



## Wirobond® C+

Processing information for CAD/CAM-produced restorations

## Wirobond® C+

As the Wirobond® C+ alloy (manufactured by BEGO Bremer Goldschlägerei) has been tried and tested millions of times, you can expect a previously unattained level of product safety.

The SLM procedure employed at BEGO Medical for the manufacture of restorations ensures metal frames of unbeatable quality.

CAD/CAM products manufactured by BEGO Medical are custom products for individual patients. These are used to produce fixed prosthetic restorations. Restorations made of Wirobond® C+ are corrosion resistant, biocompatible and offer outstanding accuracy of fit.

## Indications

Single-tooth and bridge restorations, such as:

- Frames for partially and fully veneered solutions with up to 16 units
- Two-piece abutments
- Telescopic primary crowns
- Root post crowns (only with one post)

## Contraindications

Undesirable biological (such as allergies to alloy components) or electrochemically based reactions can occur in isolated cases. Wirobond® C+ restorations are contraindicated in case of known incompatibilities or known allergies to alloy components.



Two-piece abutment made of Wirobond® C+



3-unit bridge made of Wirobond® C+

## Wall thicknesses/CAD wax-up

To achieve the clinically necessary stability, the wall thickness of the objects following final processing / preparation of the frame surfaces for ceramic veneering should be at least 0.3 mm at all times. The parameters have been set in the DentalDesigner software from 3shape™ so that, on completion, the wall thicknesses of the objects are at least 0.44 mm.

The wall thickness should be increased at critical points on the objects, e.g., at the transition between a connector and a terminal pontic.

## Abutment design

We recommend paying attention to the minimum wall thickness around the adhesive abutment when waxing up two-piece abutments. Please use the thickness representation in the Assembly step in the 3shape™ software or measure the wall thickness with

the 2D cross-section to check the data record. Avoid sharp edges in the design.

For further information concerning the abutment design, please consult the Scan and Design Centre guidelines.

## Connector design

The design of the connector is based on the size and indication of the restoration to be inserted. A distinction is made between anterior and posterior bridges. A connector cross section of at least 7 mm<sup>2</sup> (height: min. 3.5 mm, width: min 2.5 mm) must be maintained. The connector cross section must be increased for

posterior bridges, large bridges with a large number of pontics or successive pontics and/or restorations with a terminal pontic. Connector stability is achieved more through height than width. The stability of the restoration can be increased up to eight-fold by doubling the height.

## Finishing of objects

The manufactured Wirobond® C+ objects do not need to be completely finished as the surface has not been soiled by investment material, for example. Only sharp edges and corners should be rounded off and the margins should be tapered off to protect the gingival margin.

Use fine-toothed carbide cutters for finishing. Warning! Keep milling separate! If you use coolants/lubricants when milling, their residues must subsequently be completely removed.

## Soldering

**For soldering we recommend:** Fix the parts to be soldered in place (e.g., with Bellatherm® soldering investment material REF 51105), soldering gap with parallel walls: max. 0.2 mm. Use a suitable BEGO flux (e.g., Minoxid REF 52530). Following the soldering, the flux residue and metal oxides must be sandblasted and the surfaces should be cleaned with a steam blaster or by boiling in distilled water.

- We recommend for soldering before the ceramic firing with the flame: Wirobond® solder (REF 52622)

- We recommend for the soldering after the ceramic firing in the furnace: WGL solder (REF 61079) and Minoxid flux (REF 52530). 2 minutes hold time recommended, normal cooling.

**Note:** Due to the low thermal conductivity of the BEGO non-precious alloys, the required soldering temperature in the object is achieved considerably later than with precious metals.

## Laser welding

**For laser welding we recommend:** Where possible, work with a V seam and filler alloy. Please consult the instructions for use and

information on hazards provided by the device manufacturer!

- Recommended laser wire: Wiroweld (50003, 50005)

## Oxide firing

No oxide firing is necessary. This firing can, however, be performed to check the surface. The oxide must then always be sandblasted off (250 µm/3–4 bar with e.g., Korox® 250; REF 46014). Ensure that the frames are supported appropriately during firing.

Then clean them thoroughly with a steam blaster or by boiling in distilled water. After this step, do not touch the surfaces with your hands any more. Use arterial clamps or similar.

Firing chart for oxide firing (if required)				
Starting temperature °C	Temperature rise °C/min.	Vacuum start °C	Final temperature °C	Temperature hold time min.
500	100	550	900	5

\*The temperatures stated are guide values and may have to be adapted for different furnace ratings.

## Sand blasting

The surfaces to be veneered should be sandblasted with Korox® 250 at 3–4 bar using the pencil blaster directly before the ceramic veneering. When blasting, ensure that the crown margins

are not damaged. The frame must be cleaned thoroughly before applying the first layer of matrix. After cleaning, hold the objects with arterial clamps and do not touch them again.

## Frame design/ceramic veneering

The frames are anatomically reduced for the ceramic veneering; sharp edges must be avoided at all costs. All conventionally available metal-to-ceramics and press-to-metal ceramics with appropriate CTE values as per ISO 9693-1 are suitable. The layer thicknesses of the veneering ceramic (1.5–2 mm) should not be exceeded. If the layer thicknesses of the veneering ceramic are too great, internal tension may be created due to the

individual sintering processes. Ensure that the frames are also supported adequately during firing. Prolonged cooling is recommended with ceramic firings up to 600°C or 4 min.

**Note:** It is imperative to follow the instructions for use supplied by the ceramic manufacturer. The ceramic manufacturer's specific firing recommendations must be followed when fusing non-precious alloys.

## Composite veneering

The corresponding manufacturers' instructions must be taken into consideration when working with veneering systems.

## Finishing and polishing

Following the ceramic glaze firing the oxide is removed by blasting the inside of the crowns with Korox® 50 (50 µm) using a pencil blaster. Metal objects which have not been veneered need to be ground, rubber-polished and polished. To simplify the rubber-polishing, the appropriate surfaces can be blast polished with Perlablast® micro (REF 46092, lead-free sodium glass). Then they should be

rubber-polished with suitable rubber polishers and polished with suitable preliminary and subsequent polishing compounds. The blue BEGO Co-Cr polishing compounds or the Diapol diamond polishing compound are suitable for the high-lustre polishing.

Then the surfaces must be cleaned thoroughly by steam blasting or boiling in distilled water.

## Preparation

Generally speaking, anatomically reduced preparation should be performed and the conventional preparation guidelines apply.

## Cementing

There are many factors which can influence the decision about which type of cementing to employ, for example the cost and time factors, the geometry of the tooth stump and possible biological or mechanical complications. For this reason, it is not possible to formulate a clear recommendation for the fixation at this point.

### Conventional

In principle, restorations made from Wirobond® C+ can be cemented in the conventional manner using zinc phosphate or glass ionomer cements.

Experience has shown that conventional zinc-phosphate cements have the disadvantage of requiring lower removal forces compared with glass ionomer cements.

### Adhesive

In the case of limited stump retention, adhesive fixation of the restoration is advantageous.

### Notes on cementing two-piece abutments

Do not use any attachment adhesives for cementing, as their indication is not approved for this.

Please use a fixation composite for indirect restorations for the adhesion, e.g., Multilink Implant, Panavia 2.0, and follow the instructions for use.

## Wirobond® C+ composition and physical data

### Chemical composition in % by weight

Co	63.9
Cr	24.7
W	5.4
Mo	5.0
Si	≤ 1

### Alloy characteristics

Type (according to ISO 22674)	5
Density	8.5 g/cm <sup>3</sup>
0.2% elongation limit (R <sub>p</sub> 0.2)	790/1000* MPa
Tensile strength (R <sub>m</sub> )	1150/1400* MPa
Hardness (HV 10)	360
Ductile yield (A <sub>0</sub> )	12/8* %
Modulus of elasticity	approx. 210 GPa
Melting range	1370–1420 °C
Coefficient of thermal expansion (RT - 500°C)	14.1 x 10 <sup>-6</sup> K <sup>-1</sup>
Coefficient of thermal expansion (RT - 600°C)	14.3 x 10 <sup>-6</sup> K <sup>-1</sup>
BEGO colour code	8 (white)

### Corrosion resistance

Immersion test according to ISO 10271	< 1 µg/cm <sup>2</sup> in 7 days
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\* as produced / simulated ceramic firing

# GENERAL INFORMATION

## Note

Restorations are custom products in accordance with Directive 93/42/EEC.  
Wirobond® C+ is a venerable cobalt base alloy and complies with ISO 22674 and ISO 9693-1.  
If the restoration contains abutments, no ceramic firing should be performed.  
Because of their different designs, ceramic furnaces may differ in their firing conditions. It is imperative to take this fact into consideration and it is the user's responsibility to seek clarification on this point. The firing temperatures given are only guidelines.  
Please report any occurrences when using Wirobond® C+ restorations to BEGO Medical GmbH and the responsible bodies.

## Warnings

Metal dust is harmful to health. Grinding and blasting should be performed below a suitable extraction unit. We recommend wearing respiratory protection of the type FFP3-EN149.

## Precautionary information

In the case of approximal or occlusal contact with other metals, electrochemically based reactions may occur in isolated cases. No findings concerning the safety and efficacy of treatments on children or pregnant/breastfeeding mothers are available. Wirobond® C+ can disrupt the evaluation of MRI scans.

## Side effects

No side effects of Wirobond® C+ are known. However, it cannot be ruled out that individual reactions (e.g., allergies or incompatibilities) to components of Wirobond® C+ may occur in isolated cases. In this case, Wirobond® C+ restorations should not be used further.

## Warranty

Our recommendations for use, whether given verbally, in writing, or by practical instruction, are based upon our own experience and trials and can therefore only be regarded as guidelines. Our products are subject to continuous development. We thus reserve the right to make modifications in design, appearance and materials without notice.

## Labelling

Manufacturer



## Use

Only to be used by dental staff

**Rx only**

[www.bego.com](http://www.bego.com)



**BEGO Medical GmbH**

Wilhelm-Herbst-Str. 1 · 28359 Bremen, Germany  
T+49 (0)421 20 28 -0 · Fax +49 (0)421 20 28 -174  
[www.bego-medical.de](http://www.bego-medical.de) · E-mail: [info@bego-medical.de](mailto:info@bego-medical.de)