

[2007]

**CERAMIQUES &
REFRACTAIRES**
N° 1 du Creuset dentaire

[INSTRUCTIONS ON HOW TO USE OUR CRUCIBLES]

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Use of vitreous silica in crucible manufacturing

All our crucibles are essentially made of vitreous silica, which is nothing else than high purity quartz sand, melted at a temperature over 2000 °C.

Vitreous silica has very interesting features that fully justify its use in the manufacture of dental crucibles :

- Very low expansion rate that makes it exceptionally resistant to thermal shocks.
- Low sensitivity to metal oxides which ensures long lasting resistance to dental alloys corrosion.

Features and uses of crucibles for flame fusion

AREAS OF APPLICATION

Any type of dental alloys can be melted in them, except titanium.

SAFETY INSTRUCTIONS

No particular care needs to be taken and the inside glazing of the crucible before it is first heated, is not necessary. The glazing will automatically take place after the first casts.

The flame fusion crucibles do not need to be preheated in cylinder furnaces before casting.

THEIR LIFE SPAN IS AROUND ONE HUNDRED CASTS.

Features and uses of crucibles for electronic casting machines

AREAS OF APPLICATION

Any type of alloy can be cast in them, such as nickel-chromium and chromium-cobalt, palladium alloys, rich gold metals and titanium.

OUR 4 VERSIONS

	Simple version	Zircon version	Nitride version	NV3 version
Thermal shock resistance	Very good	Very good	Very good	Excellent
Adhesion of dental alloys	Normal	Very low	Very low	Low
Recommended for these alloys	Ni-Cr, Cr-Co	Ni-Cr, Cr-Co, palladium alloys	Ni-Cr, Cr-Co, palladium alloys	Ni-Cr, Cr-Co, palladium alloys
Number of casts	~15 in Cr-Co	~30 in Cr-Co	~35 in Cr-Co	~50 in Cr-Co
Comments	The most economical	Good value for money	Very good value for money	Excellent value for money

SAFETY INSTRUCTIONS

The response to heat shocks is more significant in electronic fusion than in flame fusion, therefore it is important to follow the instructions below :

- We recommend to pre-heat the crucible in the furnace with the cylinders before using it for the first time.
- Be careful not to have any alloy feeder stuck between the crucible walls. Indeed, dental alloys have an expansion 30 times higher than vitreous silica and while the temperature is rising, this difference inevitably causes the crucible to break.
- After casting, avoid shocks with metal objects like screwdrivers or spatulas to clean the crucible. Shocks caused by these tools greatly weaken the crucible.

Crucibles for electronic casting machines erode more significantly than crucibles for flame fusion. We need to pay great attention to the wear and tear of these crucibles and replace them as soon as cracks appear or pieces of ceramic become loose.

FUSION OF PALLADIUM ALLOYS

The fusion of palladium alloys is made with a vitreous carbon insert. The insert must be used with a crucible insert holder specifically intended for that purpose.

However, it is possible to cast palladium alloys in our crucibles without a vitreous carbon insert, on condition that the casting frequency and power be adapted (the case of MANFREDI, GALLONI, ERSCEM casting machines for example):

- During the stoking, around 900°C (dark red colour), introduce a few milligrams (a few grains, with the tip of a knife) of quality borax or boric acid in order to avoid metal oxidation. Other possibility: glaze the crucible with borax in a cylinder furnace, before using for the first time.
- Continue stoking until the maximum temperature of the fusion range has gone over 100 to 150°C. In practice, the casting machine should be launched 4 to 5 seconds after the melted alloy is shiny, nearly white.

Note: The more the alloy is overheated at a high temperature, the less it sticks to the crucible. By casting at high temperature, we then avoid micro porosities due to the alloy solidifying too rapidly.

FUSION OF RICH GOLD METALS

Precious alloys are hardly sensitive to induction, therefore most electronic casting machines require the use of a graphite insert that plays the role of a furnace around the precious metal.

There are two types of inserts: graphite inserts and vitreous carbon inserts. The vitreous carbon inserts wear out less rapidly than graphite inserts. These have the twin advantage of polluting the metal less through the carbon and of lasting longer.

The graphite and vitreous carbon inserts must be used with an insert holder crucible specifically intended for that purpose.

FUSION OF TITANIUM

The alloys of titanium in fusion react violently on contact with the silica that is the main component of our crucibles.

There is a specific range of crucibles for the fusion of titanium.

THE CRUCIBLE IS INTENDED FOR ONE CAST OF
TITANIUM ONLY.

Identifying the causes of damage to crucibles

DESTRUCTION OF THE CRUCIBLE THROUGH THERMAL EXPANSION

When the crucible is loaded, it is important to correctly arrange the ingots or the feeders inside the crucible. If the metal is inadvertently blocked between the walls of the crucible, when it is heated the expansion of the metal being 30 times higher than for ceramics, the pressure on the crucible is very strong, causing it to crack and break.

In most cases, cracks propagate in the shape of a spider web from a point situated on the side of the crucible.

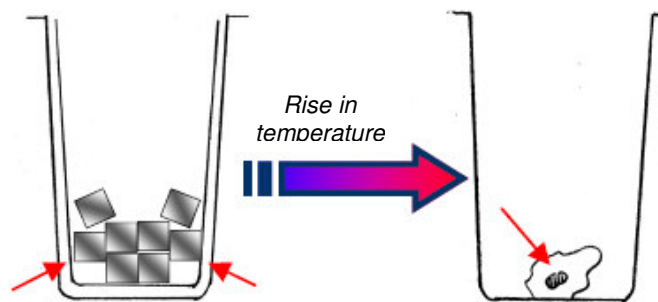


Figure 1: Wrong positioning of the ingots in the crucible.

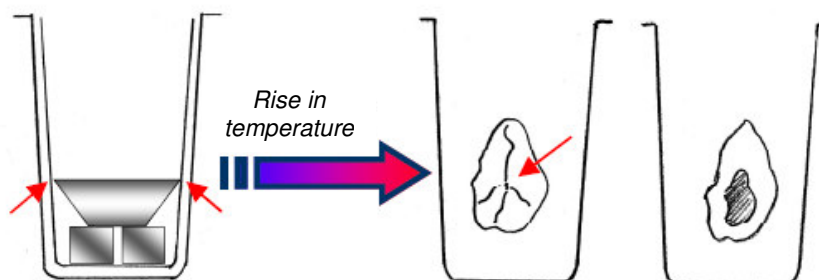


Figure 2: The volume of the feeder placed in the crucible is too large.



DESTRUCTION OF THE CRUCIBLE THROUGH THERMAL SHOCKS

While stoking, the crucible in contact with the metal goes from room temperature to around 1300°C in less than a minute. The difference in temperature between the hottest area (at the bottom of the crucible) and the coldest one (the upper part of the crucible) may cause cracks in the crucible through thermal shocks. More precisely, the different expansion of the ceramics between the two areas generates constraints causing cracks to appear.

In most cases, cracks propagate from the bottom of the crucible (the hottest part) and go up vertically towards the top of the crucible (the coldest part).

In order to avoid the destruction of the crucibles through thermal shocks, we use vitreous silica as a basic compound of our crucibles. The vitreous silica has the distinctive feature of expanding only very little in high temperature.

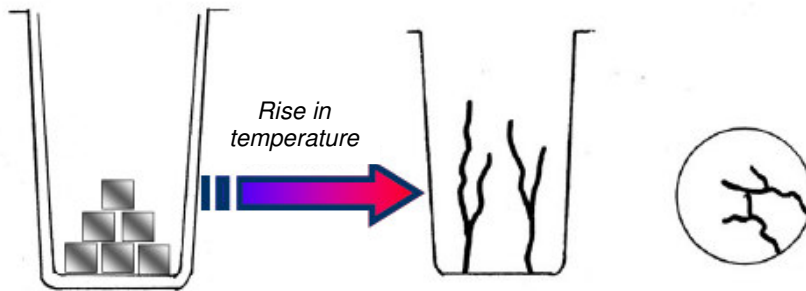


Figure 3: Breakage due to the bad quality of the crucible, in spite of the good positioning of the ingots.



DESTRUCTION DUE TO HUMIDITY IN THE CRUCIBLE

A few months may pass between the making and the use of the crucible, during which time the crucible loads itself with the surrounding humidity. When stoking, this humidity that seeps through the pores of the crucible, is the cause of a very high pressure against the walls leading to cracks or breakage.

It is important to dehydrate the crucible before its first use, in order to eliminate all the humidity in the pores. We recommend to pre-heat the crucible in the cylinder furnace with the cylinder before casting. If the crucible is used regularly, this operation is not necessary any more for the future casts.

WHAT TO DO IN CASE OF CRUCIBLE BREAKAGE OF WEAR AND TEAR

When the crucible is cracked or unusable, it is essential to identify the cause first.

In the event of the wrong use of the crucible, due to the bad positioning of the metallic masses or the failure to respect the basic instructions, Ceramiques & Refractaires will on no account replace the crucible. Conversely, if the crucible is unusable after a thermal shock, when normal conditions of use have been applied, we commit ourselves to exchange the faulty crucible with a new crucible.

However, if you cannot identify the cause of the damage, please contact us and send us your faulty crucible. If it is a quality problem, we shall send you a new crucible, otherwise we shall try to find a solution so that you can use it.