*

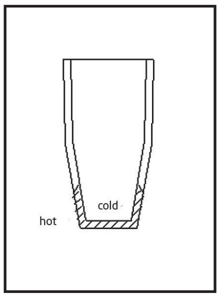
- *Vertical cracks, from the inside to the outside or from the upper edge downward (picture 12A) or through the bottom of the crucible (pictures 12B e 12C), can be found. This is usually followed by an attack to the varnish, which starts peeling off.*
- *Similarly, a hot crucible loaded with cold and big pieces or put on the cold floor can suffer cracks or ruptures from thermal shock. In extreme cases, the bottom of the crucible will be totally detached from its body. The risks of thermal shock can be avoided by the gradual and well-distributed heating of the crucibles, until they get reddish. It is also important to be attentive to the correct direction of the flame, which should be positioned laterally to the crucible and at the stand height.*
- *The crucibles should be empty when they are heated. When the whole crucible is red, it becomes more flexible and is therefore less resistant to impact. Therefore, it should be heated up to a temperature that is higher than its working temperature.*
- *Crucibles for metal transportation should be also pre-heated until they get red before being loaded with melted metals.*



Picture 12A



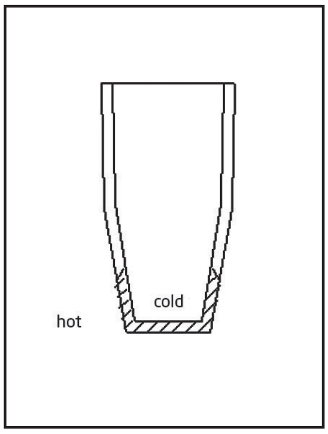
Picture 12B



Picture 12C

7.1.6. Flux Attack

- *Many types of flux can attack the crucible. Fluxes may be needed but the later they are added to the run, without causing damages to the metal quality, the better. Refining fluxes for aluminum are particularly aggressive to the crucibles as they penetrate the walls causing their thickness increase and multiple vertical and horizontal cracks. Also, in very high external temperatures the flux together with varnish drastically reduces the melting point and makes it more liquid. In this phase there is a very quick external erosion (pictures 13A e 13B). Flux penetration also makes the crucible mechanically weaker.*
- *Fluxes put in the crucible before the load can make the flux melt much earlier than the metal and penetrate the walls, thus causing internal erosion. The correct procedure is to add flux over the melted metal (Photo 5).*



Picture 13A

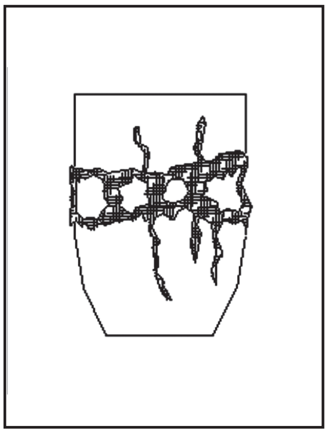

Picture 13B

Photo 5

7.1.7. Slag

- *Crucibles should be regularly scraped, preferably after each run, but in case it is not possible, this should be done at least once a day. If slag is accumulated, it gets harder and more difficult to be removed. Slag is an excellent thermal insulator and when accumulated on the crucible wall it requires an external temperature which is much higher than the normal, reducing the crucible life cycle.*
- *Besides that, the expansion of slag is much higher than the expansion of the crucible. Therefore, when the crucible is re-heated after a stop, the slag expansion can crack the crucible (Photo 6).*

Photo 6

It is not always easy to determine the reason for a crucible fault. Therefore, conclusions should not be reached hastily. All the factors must be taken into consideration and the faulty crucible should be always broken for a thorough analysis.

7.1.8. Oxidation

- *Oxidation or combustion of materials derived from carbon in the crucible make it weaker and reduces its thermal conductivity. The oxidized crucible tends to peel off, making its walls thinner (picture 15). Therefore, damages to the protecting varnish should be avoided.*
- *Whenever metalwork conditions allow, melting should occur in slightly reducing or neutral atmosphere. Opening the furnace for cleaning and drainage should be avoided during the time the furnace is being used. The burner shutters for fuel and air should be always closed at the same time and the opening lid of the burner should be closed to avoid air penetration. In the beginning, the oxidation causes the browning of the crucible material and when the crucible is completely oxidized the material color fades until it becomes light brown (Photo 7).*

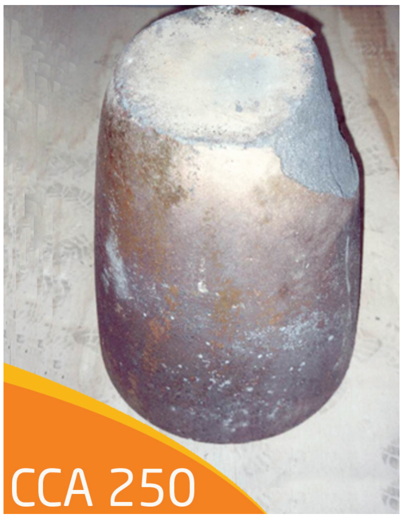


Photo 7

8. CHARACTERISTICS AND RECOMMENDATIONS

CRUCIBLES

Model	Format	Max. Temperature	Characteristic	Recommendations
CCA	Cónical	1200°C	68,2% Carbide 31,8% Graphite	Bronze, aluminum, copper, brass and zamack
CCAF	Cónical	1300°C	58% Carbide 31,8% Graphite	Bronze, copper, brass, iron, gold and silver
CCB	Basin	1200°C	68,2% Carbide 31,8% Graphite	Bronze, aluminum, copper, brass and zamack
CCC	Cylindrical	1200°C	68,2% Carbide 31,8% Graphite	Bronze, aluminum, copper, brass and zamack
CCCF	Cylindrical	1300°C	58% Carbide 42% Graphite	Bronze, copper, brass, iron, gold and silver
GA	Conical	1300°C	60,7% Graphite 19,5% Clay 19,8% Carbide	Bronze, aluminum, copper, brass and zamack
GB	Basin	1300°C	60,7% Graphite 19,5% Clay 19,8% Carbide	Bronze, aluminum, copper, brass and zamack
GC	Conical	1300°C	60,7% Graphite 19,5% Clay 19,8% Carbide	Bronze, aluminum, copper, brass and zamack
GIA	Cylindrical	1300°C	39,3% Graphite 28,1% Clay 32,6% Clay	Copper, bronze and brass
GIB	Cylindrical	1300°C	45,0% Graphite 33,8% Aluminum Oxide 21,2% Clay	Copper, bronze and brass

The crucibles CCA, CCB and CCC are produced with higher quantity of silicon carbide than graphite in their composition. Therefore, they are called carbide crucibles.

The crucibles CCAF and CCCF are produced with higher quantity of graphite than silicon carbide in their composition. Therefore, they are called graphite crucibles.

The crucibles GA, GB and GC are produced with clay and graphite in their composition and therefore they are called clay-graphite crucibles.

The crucibles GIA have formulation dedicated especially to high frequency induction furnaces (above 1,000 htz).

The crucibles GIB have formulation dedicated especially to low frequency induction furnaces (up to1,000 htz).

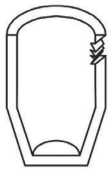
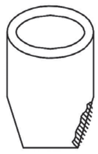
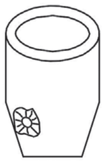
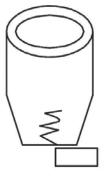
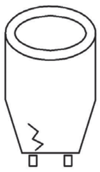
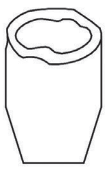
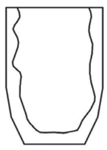
Stands

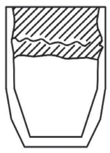
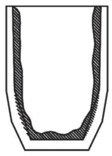
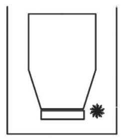
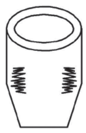
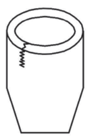
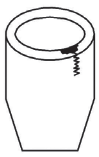
We have two models of stands: Conical and Cylindrical. Both are made of silicon carbide.

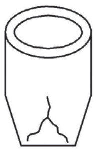
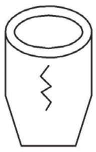
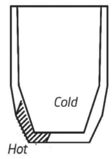
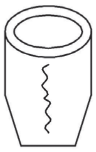
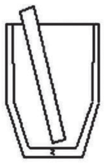
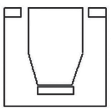
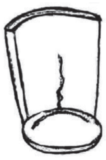
Due to their format, the conical stands should be preferably used in oil and gas furnaces, as this allows more accurate flame direction and larger combustion chamber.

Never use stands which are smaller than the bottom of the crucible!

The 23 most common problems affecting crucibles

	Recommendation	Possible Problems	Causes
1	*Carry crucibles in trolleys or forklifts*	 *Missing parts*	*Bangs during carrying or handling*
2	*Store in dry places*	 *Loose or damaged parts*	*Humidity*
3	*Use appropriate tools for loading procedures*	 *Hole or crack*	*Internal impact of the ingot*
4	*Always centralize the crucible on the stand*	 *Bottom crack*	*Strain in non-supported area*
5	*Don't sit the crucible on edges or bricks*	 *Bottom crack*	*Strain in non-supported area*
6	*Use tongs in the correct size*	 *Deformed top*	*Tongs on crucible top*
7	*Scrap the crucible carefully*	 *Premature internal wear out*	*Damage to the crucible internal wall*

	Recommendation	Possible Problems	Causes
8	*Use the correct flux in the quantities recommended by the manufacturer*	 *Internal and external erosion*	*Flux attack*
9	*Use the correct flux in the quantities recommended by the manufacturer*	 *Internal and external erosion*	*Flux attack*
10	*Scrap the crucible regularly*	 *Reduction of internal volume and cracks*	*Thermal insulation*
11	*Place the burner correctly*	 *Localized oxidation*	*Flame attack*
12	*Check the resistances*	 *Localized oxidation*	*Temperature difference and thermal shock*
13	*Use appropriate ring*	 *Top crack*	*The lid ring is smaller or equal to the crucible top*
14	*Follow the recommendation for the minimum distance of 2mm from the wedge to the crucible wall*	 *Side cracks*	*Pressure on the crucible due to lack of gap*
15	*Install ring on the furnace cover*	 *Crack or wear out on top*	*Loading and unloading lever*

	Recommendation	Possible Problems	Causes
16	*Never place ingot in diagonal position*		*Shock when loading*
17	*Never place ingot in diagonal position*		*Shock when loading*
18	*Remove metal while the crucible is hot*		*Solidified metal expansion*
19	*Be careful with thermal shock*		*Various*
20	*Scrap periodically and empty the crucible before cooling*		*Slag expansion*
21	*When starting the work watch out for the first ingot loading*		*Internal ingot impact*
22	*Leave 3-4 mm gap between furnace brick and the crucible*		*Expansion*
23	*Remove material from the crucible after the end of melting*		*Accumulated solidified metal*

9. FURNACES

9.1 Corona Electric Furnaces

Type	Crucible Size	Melting Capacity	External Dimensions (mm)	Power (kw)	Energy Consumption (kw/kg of melted aluminum)
Type 1	B135 B175	Up to 175kg	D=1100 H= 920	38	0,33
Type 2	B250 B330	Up to 330kg	D=1290 H=1050	48	0,35
Type 3	B500 B600	Up to 600kg	D=1470 H=1200	68	0,30

- *Coating in high performance ceramic fiber.*
- *Kanthal resistors.*
- Option *on/off control panel or thyristor panel and timer.*

9.2 Corona Gas Furnaces

Type	Crucible Size	Melting Capacity	External Dimension	Burner Power (Kcal/hour)	Gas Consumption (kg gas / kg of Melted Aluminum)
Type 1	B135 B175	Up to 175kg	D=1100 H= 960	150.000	0,06
Type 2	B250 B330	Up to 330kg	D=1250 H=1050	250.000	0,08
Type 3	B500 B600	Up to 600kg	D=1470 H=1200	450.000	0,11 (GN) e 0,10 (GLP)

- *Coating in refractory concrete with 70% Al203 and insulating concrete.*
- *Control panel with protection type IP54.*
- *Gas rack in compliance with safety regulations.*
- *Option for tilting furnace with handwheel or hydraulic drive.*

10. CHEMICAL SUBSTANCES FOR NON-FERROUS METALS TREATMENT

10.1 Brassdesox

DEOXIDANT OF COPPER AND ITS ALLOYS

OPERATING PROCEDURES

Brass	Bronze	Copper
1 Tablet	1 Tablet	1 Tablet
p/ 200kg	p/ 100kg	p/ 50kg

Deep it into the bottom of the crucible with a pre-heated iron bar. Stir it slowly for some seconds and then remove the bar so as not to contaminate the bath. Wait 2-4 minutes for the reaction to occur. Skim and melt it.

10.2 Clearmetal

SCORIFIER, DEOXIDANT, BRONZE, BRASS AND ALLOYS

OPERATING PROCEDURES

300 to 500 grams for each 100kg of alloy. This proportion depends on the level of impurities in the alloy.
Apply the selected quantity – between 300 and 500 grams in 2 phases.
***1st phase** – at the beginning of the metal melting;*
***2nd phase** – when the alloy melting is completed.*

Colour	Working Temperature	Standard Formulation				Humidity
		Carbonates	Fluorides	Borates	Other	
Gray	950ºC to 1100ºC	62%	25%	12%	1%	4% to 5%

10.3 Covermax

ALUMINUM ALLOYS SCORIFIER AND DEOXIDANT

OPERATING PROCEDURES

For primary aluminum ingots
- *Use 300 to 400 grams of COVERMAX for each 100kg of aluminum spread on the surface of the molten metal so as to have a complete covering.*
- *Wait for 2-3 minutes in order to reach the exothermic reaction.*
- *Stir well, skim and melt.*

For scrap metal and returns in general
- *Use 300 to 400 grams of COVERMAX for each 100kg of aluminum always at a temperature between 670º C and 900º C.*
- *When the alloy fusion starts with approximately 1/3 of the crucible capacity, apply the first 100g of scorifier.*
- *As the level of the crucible rises, apply more 100g.*
- *As soon as the whole load is melted, add the rest of the needed quantity.*
- *Mix the bath with slow movements.*
- *Wait 3- 4 minutes after the last application, skim and melt.*

Colour	Working Temperature	Standard Formulation						Treatment Period
		Humidity	Carbonates	Fluorides	Sulphates	Chlorides	Others	
Pink	670ºC to 900ºC	0.5% to 0.6 %	3%	17%	3%	76%	1%	4 min.

10.4 Coverzam

SCORIFIER AND DEOXIDANT FOR ZAMAC AND ITS ALLOYS

OPERATING PROCEDURES

- *Use 200 to 400 grams of COVERZAM for each 100kg of Zamac. Shake it for 3-4 minutes so as to remove all the Zamac from the slag. Scorify and melt.*

Colour	Working Temperature	Standard Formulation						Treatment Period
		Humidity	Carbonates	Fluorides	Sulphates	Chlorides	Others	
Yellow	380ºC to 420ºC	0.5% to 0.6 %	4%	17%	4%	72%	3%	4 min.

10.5 Modsil

SILICON ALUMINUM ALLOYS MODIFIER

OPERATING PROCEDURES

- *400 to 500 grams of MODSIL for each 100kg of aluminum. Apply the flux at 680°C to 800ºC in the middle of the crucible and immerse it with the help of a bell until reaching the bottom, preventing the impact of the bell on the bottom of the crucible.*
- *Stir the bath with the bell in cross movements. Wait for 5-7 minutes, skim and melt.*
- *In bath temperature above 730ºC, the MODSIL is liquid, thus damaging the skimming.*
- *In this case, add 100 to 200 grams of COVERMAX (CORONA SCORIFIER) on the liquid slag, stir the bath gently with a skimmer to avoid oxidation by the atmosphere, skim and melt.*
- *Due to the diversity of treatment situations for the alloys of aluminium and silicon, Corona Cadinhos offers formulation options, such as the MODSIL.*

Colour	Working Temperature	Standard Formulation			Humidity	Ideal Preatment Period
		Chlorides	Fluorides	Others		
White	680ºC to 800ºC	84%	25%	1%	0<0,0 2%	7 min.

10.6 Neutrogas

ALUMINUM AND ALLOYS DEGASIFIER

OPERATING PROCEDURES

- *Use 60 to 100 grams of NEUTROGAS for each 100kg of metal. Place the flux in the middle of the bath surface and immerse it with the help of the bell until reaching the bottom of the bath, without touching the bottom of the crucible. As soon as the reaction starts – bubbling – move the bell in cross movement inside the crucible for a complete degasification in the whole bath. Wait for around 8 minutes to remove the bell.*
- *The time taken by this treatment is proportional to the desired quality of the degasification.*
- *After the degasifying treatment, the metal cleaning can be improved by applying a thin layer of the COVERMAX (CORONA SCORIFIER) over the whole bath surface. Wait for 1 minute, skim and melt it.*

Colour	Working Temperature	Standard Formulation			Humidity	Ideal treatment period
		Chlorides	Fluorides	Othes		
Blue	650ºC to 850ºC	74%	25%	1%	6/6,5 %	8 min.

10.7 Refinal 60

GRAIN REFINER FOR ALUMINUM AND ITS ALLOYS

OPERATING PROCEDURES

- *Add 50 to 100 grams of REFINAL60 for each 100kg of aluminum.*
- *Always use REFINAL60 in the last operation before the leaking process.*
- *Pack the needed quantity in foil, immerse it with the use of a bell until it gets near the bottom of the crucible, stir the bath.*
- *Gently, skim and melt.*

10.8 Lycopodium

Product – sand separator in casting model, synthetic sand process (humid sand).

OPERATING PROCEDURES

Add up approx. 50 to 100 grams into a cotton bag and spray the powder over the model.