C. HAFNER
Edelmetall · Technologie

Precious metal dental technology

General Instructions for Use

For casting and bonding alloys and solders

CE 0483

c-hafner.de

Contents

Dear Customer,

These Instructions for Use contain general information regarding the processing of C.HAFNER alloys and solders. It is not possible to go into all the differences between the alloys and solders available from C.HAFNER here.

Therefore, C.HAFNER's Instructions for Use are divided into two sections:

1. General instructions for use
General information about dental alloys and solders from C.HAFNER
General processing instructions for dental alloys and solders from C.HAFNER

2. Data sheet for each alloy
Alloy-specific information
Detailed area of use for each alloy

Alloy-specific safety data sheets are available at **www.c-hafner.de**

Neither the general instructions for use nor the data sheets deal with specific equipment or processing aids. For these, please refer to the information provided by the respective manufacturer.

General Information

Manufacturer
C.HAFNER GmbH + Co. KG
Maybachstrasse 4
71299 Wimsheim, Germany

Tel. +49 7044 90333-0
info@c-hafner.de
www.c-hafner.de

Classification IIa
Dental alloys manufactured by C.HAFNER are classified as medical devices. They are used in the fabrication of patient-specific, customised restorations by means of extensive physical, chemical and mechanical processing by qualified personnel.

Scope of application
Alloys:
Orplid Inlay, Orplid PF, Orplid PCF, Biorplid G1,Orplid H, Orplid EH, Orplid TK, Cehadentor 2, Elfenbeingold G2, Orplid Keramik 2, Orplid Keramik 3, Orplid Keramik 4, Orplid Keramik 5, Orplid Keramik 21, Orplid Keramik PF, Orplid Implant, Cehadentor Keramik SF3, CeHa LIGHT CLASSIC, Unilight CLASSIC, Pangold Keramik N2, Orplid CF, Orplid GK, Orplid LFC, Eco 52, CeHa LIGHT PLUS, CeHa MILL PLUS, Unilight PLUS, Pangold LFC, Pangold, Interpal, Intepal S, Interpal SE, Universal Schweißdraht classic, Universal-Schweißdraht LFC
Solders:
Cehadentor Keramik Lot 1110, Orplid Keramik Lot 1070, Orplid Keramik Lot 1050, Orplid Keramik Lot 1020, Orplid Keramik Lot C 970, Orplid Keramik Lot CF 950, Orplid Lot 880, Orplid Lot CF 860, Orplid Lot 825, Orplid Lot 790, Orplid Lot 760, Orplid Lot 735, Orplid Lot CF 720, Universal Lot 770

Target group for the Instructions for Use
Qualified personnel such as dentists and dental technicians.
The products are not supplied to non-professionals or patients.

Target group for the medical device

Patients who have missing or defective teeth, usually adults and adolescents.

Indication

Fixed dentures:

- Inlays
- Onlays
- Anatomical and veneered crowns
- Anatomical and veneered bridges
- Post build-ups

Removable and two-part prostheses

- Telescopic crowns
- Tapered crowns
- Attachments
- Locking devices
- Bars
- Suprastructures
- Dentures
- Clasps

Which alloy is intended for which type of indication is described in the respective data sheet. Alloys are classified according to DIN EN ISO 22674:2016-09.

Contraindications

Patients' known intolerances and/or allergies to alloy components.

Single Use

The alloys from C.HAFNER are intended for single use.

Storage Conditions

Please store dry and at room temperature

Service Life

There are no known limits to service life for the alloys themselves.

Disposal

There are no special precautions to be observed when

disposing of C.HAFNER dental alloys containing precious metals.
Due to the value of the alloys, we recommend that you reintroduce them into the precious metal cycle by recycling them. See www.c-hafner.de. for details.

Information regarding Side Effects and Residual Risks

There are no known specific side effects of the alloys. There is a residual risk of possible sensitisation or allergic reaction to any material introduced into the human body. Such a reaction is very unlikely, but can never be ruled out completely.

Other information

If any serious incidents arising in connection with the use of the product come to the attention of the user and/or patient, they must be reported to the manufacturer and the competent authority of the State in which the user and/or patient is established.

The SSCP is available at
https://ec.europa.eu/tools/eudamed.

General Processing Instructions

Points 1-7 apply to alloys processed by casting, while all other points apply to cast and milled objects.

1. Modelling

The wax patterns are modelled according to the known rules of dental technology.

- For ceramic veneered crowns and bridges, the wax-up must correspond to the reduced shape of the piece being reconstructed.
- When designing the framework for ceramic veneering, it is essential to avoid sharp edges and transitions, deep grooves and undercuts.
- Opposing tooth contacts in the metal/ceramic transition area are unfavourable.
- The wall thickness of 0.4 mm ensures reliable filling of the mould.
- The wall thickness of the crowns, i.e. of the later metal framework, should be 0.3 - 0.5 mm after finishing, depending on whether it is a single crown or abutment crown.
- Uniform ceramic thicknesses ensure a low-stress metal-ceramic bond.
- Contact surfaces intended for soldering before firing must be flat.
- For long-span bridges, adjust the cross-sections according to the situation.
- For composite veneers, follow the recommendations given by the composite manufacturers. If no recommendations are available, apply sufficient retentions (beads, wires or individual undercuts) on the surface being veneered.

IMPORTANT

Only use waxes and modelling materials that burn out without leaving any residue.

In order to maintain the same mechanical conditions, the cross-section must be quadrupled when the span is doubled.

The cross-section of a crown/pontic connection should not be less than 8 mm^2.

Pontics must have lingual collars or, at the least, interdental reinforcements (for stability and heat dissipation).

In the case of acrylic models, follow the relevant manufacturer's information.

Cast-on parts such as implant abutments must be covered with at least 0.5 mm alloy, and compatibility of the respective CTE must be checked.

2. Spruing

The sprue system should be designed using cylindrical sprues according to the following rules:

- Single sprues with 3 - 4 mm diameter.
- Attachment of sprue without constriction or thickening at the most voluminous point of the casting.
- Shape the angle at the attachment point so that the melt can reach the furthest point of the casting without a sudden change in direction.
- For larger bridges, we recommend running bar casting: Attach distribution channel with 4 - 5 mm diameter as melt reservoir and supply each pontic with a 2.5 mm thick and 3 mm long sprue. Feed to the distribution channel 3.5 mm.
- Of course, alternative sprue systems can also be used, in which case the respective applicable rules must be observed.
- Provide interdental spaces and solid pontics with air extraction channels or heat dissipation fins (diameter 1 mm).
- Determine the amount of metal to be used for casting according to the weight of the wax (see alloy list: “Wax Conversion Table”).

IMPORTANT

Solid and long-span bridge members are connected to the cross bar with at least two sprues.

In the case of vacuum pressure casting, no air extraction channels penetrating the investment material are permitted.

Please always take care to ensure rounded wax attachments.

3. Investing

When investing, follow the instructions provided by the investment material manufacturer.

- Always use crucible formers that suit your casting system.
- For high-fusing metal-ceramic alloys, only use phosphate-bonded investment materials.
- For palladium-based alloys, use only graphite-free, phosphate-bonded investment materials.

For alloys where the mould is preheated to a maximum of 700°C, graphite-free, gypsum-bonded investment materials are also suitable.

- The position of the castings must be outside the centre of the mould.
- The investment material should cover the wax pattern to a thickness of 5 mm.
- For metal mould rings of sizes 1 and 3, a mould liner should be used
- For sizes 6 and 9, two liners should be used.

If these recommendations differ from those of the investment material manufacturer, you should follow the latter.

Setting or drying times vary for different investment materials and must follow the manufacturer's recommendations.

IMPORTANT

In the case of gypsum-bonded investment materials, the liner must be inserted in such a way that an approx. 5 mm wide metal edge is visible at the top and bottom of the mould ring. The investment material can cover the wax pattern up to 1 cm.

4. Waxing and Preheating

The temperatures and times for waxing and preheating depend on the size of the casting ring, the number of rings in the furnace, the investment material and the alloy.

Reference values:

1. Retention time: Waxing at 270-300°C, depending on the size of the casting ring 30-60 mins

2. Retention time: at 580°C, depending on the size of the casting ring 30-60 mins

Preheat at the preheating temperature (see data sheet: "Preheating Temperature"), depending on the size of the casting ring 30-60 mins

If these recommendations, with the exception of the alloy-specific preheating temperature (see respective data sheet), differ from those of the investment material manufacturer, you should follow the latter.

IMPORTANT

It is advisable to expel the wax immediately after setting.

The still moist investment material reduces the penetration of liquid wax and promotes a complete waxing process.

Wax that has not melted completely impairs the casting result.

When using modelling acrylics or prefabricated acrylic parts, we recommend using the maximum preheating time given by the respective manufacturer.

5. Crucibles

- Use a separate crucible for each alloy.
- Palladium-based alloys must never come into contact with graphite. All other alloys can be melted in crucibles of your choice.

WARNING

Using graphite crucibles will damage palladium-based alloys!

6. Melting and Casting

Heat ceramic crucibles with no metal inside in a preheating furnace.

Casting systems
When using
- High frequency casting systems
- Centrifugal casting systems
- Vacuum pressure casting systems

follow the information in the operating instructions for the system used.

Open melting with a flame
- Melt the alloy in the reducing zone of the flame at a neutral flame setting.
- The gas line pressure of propane and oxygen should follow the recommendations of the system manufacturer.
- As soon as the melted metal can be moved with the flame, observe the alloy-specific additional heating time.
- Then immediately initiate the casting process

IMPORTANT

Unless otherwise specified by the system manufacturer: Propane/oxygen pressure: 1-1.5 bar propane/2-3 bar oxygen.

Warning! Overheating the melted alloy can lead to shrinkage cavities, microporosity and the formation of coarse grains. These casting defects are often the cause of a bridge breaking or cracks forming in the veneering ceramic.

7. Divestment and Finishing

After casting, allow the ring to cool slowly to room temperature. During this process, most alloys harden perfectly and do not require any additional heat treatment.

IMPORTANT

If you still wish to harden a casting, please refer to the relevant information on the data sheet that comes with your alloy, which is also available at www.c-hafner.de.

For low-dust divestment, soak the investing core in water beforehand.

Roughly remove the investment material with a pair of pliers

Blast off remaining material (50 - 110 µm pure aluminium oxide or glass beads at a maximum blasting pressure of 2 bar).

WARNING

Never hit the casting button with a hammer!

For finishing, use

- cross-toothed carbide burs
- sintered diamond abrasives
- ceramic-bonded abrasives of medium grain size.

Grinding should be carried out using clean abrasives.

- Ensure a consistent grinding direction, moderate rotation speed and low contact pressure.
- In this way, overlaps can be largely avoided.
- Rectify imperfections such as porosities and inclusions.

Blast the surface being veneered with a disposable sandblaster:

- 50–110 µm pure aluminium oxide, maximum blasting pressure 2 bar.
- Boil the framework in deionised water or steam-clean it.
- Do not touch the framework with your fingers!

8. Oxidising

Oxide firing is not technically necessary.

For visual inspection of the framework, we nevertheless recommend oxide firing so as to properly assess the surface quality.

- Oxide firing is carried out as specified in the data sheet.
- Stained oxides and oxide islands must be reworked.

IMPORTANT

In the case of alloys with very dark oxide (e.g. Orplid GK, Orplid Keramik 5), we recommend blasting or pickling again after oxide firing, as described in the data sheet.

Recommendation: Use commercially available pickling agents to strip zinc-containing alloys after oxide firing.

9. Veneering

With ceramic materials

- Please follow the processing instructions provided by the veneering ceramic manufacturer. As standard, it is recommended that the CTE of the ceramic should be 5%-10% lower than that of the alloy.

With non-ceramic veneering materials

- If using non-ceramic veneering materials, the surface must be pretreated and veneered according to the composite manufacturer's instructions.

10. Soldering

We recommend our solders tailored to the composition and melting interval of our alloys (see respective data sheet).

Soldered surfaces must be clean, oxide-free and metallically bright. The soldering block must be made as small as possible. Please also refer to our soldering list (www.c-hafner.de) with the detailed recommendations and tips it contains.

Conditions for successful soldering

- The surfaces that form the soldering gap must be clean, oxide free and metallically bright.
- The walls of the soldering joint must be parallel.
- Ideally, the soldering joint should be 0.1-0.2 mm.
- Soldering surfaces should be of sufficient size and the flux suitable for the purpose.
- The object must be evenly heated to the working temperature of the solder.
- Only use solders of the same material: see recommendation by C. Hafner.

Tips for Soldering

- When soldering before firing, ensure that there are sufficient appropriately sized soldering surfaces, e.g. at the thickest point of a pontic, but never in the interdental area. This is essential to ensure that the solder fully bonds with the ceramic material.
- Keep the soldering block as small as possible.
- Keep as wide an area as possible around the solder joint free of soldering investment.
- Avoid sharp edges on the soldering block.
- Allow the solder joints to dry thoroughly.
- Check the solder joint for contaminants (residual sticky wax, burned out acrylic residues, etc.).
- Put the appropriate flux in place before pre-heating the soldering block.
- Fill wide and V-shaped solder joints with a suitable substitute material of the respective alloy.
- Pre-heat the soldering block and the objects fully and evenly.

- In the case of soldering before firing, we recommend open soldering with a "soft" neutral flame setting.
- Avoid local overheating.
- Do not spread solder across the surface of parts to which a ceramic veneer will be applied.
- Continue heating the solder joint for a few seconds after the solder flows into the gap.

The following additional points apply when soldering after firing

- If creating a wax model for soldering after firing, allow for suitable joints.
- Make sure that fired ceramic is generously covered with wax prior to creating the soldering block and completely remove once the block has fully set.
- Avoid contact between flux and fired dental ceramic.
- For soldering after firing, we recommend furnace soldering.
- Set the furnace temperature to 50°C-80°C above the working temperature of the solder. Depending on the size of the soldering block, this temperature must be maintained for between 5 and 8 minutes.
- If soldering has taken place before firing, a rapid heating speed can cause the furnace to overheat. This can adversely affect the "before-firing solder joint". Recommended heating speed 55°C/min.
- Depending on the CTE of the alloy, the cooling speed of the soldering block and the soldered object must also be taken into account after furnace soldering.

After soldering

- Pickle your soldered work thoroughly with clean, commercially available pickling solution, such as Hera AB 99, Oxid Ex, Neacid, or similar.
- Always ensure that flux residues are completely removed (mechanically if necessary).

IMPORTANT

Never leave objects in pickling solution for longer than absolutely necessary, especially if ceramic veneers have already been applied!

General

- For alloy-solder combinations, observe the recommendations on the data sheet; these combinations comply with the DIN EN ISO 9333 standard.
- When carrying out secondary soldering, joints that have already been soldered, or areas that are particularly thin, can be covered with colloidal graphite.

IMPORTANT

Please note that C.HAFNER does not accept any liability in case of deviation from our recommended alloy-solder combinations.

If you nevertheless use an alloy-solder combination other than those recommended, check the suitability of the solder with regard to its composition and the melting temperature of the solder as well as the solidus temperature of the alloy.

Welding

Laser welding wires are available for all C.HAFNER alloys, see data sheet.

Polishing

The finished and rubber-polished surfaces can be polished to a high gloss with standard polishing pastes or with diamond polishing pastes. Polishing enhances the surface finish and quality.

To prevent smearing, polish at a moderate speed with light pressure. The softer the alloy, the gentler the contact pressure should be.

Remove polishing residues using an ultrasonic cleaning device or steam blasting.

Use of previously cast material

The alloys and solders produced and supplied by C.HAFNER are designated for single use.

If you nevertheless consider using material that has already been melted and cast, here are some general tips:

- Check the purity of the material. Materials must only be mixed with the same material. Never mix different alloys
- Only clean, pure material may be used. There should be:
  - No residues from solder joints
  - No residues from the investment material
  - No residues from the modelling compound

- The more often you reuse material, the more impurities accumulate and changes in composition can occur.
- Ensure batch traceability in your documentation.

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C.HAFNER GmbH + Co. KG
Gold and Silver Refinery
Maybachstrasse 4
71299 Wimsheim - Germany
Telephone +49 7044 90333-333
Telefax +49 7044 90334-333
edelmetall-dentaltechnologie@c-hafner.de c-hafner.de