Straumann® SNOW Ceramic Implant System

Basic Information
Welcome to the world of safe ceramic implants

The Straumann® SNOW Ceramic Implants System is the result of many years of clinical and laboratory experience since 2004. Safety is our foremost priority. Straumann® SNOW Ceramic Implants System fulfills the mandatory requirements related to safety and performance.

This basic information on the surgical and prosthetic procedure of the Straumann® SNOW Ceramic Implants System is intended to provide dentists, physicians, surgeons and dental technicians with a description of the most important surgical and prosthetic steps for the planning, treatment and procedure of the Straumann® SNOW Ceramic Implants System. This manual cannot replace implantological and prosthetic training. It is assumed that the user is familiar with the implant procedure.
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1. General information

1.1 General aspects and important information

1.1.1 General aspects
Straumann® SNOW Ceramic Implants are unique in their combination of design and material. We expressly ask you to read this manual thoroughly before starting any treatment planning and to exactly follow our specific instructions on preparation as well as surgical and prosthetic procedures.

Observing these specific instructions and following the general implantological and prosthetic principles will ensure safe and successful implantation with Straumann® SNOW Ceramic Implants.

The health of your patients is our top priority. For this reason we have compiled a technical guide that will contribute to the success of treatment with Straumann® SNOW Ceramic Implants. The surgical and prosthetic phase should be preceded by extensive preoperative assessment, diagnosis and planning. Careful planning and adherence to the protocols for implantation and prosthetic restoration of Straumann® SNOW Ceramic Implants reduces/avoids problems/errors during implantation and especially during prosthetic restoration.

We recommend the use of Straumann® SNOW Implants only for dentists with thorough practical and surgical training and with expertise and experience in implantology. Instruction/training by an implantologist or by a Straumann representative familiar with the use of the instruments is strongly recommended.

1.1.2 Important information
Disclaimer: The Straumann® SNOW Ceramic Implants System is part of an overall concept and may only be used in conjunction with the corresponding original components and instruments and according to the Z-SYSTEMS instructions and recommendations. Instructions regarding the application of our products are given verbally, in writing, electronically or through practical training, in accordance with the state of the art at the time of product launch. The user of Straumann® SNOW products must decide whether or not a product is suitable for a patient and a specific situation according to their indication. Z-SYSTEMS and Straumann exclude any liability for damages resulting from the use or implantation of Straumann® SNOW products as a result of, or in connection with, errors in professional assessment or application/indication, in particular also claims due to the disregard of general implantological and prosthetic principles in connection with implants. The user is also obliged to inform themselves regularly about the latest developments of our system and its applications.
Availability: Not all of the products described in this manual are available in all countries. For further information, please contact our subsidiary or sales company in your country.

Precautions: Our products must be protected from aspiration during intraoral use.

Delivery: The sale of these products is limited to dentists, doctors or licensed dental technicians or orders made on their behalf.

Units per package: Unless otherwise stated, the package unit is 1 piece.

Documentation: Detailed instructions regarding the Straumann® SNOW Implant system are available from your account manager or customer service department in our headquarters.

Qualified users: Dental implants and their components/auxiliaries/prosthetic parts should only be used by dentists, doctors, surgeons and dental technicians that are trained to use the system.

1.1.3 Certification
FDA/CE/ISO13485/MDD93/42 EWG
ZSYSTEMS have complied fully since 2004 with the current normative and legal requirements for medical products through European certification according to ISO 13485, as well as the guideline 93/42/EEC for medical devices. ZSYSTEMS have been registered with the FDA (US Food and Drug Administration) since 2007.

1.1.4 Color coding of the surgical and prosthetic products
Yellow: 3.6 mm diameter
Red: 4.0 mm diameter
Green: 5.0 mm diameter

1.1.5 Explanation of the symbols on labels and package inserts

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOT</td>
<td>Batch number</td>
</tr>
<tr>
<td>REF</td>
<td>Item number</td>
</tr>
<tr>
<td>STERILE PLASMA</td>
<td>Plasma sterilised</td>
</tr>
<tr>
<td>STERILE</td>
<td>Non-sterile</td>
</tr>
<tr>
<td>❌</td>
<td>Do not use if packaging is damaged</td>
</tr>
<tr>
<td>⌚</td>
<td>Single use, not reusable</td>
</tr>
<tr>
<td>⚠️</td>
<td>Attention: Observe the package inserts</td>
</tr>
<tr>
<td>⬇️</td>
<td>Use before expiration date</td>
</tr>
<tr>
<td>⏲️</td>
<td>Date of manufacture</td>
</tr>
<tr>
<td>🔐</td>
<td>Straumann® SNOW Products are CE marked and comply with the requirements of the Medical Device Directive 93/42 EEC.</td>
</tr>
<tr>
<td>Rx only</td>
<td>Attention: According to federal law (USA), this product may only be sold by a dentist or on his instructions.</td>
</tr>
</tbody>
</table>

Observe the package insert.
Do not expose the products to direct sunlight.
1.2 Material, biocompatibility and osseointegration

1.2.1 Material
All Straumann® SNOW Implants are manufactured according to the unique “Zirkolith®” process from zirconium oxide TZP-A bioceramics in compliance with the ISO 13356 standard - it encompasses our experience in the development, material processing, quality assurance and finishing of zirconium oxide. The composition and production processes for zirconium oxide vary according to the requirements for the system component, for example whether it is an implant, a cutting instrument or some other surgical instrument.

The material achieves its bending strength, which is many times higher than with conventionally used titanium, through the “Hot Isostatic Pressing” process. In this process, the material is recompressed in a tunnel kiln for three days at 2000 bar after the sintering process, which significantly improves the physical properties of the base material. This significantly increases breaking strength and age resistance. The material used for the Straumann® SNOW is one of the safest and most stable zirconium oxide ceramics on the market and significantly more stable than the zirconium oxide used in dental technology.

Not only the implants, but also the instruments that come into direct contact with the bony surgical area are made of zirconium oxide. The cutting instruments are made of high-strength ATZ high-performance ceramics (Alumina Toughened Zirconia).

1.2.2 Biocompatibility
Numerous studies since the 1960s have confirmed the excellent biocompatibility of zirconium oxide ceramics.

1.2.3 Osseointegration
Zirconium oxide has similar osseointegration behavior to commercially pure titanium, which has also been proven in a large number of studies.
1.2.4 Surface
Surface modification is made in the SLM® process developed by Z-SYSTEMS using laser technology and results in an increase in surface area and therefore to increased macro and micro roughness.

1.2.5 Healing time
We recommend a healing time of 3 months in the lower jaw and 6 months in the upper jaw* for healthy patients with good bone density and sufficient bone quality.

It is strongly recommended to protect each implant during the healing phase through placement of provisional elements or prosthesis.

1.3 Indications

Straumann® SNOW Ceramic Implants are suitable for almost all indications in the upper and lower jaw for the functional and esthetic oral rehabilitation of edentulous or partially edentulous patients. Straumann® SNOW Ceramic Implants are restored either with fixed cement-retained crowns and bridges or with removable prosthetic work. Straumann® SNOW BL implants are suitable for patients with metal allergies and the chronic diseases resulting from them. Straumann® SNOW BL implants are intended for delayed loading.

1.3.1 General areas of application

As a rule of thumb, the implant with the largest possible diameter should always be used, because the mechanical strength increases proportionately with increasing diameter of the implant.

1.3.2 Applications for 3.6 mm (■)

Ø 3.6 mm implants are only approved for use in the lateral incisor region (tooth 12/22) of the upper jaw and in the incisor region (tooth 42/41/31/32) of the lower jaw. Their inclusion in bridge constructions are only permitted if each tooth to be replaced is with an implant and is located in the regions mentioned above. The inserts are not suitable for applications where there is a risk of excessive cantilever like movement (e.g., singletooth replacement for 11/21, molars, premolars, extended crowns, extension bridges, bridges, bar work, telescopic work).

1.3.3 Applications for 4.0 mm (■)

Universal implant that is suitable for most indications. Not suitable for applications where there is a risk of excessive bending moments (e.g. extended crowns, extension bridges, bridges with more than one pontic). Limited suitability for extension bridges and telescopic restorations.

1.3.4 Applications for 5.0 mm (■)

Universal implant, suitable for most indications where there is sufficient bone. Not suitable for applications where there is a risk of excessive bending moments (e.g. extended crowns, extension bridges, bridges with more than one pontic). Implants with Ø 5.0 mm are recommended for the indication canines, central upper incisors and upper jaw/lower jaw molars. Limited suitability for extension bridges and telescopic restorations.

<table>
<thead>
<tr>
<th>Implant size</th>
<th>Thread diameter</th>
<th>Shoulder diameter</th>
<th>Minimum space requirement, peri-oral (mm)</th>
<th>Minimum space requirement, mesio-distal (mm)</th>
<th>Optimum indication odontogram</th>
<th>Single-tooth</th>
<th>Blocking</th>
<th>Bridge in premolar width (max. 1 pontic)</th>
<th>Extension bridge</th>
<th>Bar</th>
<th>Telescope</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6</td>
<td>3.6 mm</td>
<td>3.6 mm</td>
<td>5.6 mm</td>
<td>5.6 mm</td>
<td>UPPERRIGHT</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>4.0</td>
<td>4.0 mm</td>
<td>4.0 mm</td>
<td>6.0 mm</td>
<td>7.0 mm</td>
<td>UPPERRIGHT</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>– [+ (+)]</td>
<td>+</td>
<td>(+)</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0 mm</td>
<td>5.0 mm</td>
<td>7.0 mm</td>
<td>8.0 mm</td>
<td>UPPERRIGHT</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>– [+ (+)]</td>
<td>+</td>
<td>(+)</td>
</tr>
</tbody>
</table>

+ recommended | (+) not recommended | – not possible
1.4 Fundamentals of treatment planning

The patient must meet the generally valid implant surgical and prosthetic criteria for an implant treatment and restoration.

Implant prosthetic restoration is a collaboration involving the dentist/surgeon and dental technician and requires a high degree of clinical experience and detailed knowledge from all involved.

1.4.1 The following are important planning points:
It is recommended to select the appropriate implant and its restoration according to the following criteria:
• Endosseous diameter of the implant
• Shoulder diameter of the implant
• Length of the implant
• Vertical implant position

1.4.2 Esthetically optimum result
Many conditions are decisive for an esthetically optimum result:
• the harmonious course of the gingiva
• the best implant position (vertical, orofacial and mesio-distal)
• the shape of the crown and
• the presence of interdental papillae

1.4.3 Planning the position of the implant
During planning, the instructions for the hard tissue configurations are to be complied with and soft tissue management must be observed.

The implant diameter and implant length must be determined so that there is sufficient bone (at least 1 mm) around the implant. A minimum distance of 1.5 mm to an adjacent natural tooth and 3 mm to an adjacent implant must be maintained.

Structure-preserving and structure-protecting procedures are to be used for flap design and implant placement. The oral hygiene requirements must be taken into account as early as the planning stage.
1.4.4 Restorations

Single-tooth crowns
Restoration with single crowns is a possible restoration under the aspect of “restitutio ad integrum”. It includes all the advantages that are possible in periprosthetic rehabilitation.

The physiologically adequate biomechanical load prevents further atrophy of the hard and soft tissue.

Blocked crowns
Blocking of the crowns may be necessary for static reasons (such as unfavourable lever ratios). When selecting blocking, the possibility to maintain good hygiene must be considered.

Implant-supported bridges
Implant-supported bridges can be inserted in positions that do not permit implant placement. The implant distribution must be selected so that small span segments are created.

SNOWloc abutment restoration
SNOWloc abutments are for attachment of overdenture prostheses into the edentulous upper and lower jaw.
• The principle of 4-point-support is recommended
• Axis divergence maximum of 40° between implants
1.5 Protective measures

For successful osseointegration, the implants must be protected from macro movements during the healing phase. Depending on bone quality, insertion torque, periotest measurement and general patient compliance, the dentist decides whether and which additional protective measures are necessary. Possible protective measures are:

- protective splints
- splinted temporary restorations
- protective prostheses.
2. Surgery

2.1 Surgical Tray

The Straumann® SNOW Surgical Tray from Z-SYSTEMS is to be used.

The Surgical Tray contains all the instruments required for implantation and has been designed to be user-friendly. The rotating instruments are sorted according to the treatment process and marked with a color code throughout.

Both the instruments and the space provided for them are labelled with the respective instrument designation to avoid any risk of confusion. The drills are arranged in the tray according to the treatment sequence.

<table>
<thead>
<tr>
<th>Screwdrivers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SD-BS-S</strong></td>
</tr>
<tr>
<td><img src="image1" alt="Screwdriver Short for Basal Screw" /></td>
</tr>
<tr>
<td>Screwdriver short for Basal Screw, single-use article with pre-defined breaking point</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth Probes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DP230</strong></td>
</tr>
<tr>
<td><img src="image5" alt="Depth Probe 2.30 mm" /></td>
</tr>
<tr>
<td>Depth Probe 2.30 mm</td>
</tr>
</tbody>
</table>

Meaning of the colors:
- Yellow = Ø 3.6 mm
- Red = Ø 4 mm
- Green = Ø 5 mm
### 2.1.1 Material properties

All instruments that come into direct contact with the surgical field are made of zirconium oxide. The cutting instruments are made of high-strength ATZ high-performance ceramic (Alumina Toughened Zirconia).

This alumina-reinforced zirconium oxide is ideal for the manufacture of drills and taps. The ATZ drills cut excellently with very little wear. Note: The drills must be replaced after being used 20 times.

<table>
<thead>
<tr>
<th>Drills</th>
<th>Cortical drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD230</td>
<td>CD360</td>
</tr>
<tr>
<td>TD230</td>
<td>CD400</td>
</tr>
<tr>
<td>TD285</td>
<td>CD500</td>
</tr>
<tr>
<td>TD325</td>
<td></td>
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<tr>
<td>TD375</td>
<td></td>
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<tr>
<td>TD425</td>
<td></td>
</tr>
</tbody>
</table>

- Round Drill 2.3 mm
- Twisted Drill 2.3 mm
- Twisted Drill 2.85 mm
- Twisted Drill 3.25 mm
- Twisted Drill 3.75 mm
- Twisted Drill 4.25 mm
- Cortical Drill 3.6 mm
- Cortical Drill 4 mm
- Cortical Drill 5 mm

<table>
<thead>
<tr>
<th>Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD-DS230</td>
</tr>
<tr>
<td>TD-DS285</td>
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<tr>
<td>TD-DS325</td>
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<tr>
<td>TD-DS375</td>
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<tr>
<td>TD-DS425</td>
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<tr>
<td>CD-DS500</td>
</tr>
<tr>
<td>KIS89</td>
</tr>
<tr>
<td>BL-CD</td>
</tr>
<tr>
<td>BL-RT</td>
</tr>
</tbody>
</table>

- Drill Stop 2.30 mm
- Drill Stop 2.85 mm
- Drill Stop 3.25 mm
- Drill Stop 3.75 mm
- Drill Stop 4.25 mm
- Drill Stop 5.0 mm
- Drill Extension
- Abutment-Removal Instrument
- Rescue-Tool

<table>
<thead>
<tr>
<th>Tap</th>
<th>Adapter for tap</th>
<th>Ratchet</th>
</tr>
</thead>
<tbody>
<tr>
<td>T360-3</td>
<td>ZT-HA-9</td>
<td>TR-70</td>
</tr>
<tr>
<td>T400-3</td>
<td>ZT-RA10-9</td>
<td></td>
</tr>
<tr>
<td>T500-3</td>
<td>ZT-RA20-9</td>
<td></td>
</tr>
</tbody>
</table>

- Bone Tap 3.6 mm
- Bone Tap 4 mm
- Bone Tap 5 mm
- Contra-Angle Adapter
- Ratchet Adapter 10 mm
- Ratchet Adapter 20 mm
- Torque Wrench
2.1.2 Preparation instructions for the surgical tray
These descriptions contain detailed instructions for cleaning, disinfecting and sterilizing the Straumann® SNOW Implant system instruments and surgical tray.

2.1.3 Sterilizer and disinfector
Please note that as part of your responsibility for the sterility of the products during use,
- the steam sterilizers used must comply with DIN EN 13060/DIN EN 285 and/or ANSI AAMI ST79 (for USA: FDA clearance),
- only specifically validated processes are used for the cleaning/disinfection and sterilization of the devices and product,
- the equipment used is regularly serviced and checked and
- the validated parameters are maintained at each cycle.

The national legal regulations and the hygiene regulations of the dentist's or surgeon's practice or hospital must be observed. This applies in particular to the requirements for effective prion inactivation.

Important notes
Unless otherwise specified in the instructions for use, reusable Straumann® SNOW products may be prepared as often as the inspection prescribed in the instructions for use or preparation instructions is successfully passed. Removable instruments must be disassembled for effective cleaning. The silicone O-rings of the insertion adapters must be replaced after 20 sterilization cycles. The number of sterilization cycles must be documented. Straumann® SNOW products intended for single use may not be reused, as safe preparation and/or functional safety cannot be guaranteed.

2.1.4 Instruments
The Straumann® SNOW Implant system instruments are not supplied sterile unless expressly marked as sterile. They must be cleaned, disinfected and sterilized before the first and every subsequent use on a patient. Effective cleaning and disinfection is an indispensable prerequisite for effective sterilization. During use, care must be taken to ensure that contaminated instruments are collected separately and not returned to the surgical tray to avoid cross-contamination of the occupied instrument tray. After cleaning and disinfection, the instruments must be sorted and placed back in the surgical tray. The fully loaded surgical tray must then be sterilized.

2.1.5 General remark
Instruments made of zirconium oxide must always be prepared and stored separately from metal instruments, otherwise metallic abrasion could occur on the instrument surface. Instruments made of zirconium oxide must not be disinfected and cleaned in the thermodisinfector, as instruments made of zirconium oxide can be corroded by the interaction of high temperature and cleaning agents.

2.1.6 Manual cleaning and disinfection
The following information refers to a manual preparation process with a combined cleaning and disinfecting agent. When selecting the combined cleaning and disinfecting agent, ensure that it:
- is suitable for cleaning and disinfection of dental instruments,
- is suitable for ultrasound cleaning (no foaming),
- has tested effectiveness in disinfection (VAH/DGHM or FDA approval or CE marking),
- is compatible with the materials of the products to be cleaned and disinfected and is aldehyde-free (otherwise there is a risk of the fusing of blood, secretions, tissue residues, etc.).
Disassembly
Completely disassemble all removable instruments (see instrument disassembly and assembly).

Initial disinfection
Immediately after use, place all instruments in a bath with combined cleaning and disinfectant agent (e.g. freshly prepared Comet DC1 (Brasseler GmbH & Co. KG, Lemgo, Germany), 2% solution at room temperature +15/+25°C, application time 5 minutes). This serves for your own safety and prevents contaminants from drying out. The concentration and application time of the combined cleaning and disinfectant specified by the manufacturer must be observed. This initial disinfection does not replace the later disinfection step after cleaning.

Preliminary cleaning
Coarse contamination on the instruments must be removed within a maximum of 2 hours after use. Use running water and a soft plastic brush (no metal bristles or steel wool) for this purpose. In areas difficult to access remove contaminants using suitable instruments and rinse at least three times with water using a cannula and a syringe (min. 10 ml).

Combined cleaning and disinfection
The instruments must be placed completely covered in a combined cleaning and disinfectant bath freshly prepared for cleaning and disinfection within the prescribed exposure time.

The instruments must not touch each other. Exposure to a 10-minute ultrasonic bath is recommended before brushing. The instruments must be brushed off with a soft plastic brush to completely remove residues. Ratchet adapters and contra-angle adapters, drill extensions, mandrels and parts of the torque wrench have places that are difficult to access; remove residues in these difficult to access places with a soft plastic brush and rinse with at least 2 x 25 ml cleaning and disinfecting agent with the help of a syringe.

Rinsing and drying
Remove the instruments and rinse completely for at least one minute with deionised, low-germ (maximum 10 germ/ml) and low-endotoxin (maximum 0.25 endotoxin units/ml) water (e.g. Aqua purificata [valde]). Even areas that are difficult to access must be flushed at least five times with the aid of a cannula and a syringe (at least 10 ml).

Use lint-free disposable cloths and oil-free, dry and lowgerm compressed air. We also recommend the use of a sterile filter.

Inspection
Inspect the instruments for corrosion, surface damage, chipping and soiling. Damaged instruments must be sorted out. Instruments that remain soiled must be cleaned and disinfected again. The maximum permissible number of drilling applications - as specified in the instructions for use - must be observed.

Assembly
Reassemble all disassembled instruments (see disassembly and assembly instructions).

Packaging
Pack the instruments for sterilisation as soon as possible. We recommend that the instruments are sorted into the Straumann® SNOW BL implant surgical tray and the tray packed in a disposable sterilisation package according to ISO 11607. The instruments can also be packed individually in disposable sterilisation packaging according to ISO 11607. It must be ensured that the packaging is suitable for steam sterilisation (temperature resistant up to at least 141°C / 286°F with sufficient steam permeability) and that the products are adequately protected against mechanical damage.
2.1.7 Sterilization in a steam sterilizer/autoclave

Use steam sterilization processes with a fractionated vacuum process (and sufficient product drying). Other sterilization methods (including gravitational steam sterilization) are not permitted. Pay attention that:

- the sterilization temperature does not exceed 138°C / 280°F (plus tolerance in compliance with DIN EN ISO 17665).
- EU: the sterilization holding time (exposure time at sterilization temperature) is at least 4 minutes at a minimum temperature of 134°C / 273°F.
- USA: the sterilization holding time (exposure time at sterilization temperature) is at least 4 minutes at a minimum temperature of 132°C / 270°F.

We recommend a drying time of at least 30 minutes for each of the cycles described above.

When using the surgical tray, make sure that it does not touch the walls of the steam sterilizer, as high local temperatures could deform the plastic.

Attention: Straumann® SNOW products that are not sterile packed must not be sterilized in their original Straumann® SNOW packaging!

2.1.8 Instrument disassembly and assembly

The following instruments must be cleaned and disinfected when dismantled:

- Torque wrench (TR-70)
  
  The disassembly, care and assembly of the torque wrench is described in the torque wrench instruction leaflet, included in the torque wrench packaging.
2.1.9 TR-70 - Unpacking and content included in package

Remove outer packaging to access plastic box with manual torque wrench (TR-70).

Open transparent lid to access inner content.

Remove ratchet.

Remove adjustment key.

Remove tube with instrument lubricant.

To access IFU, lift white plastic tray.

Remove IFU.

Unfold and carefully read the instructions.
2.1.10 IN and OUT function

IN - inserting/tightening

The word “IN” on the cover shows the position of the wrench that is used for inserting and tightening (e.g. inserting implants, tightening screws).

OUT - removing/loosening

To change to reverse mode, disconnect adapter from ratchet.

By turning the device over, the word “OUT” indicates the removing/loosening function. Connect adapter to torque wrench for removing and loosening (e.g. to remove Ratchet Adapter ZT-RA20-9 from osteotomy, screwdriver BI-SD-LT to loosen screws).
2.1.11 Torque wrench

Torque wrench: 10 Ncm to 70 Ncm.

Turn grooved end of ratchet clockwise to increase Ncm and counterclockwise to reduce Ncm of torque control.

Note: In order to change from a higher to a lower torque value, one must screw two turns under the desired torque value, then screw clockwise again to the exact line marking.

Note: The lines on the ratchet and the middle part must be aligned for correct torque.
2.2 Surgical procedure/Drilling protocol

2.2.1 General drilling protocol

Round Drill
Use the Round Drill to prepare alveolar ridge and to mark the implant position.

Twist Drill
The implant bed is prepared with the twist drills in ascending order. The last drill used depends on the diameter of the implant to be inserted. Please follow the detailed instructions. The depth markings on the drill are easy to read. The first depth mark is 8 mm followed by 10 and 12 mm.

Warning: The apical excess length of the drill tip is maximum 0.8 mm longer than the insertion depth of the implant. Please take this into account during the drilling process during implant length planning and drilling process.

Drill stops
Drill stops are available for twist drills and cortical drills in the respective diameters. These are attached to the corresponding drills from the contra-angle handpiece connection side in the direction of the arrow and fixed at the required drilling depth. To remove, simply pull off in the direction of the arrow.

Cortical Drill
Cortical drills are available to expand the cortical area according to the implant diameter. The use of a cortical drill is recommended for cases with hard bone or hard cortical bone.

Tap Drills
The use of a tap is recommended for cases with hard bone or hard cortical bone (Bone class D1 and D2).
2.2.2 General recommendations

Bone class D1+D2:
- Cortical area expansion with the cortical drill up to the depth marking
- Tap the entire length

Bone class D3+D4: do not tap.

2.2.3 Exemplary procedure: Preparing the implant bed

The following shows how to prepare the implant bed using the example of a Straumann® SNOW Implant Ø 4.0 mm/10 mm in hard bone (D1).

After unfolding the gingiva, the basic preparation of the implant bed begins with preparation of the alveolar ridge and marking the implantation site with a Round Drill (RD230). This is followed by pilot drilling with the twist drill (TD230) and the further preparation of the implant bed using the twist drills in accordance with the endosteal implant diameter.

The threads are pre-cut with the tap; please refer to chapter 2.2.1 General drilling protocol and 2.2.2 General recommendations.

1. Preparation of the alveolar ridge and marking of the implantation site

Carefully reduce and smooth a narrow and tapered alveolar ridge with the RD230 Round Drill. This results in obtaining a flat and sufficiently wide bone surface. Mark the implantation site determined during planning of the implant position with the RD 230 Round Drill.

Note: Depending on the clinical situation, this step may be omitted or applied in a modified form (e.g. for fresh extraction sockets).
2. Implant axis and depth
Use the twist drill TD 230 to mark the implant axis by drilling to a depth of about 5 mm. Use the depth gauge DP 230 to check the correct orientation of the implant axis. Drill the implant bed to the final preparation depth with the twist drill TD 230. If necessary, correct the orientation of the implant axis.

Use depth gauge DP 230 to check the implant axis and preparation depth. Take an x-ray at this time, especially if the vertical bone volume is reduced. The depth gauge is inserted into the drilled hole and allows a visual assessment of the hole in relation to the anatomical structures.

3. Widening the implant bed to Ø 2.85 mm
Widen the implant bed with twist drill TD 285.
4. Widening the implant bed to $\varnothing$ 3.25 mm
Widen the implant bed with twist drill TD 325.

5. Profile drilling
The cortex is widened to the diameter of the implant with the CD 400 cortical drill.

6. Tap
Pre-tap the thread with the T400-3 tap over the entire length of the implant bed preparation for bone class D1+D2.
2.2.4 Drilling protocol

Drilling depth according to the implant length: 8/10/12 mm

Drills with drill stops
TD375 | max. 500 rpm

TD425 | max. 15 Rpm for D1+D2

CD500 | max. 400 rpm

T500-3 | max. 15 Rpm for D1+D2

CD400 | max. 400 rpm

T400-3 | max. 15 rpm for D1+D2

CD360 | max. 400 Rpm
2.3 Specific features of Straumann® SNOW

2.3.1 Concept
The two-piece, screw-retained Straumann® SNOW Implant is a self-tapping bone level implant. The Straumann® SNOW Implant has no transgingival portion (shoulder) and is surgically placed at bone level. Inside the implant there is a thread in which prosthetic components such as healing caps, healing abutments and abutments are fixed with the aid of a screw. After implantation, the inner connection of the Straumann® SNOW Implant is closed with the supplied healing cap (BL-HC) made of radiopaque PEEK (polyether ether ketone) by simply screwing in and a submerged healing is aimed for. A selection of standard healing abutments is available for shaping the soft tissue before the prosthetic restoration. An individual design of the emergence profile can be achieved with the help of the temporary abutment and a temporary crown. Straight and angled standard abutments, the Straumann® SNOWbase, SNOW crown and bridge abutments as well as SNOWloc abutments are available for the final prosthetic restoration.

During the surgery, the dentist / surgeon decides to which dimension is to be prepared, depending on the bone quality. The drilling protocol must be observed and adhered to.

The optimum insertion torque for implant placement is in the range of 25–35 N cm. For harder bone, a tap should be used to avoid torques of over 35 N cm when inserting. The twist drills have a depth stop to ensure safe and precise preparation of the implant bed.

2.3.2 Implant removal from the sterile packaging
After opening the secondary packaging, remove the sterile inner blister and open the sealed lid. The white implant holder is rotated clockwise and the implant is now easily accessible. The implant driver is a two-piece component. The transfer-piece (TP) is inserted into the preferred adapter (ZTHA-9, ZT-RA10-9, ZT-RA20-9) until it clicks into place. Firmly press the corresponding adapter with the TP into the implant, taking into account the hexagon. Now the implant can be removed and inserted into the prepared osteotomy. After insertion, the implant driver must be removed again.
Removing the implant from the packaging

All Straumann® SNOW Ceramic Implants are delivered in a sturdy cardboard box. Inside is an outer blister (secondary packaging), with the inner blister (primary packaging) and the implant with an healing cap, as well as the package insert and three removable label strips for documentation.

1. Connect the TP to the preferred adapter. Before pushing down the adapter on the transfer piece, assure correct alignment of the hexagon. A click is heard when the adapter is attached correctly.

2. Carefully apply light pressure to stabilize the white insert.

3. Open the sealed lid.

4. Turn the white insert anticlockwise.

5. Slide the transfer piece into the implant with a slight rotational movement. A click will be heard when the transfer piece is properly attached.

6. For safe removal, ensure that there is no gap between the TP-SN/TP-SNS and the implant shoulder.

7. Remove the implant from the insert by hand or by attaching the ratchet or handpiece.
Implant placement

Transfer-piece TP driven by:
ZT-HA-9 | ZT-RA10-9 | ZT-RA20-9

Insertion speed (rpm) 15
max. torque 25–35

User tip:
Turn the implant slightly to the left before insertion. The thread noticeably engages in the osteotomy and then follows the threads in a clockwise direction as it is inserted.

Transfer-piece for Z5 BL/TL Implants

Retentive notch
- To ensure secure retention to adapter i.e. handpiece or ratchet.

Predefined breaking point
- To ensure excess torque is not applied to the implant.

Abutment alignment indicator
- Alignment aid for ideal prosthetic abutment orientation
  Congruent hexagon (Implant – TP – Abutment)

Retentive notch
- To ensure secure retention to adapter i.e. handpiece or ratchet after failure of the predefined breaking point

Snap feature/Retention
- To ensure secure retention of the implant
- Detaches with Adapter after implant insertion.

Implant Driver Removal

Removal of a broken Transfer-piece

Implant extraction after breaking the pre-defined breaking point to check the implant bed preparation
2.3.3 Implants
A total of nine different Straumann® SNOW Implants are available. Three diameters, 3.6, 4.0 and 5.0 mm, each in lengths of 8, 10 and 12 mm.

<table>
<thead>
<tr>
<th>3.6 mm diameter</th>
<th>4 mm diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS-BL-3608</td>
<td>ZS-BL-3610</td>
</tr>
<tr>
<td><img src="image1" alt="Bone Level implant ∅ 3.6 mm, 8 mm long" /></td>
<td><img src="image2" alt="Bone Level implant ∅ 3.6 mm, 10 mm long" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5 mm diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZS-BL-5008</td>
</tr>
<tr>
<td><img src="image7" alt="Bone Level implant ∅ 5 mm, 8 mm long" /></td>
</tr>
</tbody>
</table>
2.4 Follow-Up

2.4.1 Postoperative follow-up protocol

The following postoperative checks should be carried out at the intervals indicated:

Regular hygiene examinations (depending on the oral hygiene of the patient) up to the beginning of the prosthetic restoration.

Consultation with the dentist/surgeon to determine the follow-up during the first 6–8 weeks of the healing phase. Depending on the case, further conditioning of the soft tissue can be performed with the aid of a healing abutment before the impression for final restoration is taken.

The patient should be instructed to contact the practice immediately in the event of any complaints. A prophylactic check should be carried out 14 days and 6 weeks after implantation, at the latest however after three months.

Successful integration:
- No soft tissue inflammation
- No peri-implantitis
- No clinically noticeable loosening of the implant
- Periotest® values of < 0 (minus values)
- No pain in the vicinity of the implant
- No radiographic visible peri-implant gap
3. Prosthetic concept

3.1 Healing Abutments

A selection of healing abutments with different gingiva heights and widths is available for shaping the soft tissue before prosthetic restoration. These are screwed into the implant hand-tight using the screwdriver. An individual design of the emergence profile can be achieved with the help of the temporary abutment and a temporary single-tooth restoration. All healing abutments are supplied non-sterile and must be sterilized before use by the patient.

3.1.1 Soft-tissue management

<table>
<thead>
<tr>
<th>BL-GF1538</th>
<th>BL-GF3055</th>
<th>BL-GF1545</th>
<th>BL-GF2545</th>
<th>BL-GF1555</th>
<th>BL-GF2555</th>
<th>BL-GF2565</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healing Abutment, GH 1.5 mm, Ø 3.8 mm</td>
<td>Healing Abutment, GH 3.0 mm, Ø 5.5 mm</td>
<td>Healing Abutment, GH 1.5 mm, Ø 4.5 mm</td>
<td>Healing Abutment, GH 2.5 mm, Ø 4.5 mm</td>
<td>Healing Abutment, GH 1.5 mm, Ø 5.5 mm</td>
<td>Healing Abutment, GH 2.5 mm, Ø 5.5 mm</td>
<td>Healing Abutment, GH 2.5 mm, Ø 6.5 mm</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BL-A001S</th>
<th>BL-BB1545</th>
<th>BL-BB2545</th>
<th>BL-CB1555</th>
<th>BL-CB2555</th>
<th>BL-CB2565</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOW BL Anatomic Abutment, straight, GH 1.5 mm, Ø 5.0 mm</td>
<td>SNOW BL Bridge Abutment, GH 1.5 mm, Ø 4.5 mm</td>
<td>SNOW BL Bridge Abutment, GH 2.5 mm, Ø 4.5 mm</td>
<td>SNOW BL Crown Abutment, GH 1.5 mm, Ø 5.5 mm</td>
<td>SNOW BL Crown Abutment, GH 2.5 mm, Ø 5.5 mm</td>
<td>SNOW BL Crown Abutment, GH 2.5 mm, Ø 6.5 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BL-A002S</th>
<th>BL-CB1545</th>
<th>BL-CB2545</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOW BL Anatomic Abutment, angled 15°, GH 2.5 mm, Ø 5.5 mm</td>
<td>SNOW BL Crown Abutment, GH 1.5 mm, Ø 4.5 mm</td>
<td>SNOW BL Crown Abutment, GH 2.5 mm, Ø 4.5 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BL-ZB1538</th>
<th>BL-A1515</th>
<th>BL-ZB1545</th>
<th>BL-ZB2545</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOWbase BL, GH 1.5 mm, Ø 3.8 mm</td>
<td>SNOW BL Anatomic Abutment, angled 15°, GH 1.5 mm, Ø 5.0 mm</td>
<td>SNOWbase BL, GH 1.5 mm, Ø 4.5 mm</td>
<td>SNOWbase BL, GH 2.5 mm, Ø 4.5 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BL-AN1515</th>
<th>BL-A1525</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOW BL Narrow Anatomic Abutment, angled 15°, GH 1.5 mm, Ø 4.3 mm</td>
<td>SNOW BL Anatomic Abutment, angled 15°, GH 2.5 mm, Ø 5.5 mm</td>
</tr>
</tbody>
</table>

The temporary abutments are made out of PEEK. The temporary abutment with Ø 5.5 mm has a prepared mucosa margin, therefore, less grinding to modify is required. Its emergence profile fits the straight anatomic abutment contours.
3.2 Temporary restoration

3.2.1 General note
The general information on implant-supported restoration applies to the temporary restoration of Straumann® SNOW Implants.

Occlusion contacts must always be set so that a simple shim-stock foil can be pulled through interocclusally with slight resistance in the final bite position with maximum intercuspidation. Occlusion contacts should be point-shaped. Flat contacts must be avoided. A group function must be aimed for to relieve a single implant in the canine position.

If temporary restorations are to remain in place for a longer period of time, a close inspection of the firm hold and the static and dynamic occlusion and the periodontal conditions with any appropriate corrections and prophylactic sessions must be ensured. Temporary restorations on Straumann® SNOW Implants must have a passive fit.

The temporary abutments BL-TA0030 or BL-TA1538 can be used until final restoration, by using the specific screw BL-OST (Screw for Temp abutment and auxiliaries) already packaged with the abutments and the screwdriver BL-SD-ST or BL-SD-LT with a maximum tightening torque of 15 Ncm.

3.2.2 Direct temporary restoration
Two different procedures are recommended for the fabrication of direct temporaries on Straumann® SNOW Implants in the mouth:

- Fabrication of a temporary restoration using an anatomic impression taken directly in the mouth
- Restoration with egg shell temporary

3.2.3 Restoration with a laboratory-fabricated long-term temporary restoration after osseointegration
If a temporary restoration on Straumann® SNOW Implants is intended to stay in place for a longer period (several months), it is recommended to use laboratory-fabricated, framework-reinforced long-term temporaries for stability reasons. The laboratory requires precise impressions for their fabrication.

The long-term temporary restoration must be completely stress-free and must have sufficient space for the placement of cement. Occlusion and dynamic occlusion must be precisely adjusted.

3.2.4 Procedure
- Check the passive fit of the long-term temporary restoration
- Check the esthetics, form, phonetics
- Check the occlusion and dynamic occlusion
- Cement
3.3 Impression taking

Precise and rotationally stable transfer parts are available for impression taking at implant level. An impression post for the closed impression (BL-IP-C), one for the open impression (BL-IP-O), and a Scanbody for the digital impression (BL-SB-36). For divergent or eccentric implant axes, the impression can be taken via the transfer abutment (BL-TA) with the Impression Cap closed for CB-Abutment (BL-CB-IC). The Impression Cap closed for CB-Abutment (BL-CB-IC) can be used for conventional impressions on all standard crown abutments (BL-CB1545/BL-CB2545).

Note BL-SB-36 and BL-CB-IC:
Z-SYSTEMS cannot currently guarantee the provision of individual abutments. Z-SYSTEMS does not assume any guarantee for externally manufactured parts on original Z-SYSTEMS parts.

<table>
<thead>
<tr>
<th>BL-IP-O</th>
<th>BL-IP-C</th>
<th>BL-CB-IC</th>
<th>BL-SB-36</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Impression Post Open Tray" /></td>
<td><img src="image2" alt="Impression Post Closed Tray" /></td>
<td><img src="image3" alt="Impression Cap closed for CB-Abutment" /></td>
<td><img src="image4" alt="Scanbody" /></td>
</tr>
</tbody>
</table>

Impression Post Open Tray, open flat top connection
Impression Post Closed Tray, closed conical connection
Impression Cap closed for CB-Abutment BL-CB1545/BL-CB2545
Scanbody (with BL-OSL lab screw)

<table>
<thead>
<tr>
<th>BL-TA</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Impression cap Transfer Abutment" /></td>
</tr>
</tbody>
</table>

The laboratory analogue BL-L is available for a conventional reconstruction on the stone model and a repositionable analog BL-L-3D for the digital work flow and 3D print.
3.3.1 Fabrication of the master model
The matching lab analog is inserted into the impression cap so that the lab analog clicks into the impression cap with a perceptible click. This is the only way to ensure that the situation in the mouth is correctly represented in the master model.

The impression can then be cast with plaster and the master cast can be completed.

3.3.2 Master model production with the transfer abutment

The transfer abutment (BL-TA) is inserted in the Lab Analog (BL-L) and aligned through the hexagonal rotation stop. Subsequently, the transfer abutment is hand-tightened with the Lab Screw (BL-OSL). The transfer abutment is positioned in the impression cap (BL-TA) with the conical connection geometry until it engages.
3.4 Final restoration

3.4.1 Final Abutments

The abutments should be selected between the dentist, surgeon and dental technician, taking into account the previous prosthetic planning. The implant axis, the gingival height and the occlusion concept must be taken into account. All final abutments are packed with a titanium screw and single use screw drivers (2 length).

The following abutments are available:

- **Straight Straumann® SNOW BL Anatomic Abutment** in two different gingiva heights for cementable single-tooth crown and bridge restorations.

<table>
<thead>
<tr>
<th>BL-A0015</th>
<th>BL-A0025</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="SNOW BL Anatomic Abutment, straight, GH 1.5 mm, Ø 5.0 mm, AH 5.5 mm, CA 3.5°" /></td>
<td><img src="image2" alt="SNOW BL Anatomic Abutment, straight, GH 2.5 mm, Ø 5.5 mm, AH 5.0 mm, CA 3.5°" /></td>
</tr>
</tbody>
</table>

- **15° angled Straumann® SNOW BL Anatomic Abutment** in two different gingiva heights and an anatomically adapted shape for cementable single-tooth crown and bridge restorations.

<table>
<thead>
<tr>
<th>BL-AN1515*</th>
<th>BL-A1525</th>
<th>BL-A1515</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="SNOW BL Nanow Anatomic Abutment, angled 15°, GH 1.5 mm, Ø 4.3 mm, AH 6.0 mm, CA 3°" /></td>
<td><img src="image4" alt="SNOW BL Anatomic Abutment, angled 15°, GH 2.5 mm, Ø 5.5 mm, AH 5.5 mm, CA 3°" /></td>
<td><img src="image5" alt="SNOW BL Anatomic Abutment, angled 15°, GH 1.5 mm, Ø 5.0 mm, AH 5.5 mm, CA 3°" /></td>
</tr>
</tbody>
</table>

- **Crown and Straumann® SNOWbase abutments** in three different widths and two different gingival heights for cementable single crown and bridge restorations. The crown abutments and the matching impression cap (BL-CB-IC) can be visually detected with suitable dental scanners and subsequently used in the modelling and fabrication of superstructures using CADCAM techniques.

<table>
<thead>
<tr>
<th>BL-ZB1538*</th>
<th>BL-ZB1545</th>
<th>BL-ZB2545</th>
<th>BL-CB1545</th>
<th>BL-CB2545</th>
<th>BL-CB1555</th>
<th>BL-CB2555</th>
<th>BL-CB2565</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image6" alt="SNOWbase BL, GH 1.5 mm, Ø 3.8 mm, AH 5.0 mm, CA 1°" /></td>
<td><img src="image7" alt="SNOWbase BL, GH 2.5 mm, Ø 4.5 mm, AH 5.0 mm, CA 1°" /></td>
<td><img src="image8" alt="SNOWbase BL, GH 1.5 mm, Ø 4.5 mm, AH 5.0 mm, CA 3.5°" /></td>
<td><img src="image9" alt="SNOW BL Crown Abutment, GH 2.5 mm, Ø 4.5 mm, AH 5.0 mm, CA 3.5°" /></td>
<td><img src="image10" alt="SNOW BL Crown Abutment, GH 1.5 mm, Ø 5.5 mm, AH 5.0 mm, CA 3.5°" /></td>
<td><img src="image11" alt="SNOW BL Crown Abutment, GH 2.5 mm, Ø 5.5 mm, AH 5.0 mm, CA 3.5°" /></td>
<td><img src="image12" alt="SNOW BL Crown Abutment, GH 2.5 mm, Ø 6.5 mm, AH 5.0 mm, CA 3.5°" /></td>
<td></td>
</tr>
</tbody>
</table>

Explanation of abbreviations:
- Angle dimension
- Ø Platform diameter
- GH Gingiva height
- AH Abutment height
- CA Cone angle

Meaning of the colors:
- **Yellow**: Ø 3.6 mm
- **Red**: Ø 4 mm
- **Green**: Ø 5 mm

*BL-ZB1538 and BL-AN1515 Abutments are only for use with Bone Level Implant Ø 3.6 mm.
• Bridge abutments in two different gingiva heights without rotation lock in the implant-abutment connection for cementing bridges.

<table>
<thead>
<tr>
<th>Bridge Abutment</th>
<th>GH (mm)</th>
<th>Ø (mm)</th>
<th>AH (mm)</th>
<th>CA (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL-BB1545</td>
<td>1.5</td>
<td>4.5</td>
<td>4.5</td>
<td>5</td>
</tr>
<tr>
<td>BL-BB2545</td>
<td>2.5</td>
<td>4.5</td>
<td>4.5</td>
<td>5</td>
</tr>
</tbody>
</table>

• Straight and angled Straumann® SNOW loc abutments in two different gingiva heights for removable anchoring of implant-supported full dentures in the edentulous jaw.

<table>
<thead>
<tr>
<th>SNOWloc BL, straight</th>
<th>GH (mm)</th>
<th>Ø (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL-LC0030</td>
<td>3.0</td>
<td>4.5</td>
</tr>
<tr>
<td>BL-LC0040</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>SNOWloc BL, angled 15°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BL-LC1530</td>
<td>3.0</td>
<td>4.5</td>
</tr>
<tr>
<td>BL-LC1540</td>
<td>4.0</td>
<td>4.5</td>
</tr>
</tbody>
</table>

All abutments and basal (abutment) screws are supplied non-sterile and must be sterilised before use by the patient.

3.4.2 Fixing the final abutments

Firmly press the abutment into the implant body by hand. Make sure that the abutment engages in the hexagon.

The connection between abutment and implant is ensured by screwing a basal screw into the internal thread of the implant body. A short as well as a long screwdriver are available for the basal screws (SD-BS-S and SD-BS-L). The necessary tightening torque value is reached when the handle of the screwdriver is turned off. Remove carefully the remaining broken driver from the abutment channel. The thread is reversible and the screw can be loosened again. In addition, if necessary, the Abutment-Removal Instrument (BL-CD) may also be used to remove the abutment from the implant by disconnecting the firm conical attachment pushing out the abutment.

<table>
<thead>
<tr>
<th>Screwdriver short for Basal Screw</th>
<th>Screwdriver long for Basal Screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD-BS-S</td>
<td>SD-BS-L</td>
</tr>
</tbody>
</table>

To prevent accidental swallowing of the screwdriver pin or its handle, both parts should be secured with a dental floss loop.
3.4.3 Basal screw
Two different types of basal screws are available for final restoration with final abutments. A gold anodized titanium basal screw (BL-OST-H) is packaged with the final abutments, but is also available as a stand alone product. A ceramic basal screw (BL-OSC-H) is provided as a stand alone product. Both screws need to be placed with the same single-use drivers SD-BS-S or SD-BS-L (resp. short or long) and the screws must be tightened until the handle of the disposable screwdriver turns off. Both drivers are packaged with the final abutments, but they are also available as stand alone products.

3.4.4 General note
Straumann® SNOW Implants can be restored with all restorative materials used in modern dentistry.

In addition to all-ceramic restorations, composites, metal restorations and combinations (Porcelain Fused to Metal (PFM)) are also conceivable. All restoration types are permanently cemented in the conventional manner.

Adhesive cementation of restorations to Straumann® SNOW abutments is not possible. When restoring Straumann® SNOW Implants, the generally applicable guidelines for the planning and fabrication of implant-supported prosthetics must be observed. Particular care must be taken to ensure that the supply is free of voltage.

The static, occlusal contact of the restoration must be kept weak in relation to the contacts of permanent teeth. The movement of permanent teeth must be taken into account, particularly with single-tooth restorations. Dynamic occlusal contacts on the restoration must be avoided. A group function must be aimed for to relieve a single implant in the canine position. A sufficient number of the supporting abutments and a statically favorable distribution must be ensured, as well as good cleaning possibilities.

3.4.5 Indication for the final prosthetic restoration of Straumann® SNOW Implants
The following clinical or radiographic findings indicate that the final prosthetic restorations can be fitted:
- No soft tissue inflammation
- No peri-implantitis
- No clinically noticeable loosening of the implant
- No loosening when attempting to unscrew (max. 15 Ncm/anaesthesia)
- No pain in the vicinity of the implant
- No radiographic visible peri-implant gap
3.4.6 Prosthetic restoration of Straumann® SNOW Implants

The valid general guidelines for the fabrication of fixed restorations on implants must be observed on Straumann® SNOW Implants. This applies in particular to the static and dynamic occlusion and the periodontium-prophylactic design of the restoration.

3.4.7 Indication of single-tooth restoration on Straumann® SNOW implants

Straumann® SNOW Implants allow a restoration with fixed single-tooth crowns in the anterior and posterior regions.

The indication guidelines for implant selection must be observed. Furthermore, the instructions for restorations on Straumann® SNOW Implants with regard to static and dynamic occlusion, the periodontium-prophylactic design of the restoration, as well as the valid general guidelines for the fabrication of fixed restorations on implants must be observed.

3.4.8 Restoration of interdental gaps on Straumann® SNOW implants

Fixed restorations can be placed on Straumann® SNOW Implants to close interdental gaps. Please note the preoperative selection of Straumann® SNOW Implants according to the Institut Straumann indication guidelines and the sufficient number of abutments according to generally applicable prosthetic guidelines.

The mesial and/or distal extension of the restoration is not permitted under any circumstances. The integration of Straumann® SNOW Implants in composite bridges requires the exact observance of the corresponding recommendations of the implantological societies.

**Note:** To prevent excessive bending moments, the crown should be max. 3.5 mm longer than the abutment occlusal or incisal.

**Recommendation:** The horizontal crown width should overlap the implant diameter \( d \) by a maximum of \( d/2 \).
3.4.9 Restoration of Straumann® SNOW Implants with a bar construction
When planning a prosthetic restoration of Straumann® SNOW Implants using bar construction and removable prosthesis, the indication guidelines for implant selection must be observed. Number and location of implants (recommendation: 6 implants in the upper jaw, 4 implants in the lower jaw, min. 5 mm diameter) and the design of the prosthesis body and occlusion should depend on anatomical, functional and hygienic aspects.

3.4.10 The task of a bar restoration
- Stabilization and primary blocking of the implants
- Securing the prosthesis against pulling and levering forces
- Thrust distribution
- Resilience compensation through degrees of freedom

3.4.11 The relining of an implant-supported bar prosthesis
Hybrid prostheses with resilient anchoring elements must be checked in a follow-up examination approximately every three months, to remedy any damaging movement of the prosthesis at an early stage using appropriate measures (such as relining).

3.4.12 Restoration of Straumann® SNOW Implants with a telescopic construction
In principle, the Straumann® SNOW Implants can be restored with telescopic constructions in combination with removable prostheses and bridges. However, there is an increased risk of forces not applied through the axis (especially high shear forces) acting on the implants. The abutments must be distributed so that at least one telescope is located at the distal end of the prosthesis (masticatory centre) so that no resiliencies act on the implants. A minimum implant diameter of 4 mm and a minimum number of 4 implants must be complied with. The integration of Straumann® SNOW Implants in telescopic construction requires the exact observance of the corresponding recommendations of the implantological societies.
Planning and specific features of applications with SNOWloc abutments
This page must be followed for the treatment of patients with SNOWloc restorations.

Note: To ensure optimal performance of the retentions and avoid loading the implants beyond their stability, strive for an axial transfer of force to the implants. For this purpose, the implants should be positioned as parallel to each other and perpendicular to the occlusal plane as possible. If practical, the implants should be placed in the same horizontal plane to allow easy handling when removing or inserting the prosthesis.

Guided surgery
When case planning, Straumann recommends using 3-dimensional x-ray images (CB/CT) and referencing the drill guide. Planning in this way will allow for a more axial alignment and assist with parallelism.

Gingiva height
Before surgery, measure the maximum tissue thickness at the planned implantation site (e.g., using a probe and attached measuring stop root canal instrument, local anesthesia).

Implant divergence
After pilot drilling with the DP230 depth gauge, Straumann recommends a visual check of the axis alignment for parallelism.

The maximum divergence between multiple implants is 40° and the maximum angulation per implant body is 20°. For implants angulated or near the maximum recommended angulation, we recommend the use of the SNOWloc abutments which have an angulation of 15°. If there is a divergence of more than 20° per implant to the occlusal plane, or more than 40° between several implants, the axial alignment must be corrected.

To ensure optimal performance of the Novaloc®-matrix, the working area is 1.35 mm above the surrounding gingiva (1.85 mm if the overdenture is to be made with 0.5 mm gingival clearance).

There are straight and angled locator-type abutments in two different gingival heights (GH).
3.4.14 Prosthetic restoration of Straumann® SNOW Implants with SNOWloc abutments

The new fabrication of a prosthesis is always recommended as part of overall planning or after implant restoration. When fabricating the overdenture, please follow the detailed instructions of the manufacturer Valoc (www.valoc.ch) for the assembly of Novaloc® matrices.

For chair-side matrix fixation into the denture, prevent any resin from entering in between the matrix and the implant abutment. This can be accomplished by placing thin foil or a rubber dam between abutment and matrix. Make sure to provide sufficient space for the matrix and the resin in the overdenture.

3.4.15 Try-in of the overdenture

The try-in should take place at first without the retention inserts installed in the Novaloc® matrices. In the first step you should check the fit of the overdenture on the gingiva and in occlusion. In the second step the denture is tried in with built-in retention inserts and the retention force is adjusted.

3.4.16 Matrix

For prosthetic restoration of Straumann® SNOW Implants with locatortype abutments only original Novaloc® matrices of the manufacturer Valoc (www.valoc.ch) are recommended.

Matrix housings are available from PEEK or titanium. Colour-coded retention inserts are available with different retention values (red extra light / white light / yellow medium / green strong / blue extra-strong). The retention value (pull-off strength) can be varied easily by simple exchange of the retention insert. Please follow Valoc’s (www.valoc.ch) manufacturer’s instructions.
3.4.17 Impression taking when using SNOWloc

The impression can be taken with the Straumann® SNOW impression components or with the Novaloc® Impression Coping. A Novaloc® Impression Coping is available for impression taking. Please follow the relevant instructions of the manufacturer Valoc (www.valoc.ch).

**Impression taking by Straumann® SNOW impression components**
- Impression with bone level impression components
- Master model production with the lab analog (BL-L)
- Fix the locator-type abutment with the laboratory screw into the lab analog (BL-L)
- Place the Novaloc® Block Out Spacer on the locator-type abutment
- Fabrication of the prosthetic restoration

**Impression taking by Novaloc® Impression Coping**
- Fix the locator-type abutment with occlusal screw in the implant
- Put on the Novaloc® Impression Coping
- Take impression
- Master model production with straight or angled Novaloc® Model Analog
- Place the Novaloc® Block Out Spacer on the locator-type abutment
- Fabrication of the prosthetic restoration

* Please follow the relevant instructions of the manufacturer Valoc (www.valoc.ch).
3.5 Considerations

3.5.1 Loosening the abutment

Since the conical implant-abutment connection has a very high accuracy of fit, there is a positive fit between implant and abutment. To be able to loosen the abutment safely again, the Abutment-Removal Instrument (BL-CD) must be used.

If a screw head of the temporary basal screw breaks off, the remainder of the screw fragment can be removed with the Rescue-Tool (BL-RT).
3.6 Prosthetic aftercare of the Straumann® SNOW Implants

Regular prosthetic aftercare of Straumann® SNOW Implants is necessary as with all implant systems. As individual factors such as the patient’s oral hygiene, cooperation, etc. play a major role in determining regular prosthetic aftercare, the interval proposed here can only be regarded as a guideline.

On the day of final placement of the restoration
- Repeat check for impression material residues
- Check the cement in the sulcus area
- Static and dynamic occlusion check
- Oral hygiene instruction
- X-ray examination

1 day after placement of the restoration
- Check the cement in the sulcus area
- Static and dynamic occlusion check
- Oral hygiene instruction

3 months after placement of the restoration
- Check for plaque
- Static and dynamic occlusion check
- Hygiene check; if necessary reinstruction and motivation
- Performance of a prophylaxis
- For removable prosthetic restorations, check resilience and perform relining if necessary

6 months after placement of the restoration
- Check for plaque
- Static and dynamic occlusion check
- Hygiene check; if necessary reinstruction and motivation
- X-ray examination
- Performance of a prophylaxis
- For removable prosthetic restorations, check resilience and perform relining if necessary

- Check-up every 6 months
- Regular prophylaxis
3.7 Cementing of restorations on Straumann® SNOW Implants

General note
The following points must be observed when fixing temporary or final restorations on Straumann® SNOW Implants:
- Relative drainage of the working area
- Completely remove blood and/or saliva
- Cement residues must be completely removed
- Clean the peri-implant sulcus completely of cement residues (probe, superfloss)
- Temporary cementation of final bridge constructions carries the risk of a one-sided loosening of a bridge anchor with an increased risk of a possible fracture of the bridge or abutment ceramic.

3.12.1 Final cementing on Straumann® SNOW Implants
Z-SYSTEMS recommends the use of cements for final cementation that are suitable for zirconium oxide cementation. Zirconium oxide cannot be roughened intraorally by known adhesive systems.

Warning: The temporary cementing of final restorations is not recommended.

Z-SYSTEMS accepts no liability for incorrect use of fastening systems or damage to the prosthetic restoration and/or to the implant itself resulting therefrom.

3.8 Prophylaxis for Straumann® SNOW Implants
Zirconium oxide has a very low affinity for plaque. Therefore, compared to other materials used in dentistry, there is very little plaque on Straumann® SNOW Implants. Nevertheless, regular and adequate prophylaxis is also indispensable for Straumann® SNOW Implants.

Due to their special material and design, some points deviating from the usual prophylaxis guidelines for implants must be observed with Straumann® SNOW Implants.

Warning: Use only Teflon-based hand scalers and curettes for cleaning Straumann® SNOW Implants.

Rinsing solutions based on chlorhexidine and/or alcohol can be used in the short-term without concern. These solutions are not recommended for long-term use due to possible discoloration of the tooth structure and cement gaps.

Do not use ultrasound-operated, metallic cleaning aids to clean Straumann® SNOW Implants. Always avoid the application of ultrasound to Straumann® SNOW Implants through metallic carriers. Improper use and application of ultrasound can cause lasting damage to the surface of the Straumann® SNOW Implant.

When working with metallic cleaning aids (ultrasound-operated scalers or hand-curettes or scalers) there is the possibility of metallic abrasion on the implant surface. This abrasion is difficult or impossible to remove.

Do not use abrasive prophylaxis pastes to clean Straumann® SNOW Implants. A powder/water jet cleaner (Air-Flow®) is not suitable for cleaning Straumann® SNOW Implants.
4. Portfolio Overview

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