Instructions for use *Interaction® Carrara*

Indications
- *Interaction® Carrara* is a low-fusing ceramic material for veneering crowns and bridges of frameworks made of dental alloys with a CTE range of 15.8 - 16.9 µm/m · K (25-500°C).
- Use only with alloys with a solidus temperature of at least 1085°C.
- For dental use only.

Contraindications
- Suitable only for the indications listed above.

Precautionary notes for medical devices
If properly processed and used, adverse effects of these medical products will be highly unlikely. However, reactions of the immune system (such as allergies) or localized paraesthesia (such as an irritating taste or irritation of the oral mucosa) cannot be completely ruled out as a matter of principle. Should you hear or be informed of any adverse effects – even when doubtful – we would like to request notification.

In patients with hypersensitivity to *Interaction® Carrara* or one of its ingredients, this medical product may not be used or only under the particular scrutiny of the dentist or physician in charge. Known cross-reactions or interactions of this medical product with other medical products or material already present in the oral environment must be taken into consideration by the dentist or physician in charge when selecting this medical product.

Notify the dentist or physician in charge of all factors described above if you use this medical product for a custom construction.
- **Do not inhale dust particles during grinding.**

Safety instructions
When working with these materials, make sure to comply with the Instructions for Use and the pertinent Material Safety Data Sheets (MSDS).

Adverse effects
We are not aware of any risks or adverse effects related to Interaction® Carrara.

Technical specifications
- 14.2 µm/m · K (25°C - Tg) CTE dentin, flexural strength according to EN ISO 6872, biocompatibility (cytotoxicity) according to EN ISO 10993-5, chemical solubility according to EN ISO 6872 and metal/ceramic bond according to EN ISO 9693.
- Tg = 460°C.

Alloy selection
- *Interaction® Carrara* is compatible with high-gold and Carrara alloys, reduced gold alloys as well as Vi-Comp LFC. Ask the alloy manufacturer about the alloy's composition and coefficient of thermal expansion.
- Veneering alloys with a CTE of 15.8 - 16.9 µm/m · K (25–500°C) can be recommended.
- It is recommended to clean the ceramic ovens and all carriers regularly to avoid discolouration.

Transport and storage
- Liquids: Store containers tightly closed at temperatures above 10°C.
- Protect others and pastes from moisture.

Symbols on product labels
REF Product code
LOT Batch or lot number
Use before
Consult instructions for use

Combinable liquids

Interaction® pencil (brush) cleaner

Liquid intended solely for moistening and cleaning the *paste-opaque pencil*.

Interaction® stain liquid

Standard mixing liquid for *Interaction® Antagon & Carrara classic stains, Interaction® Antagon & Carrara glaze* and *Interaction® Sakura glaze*.

Interaction® paint liquid

Standard mixing liquid for *Interaction® Sakura & Carrara paint* and *Interaction® Sakura & Carrara shade paints*.

Interaction® margin liquid

This is a mixing liquid for the *Interaction® Sakura, Antagon & Carrara margin* materials and ensures that the margin material can be built up properly.

Interaction® carving liquid

Standard mixing liquid for *Interaction® Sakura, Antagon & Carrara value dentins, incisals, action-i dentins, gum* and *x-tra incisals*.

Interaction® superwet liquid

This is used for the same purpose as *carving liquid*, but stays moist longer, which makes it ideal for building up bigger restorations.

Interaction® superform liquid

This is used for the same purpose as *carving liquid* and *superwet*, but is 'oilier', which means that it is ideal for application techniques that only need a minimum of condensing. However, *Interaction® superform liquid* does require a longer pre-drying time, from 7 – 10 minutes.

Interaction® contrast liquid

Available in the colours red, yellow, green and blue, these colour liquids can be used to achieve a bigger contrast when applying different ceramic layers.

Ceramic furnace
For best results, make sure that the required firing temperatures and times are observed strictly. If necessary, adjust the firing parameters of the ceramic oven as required.

Names of important materials and explanations

Interaction® with *blend-in dynamics™*: ceramics that adapt to their environment.

Blend-in dynamics™ refers to the capacity of *Interaction® ceramics* to display natural light and colour behaviour in a restoration.

The effect is based on the fact that:

- the brightness of the crown can change due to the optical properties of the core layers;
- the appearance of the crown is more natural because the transparent outer layer absorbs and reflects the surrounding colours and light as well as allowing them to pass through.

Your *Interaction® Carrara blend-in dynamics™* restoration will be built up from:

The core layers

Interaction® Carrara paste opaque *(V1/B1 – V16/C4 and bleach)*

These are ready-for-use, fluorescent opaques and can be applied directly to the prepared zirconium oxide sub-structure. *Interaction® Carrara paste opaque* ensures bonding with all sub-structures within the indication areas, while its fluorescent effect guarantees the ability of the restoration to vary in clarity in changing light conditions.

Interaction® Carrara value dentin *(V1/B1 – V16/C4)*

These are dentines that are ordered by level of clarity. In terms of translucence and colour pigmentation, these value dentines have been adapted to ensure the correct achievement of the appearance required when used in combination with the corresponding *paste opaque* and *incisal*. The fluorescent effect of the *dentin* also contributes to the active interaction of the restoration with changing light conditions.

Interaction® Carrara action-i dentin
(1A2, 3A4, 1B2, 3B4, 1C2, 3C4)

These are strong-fluorescence dentines, ordered by colour and clarity, and used to apply characteristics in the incisal part of the element (mamelons, for example) and to influence the chroma of the restoration (i=incisal, i=individual, i=intensive and i=interactive).

The transparent outer layers

Interaction® Carrara incisal *(57 – 60)*

These are transparent incisals that are used to achieve a high-quality aesthetic outer layer for the fired restoration. Thanks to consistent applicated opalising properties, the crown has a natural, aesthetic appearance in changing light conditions. In this way, the crown blends in with adjacent elements in a natural manner.

Interaction® Carrara x-tra incisal
(x-tra i bright, x-tra i medium, x-tra i dark)

These are opalising, transparent materials that can be used to precisely adjust the value of a crown. For example, when the cervical area of a tooth needs to be slightly darker in colour, in line with the processing instructions provided by the dentist, this can be achieved using *x-tra I dark*. If a crown is 'too dark' after the f irst firing, *x-tra i bright* makes it possible to correct this without any cut-back.

Interaction® Carrara x-tra-incisal
(x-tra i blue, x-tra i red, x-tra i grey, x-tra i orange, x-tra i white)

These are opalising, transparent materials that ensure an additional colour transparency in tooth surfaces. This makes it easy to individualise the incisal part of the crown.

Interaction® Carrara x-tra-incisal clear

This is a neutral, transparent, non-opalising material.

Your Interaction® *blend-in dynamics™* restoration can be individualised using:

Interaction® Carrara margin
(1A2, 3A4, Booster, 1B2, 3B4, 1C2, 3C4)

These are materials that are used to fire ceramic shoulders onto shoulder or chamfer preparations. *Interaction® Sakura margins* can also be used in situations where a very limited layer thickness requires a dentine colour with better coverage.
We recommend a mixture ratio of 1:1 of *value dentin* and *margin*.

Interaction® Carrara action-i dentin
(221 – 240, for individual use)

These are special coloured dentines, ordered by colour and clarity, that are used to apply characteristics to the incisal part of the element (mamelons, for example) and to influence the chroma of the restoration. They are ready for use and can be used unmixed.

Interaction® Carrara correction

This is a colourless, layer-melting, transparent correction material for the correction of contact points and occlusal or incisal edges, or for the improvement of the crown surface shape.

Interaction® Carrara gumshades
(211 Violet, 212 Dark, 213 Light, 214 Translu-violet, 215 Translu-dark, 216 Translu-light, 217 Extra Translu-light, paste opaque gum)

These are materials that can be used to create high-quality and aesthetic ceramic reconstructions of lost gingiva material/gums. This may be necessary in the event of significant implants and suprastructure works, for example.

Shade matching chart

Tab. 1: *Interaction®* shade matching chart for V-Classic-shades

Interaction®	V-Classic-shade	paste opaque	value dentin	incisal
V1	B1	V1/B1	V1/B1	57
V2	A1	V2/A1	V2/A1	58
V3	B2	V3/B2	V3/B2	59
V4	A2	V4/A2	V4/A2	58
V5	C1	V5/C1	V5/C1	60
V6	D2	V6/D2	V6/D2	60
V7	A3	V7/A3	V7/A3	59
V8	D3	V8/D3	V8/D3	59
V9	C2	V9/C2	V9/C2	59
V10	B3	V10/B3	V10/B3	59
V11	D4	V11/D4	V11/D4	59
V12	A3,5	V12/A3,5	V12/A3,5	59
V13	B4	V13/B4	V13/B4	59
V14	C3	V14/C3	V14/C3	59
V15	A4	V15/A4	V15/A4	60
V16	C4	V16/C4	V16/C4	60

Tab. 2: *Interaction®* shade matching chart for V-3D-shades

V-3D-shade	Interaction®
1M1	V1
1M2	V2
2L1.5	V5
2L2.5	V3
2M1	V1
2M2	V3
2M3	V3
2R1.5	V5
2R2.5	V3
3L1.5	V9
3L2.5	V11
3M1	V6
3M2	V9
3M3	V13
3R1.5	V8
3R2.5	V11
4L1.5	V14
4L2.5	V15
4M1	V14
4M2	V14
4M3	V15
4R1.5	V14
4R2.5	V15
5M1	V16
5M2	V16
5M3	V16

1. Framework preparation

For balanced support and to ensure that uniform layers are applied, the framework must have been cut back to a reduced anatomical shape.

To avoid tension in the ceramic veneer, any edges or corners of the frameworks must be rounded.

Use only cross-cut tungsten-carbide cutters to finish the framework. The use of chip-removing tools is recommended. Using stones invariably leads to microscopic overlaps, which in turn will lead to bubble formation in the ceramic veneering material. This is particularly true of soft alloys (copper-free and palladium-free biological alloys).

After finishing with tungsten-carbide cutters, unless otherwise recommended by the alloy manufacturer, sandblast the metal frameworks with alumina (50 - 125 µm) at a pressure of 3 bars.

Then the frameworks are cleaned by steam or in a clean ultrasonic bath.

2. Applying the *Interaction® Carrara paste opaque*

The framework is prepped by applying opaque. The liner gives the crown its basic shade and matches the appropriate V-Classic or V-3D shade. For the appropriate shade assignments, see Tables 1 and 2.

Applying two covering layer of the opaque is eesential for the standard build-up technique and for an accurate reproduction of the V-Classic and V-3D shades.

The *Interaction® paste opaque* is easy to apply undiluted straight onto the paste opaque pencil and from here onto the sub-structure.

Caution: Use only very small quantities of *Interaction® pencil (brush) cleaner.* Using too much liquid may result in cracks and bubbles during opaque firing.

3. Ceramic margins

- When creating a ceramic margin, use a carbide bur to reduce the crown margin so it ends 0.5–0.8 mm above the lowest part of the chamfer or ledge. Also, ensure that the crown margin tapers off softly to avoid tension in the ceramic material.
- Air-abrade the internal surfaces (especially the margins) and the external surfaces of the framework coping as described above, then clean the framework using the steam cleaner.
- Mark the preparation margin using a graphite-free pencil and seal it as usual, e.g. using an acrylic adhesive.
- Now apply a ceramic separation agent and dry with compressed air.
- Mix the margin ceramic with *Interaction® margin liquid*.
- Use the margin ceramic to rebuild the cutback crown margin.
- Apply the margin ceramic to the coping in the cervical quarter.
- Allow the ceramic margins to dry, using a heat source of heat if preferred, and fire as per the firing recommendations.
- The shrinkage during the first firing will be compensated for during the second shoulder firing.
- Apply the second layer in line with the method described above and fire the ceramic according to the firing schedule.
- Once the glaze firing stage has been completed, it is still possible to make minor corrections with *Interaction® margin correction*.
- Just as you would with the *Interaction® margin*, use margin liquid to mix the *Interaction® margin correction* into a cream-like consistency.
- Apply the *Interaction® margin correction* to the area to be corrected and condense well.
- Before proceeding, dry with a hairdryer.
- Remove the object from the die.
- Fire the ceramic in accordance with the firing chart.
- Once the firing process has been completed, the correction layer should preferably be polished mechanically, with silicon polishing tools and diamond paste.

4. Building up the aesthetic ceramic layers

Interaction® value dentin & incisal preparations make it possible to produce high-quality aesthetic firing results in a very short time. Proceed as described below. See Table 1 for the different colour combinations.

First firing stage:

- Start by building up the dentine core and use the cutback technique to prepare it for the incisal layer.
- Rebuild the cutback part with incisal material.
- Fire the ceramic in line with the firing chart for the first dentin firing stage (see table 3).

Tip: *Interaction® Sakura margins* can also be used in situations where a very limited layer thickness requires a dentine colour with better coverage. We recommend a mixture ratio of 1:1 of *value dentin* and *margin*.

Second firing stage:

- Next, the contracted part will be rebuilt using the appropriate dentine and incisal materials.
- Fire the ceramic in line with the firing chart for the second dentine firing stage (see table 3).
- Finish the surface of the ceramic and follow with the glaze firing process.

Individual layer build-up

When building up the individual layers, it is possible to use the *Interaction® action-i dentins*, the individual *action-i dentins* and the *x-tra incisal* opalescent effect materials to create very high-quality and natural-looking restorations.

- The base colour is assured using the *paste opaque*.
- This will be followed by dentin build-up, as normal.
- After the cutback, the opal incisal-material layer build-up can be individualised. For example, apply *action-i dentin* accents on the cutback dentin layer and/or build up the incisal edge with opalescent effect materials *x-tra i blue, red, grey, orange, white* or *clear*.
- The individual *action-i dentins* are ideal for cervical and vestibular areas.

When *action-i dentin* is used, more dentine material must be removed.

- The *Interaction® x-tra incisals bright, medium* and *dark* can be used to adjust the colour of the crown in the final stage without having to do any grinding work on the restoration.
- 'A shade darker': the *Interaction® x-tra incisals bright, medium* and *dark* make it possible to adjust the value of the colour very precisely. For example, when, according to the processing instructions, the cervical area is to be coloured slightly darker, this can be achieved using *x-tra i dark*.

5. Finishing and glazing

The shape of the surface is key to the restoration's aesthetic properties, especially those related to the incidence of light. The surface structures of the neighbouring elements on the plaster model can be highlighted using silver powder. This helps to determine what the surface structure should be like.

Processing:

- Mix the *Interaction® Antagon & Carrara glaze* with *Interaction® stain liquid* or *paint liquid* until you have an even, cream-like mass.
- Apply a thin, even layer to the polished ceramic surface.
- Fire the ceramic in line with the firing chart.

6. Make corrections

Processing option 1:

- Use *Interaction® carving liquid* to mix *Interaction® Antagon correction* into a cream-like consistency.
- Apply the desired quantity to the location to be corrected and condense it thoroughly.
- Fire the ceramic in accordance with the firing chart.

Processing option 2:

- Use *Interaction® stain liquid* (possibly with the stains required) to mix *Interaction® Antagon* correction into a cream-like consistency.
- Apply the desired quantity to the location to be corrected.
- Fire the ceramic in accordance with the firing chart.

Cooling down stage:

Interaction® Carrara can be easily fired on metal sub-structures with a CTE range of 15.8 - 16.9 µm/m.K (25-500°C).

Depending on the CTE value indicated for the alloy used, the cooling down stage for the firing programmes must be brought into line as follows:

- **Quick cooling down**
  at a CTE value of up to 16.0 µm/m.K (25-500°C) – 0 min.
- **Normal cooling down**
  at a CTE value from 16.1 up to 16.5 µm/m.K (25-500°C) – 2 min.
- **Slow cooling down**
  at a CTE value from 16.5 µm/m.K (25-500°C) – 5-7 min.

7. Inlays, onlays and facings with *Interaction® Veneering Investment*

To produce refractory dies, follow the instructions provided for *Interaction® Veneering Investment.*

The values listed here are intended for orientation only and should be regarded only as guidelines. Your firing results may differ. All firing results depend on the performance of the furnace used, which in turn depends on the make, model and age of the furnace. Therefore, the guideline values will have to be adapted individually for each firing. We recommend running a test firing cycle to evaluate the performance of the furnace used. We have compiled and checked all values and other data with great care. However, we cannot under any circumstances be liable for your results.

Table 3: General firing recommendations – *Interaction® Carrara*

		1st paste opaque	2nd paste opaque	1st margin	2nd margin	1st dentine	2nd dentine	Glazing	Correction and margin correction
Preheat or start temperature	°C	450	450	450	450	450	450	450	450
Pre-dry time	min.	7	7	8-10	8-10	5-7	4-5	4	4-5
Rate of heat increase	°C/min.		60	60	60	60	60	60	60
Final temperature	°C	860	860	860	860	835	830	830	795
Hold time with vacuum	min.	1	1	2	1	1	1	-	1
Hold time without vacuum	min.	1	1	1	1	1	1	1-2	1
Vacuum start temperature	°C	450	450	450	450	450	450	450	450
Vacuum final temperature	°C	860	860	860	860	835	830	830	795
Cooling down stage	min.		*	*	*	*	*	*	*

interaction®

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