**Instructions for Use for Medartis APTUS Plates, Screws and Instruments**

**Introduction**

These instructions for use are for a product line of Medartis AG, Hochbergerstrasse 60E, 4057 Basel/Switzerland. Phone +41 61 633 34 34, Fax +41 61 633 34 00, www.medartis.com. All instructions provided in this document must be followed.

**Notes Regarding the Delivered Goods**

The individual parts of the system may only be accepted when the manufacturer’s label and packaging are undamaged and unopened at the time of delivery. If this is not the case, the rejected goods must be returned to Medartis AG, Basel/Switzerland or to the relevant Medartis Territory Consultant or distributor within ten working days. Implants are intended for single use only and are not designed to be reused. All components are delivered NON-Sterile and must be appropriately prepared before first use. All packaging must be removed before preparation.

**Product Materials**

All APTUS implants are made of pure titanium (ASTM F67, ISO 5832-2) or titanium alloy (ASTM F136, ISO 5832-3). All of the titanium materials used are biocompatible, corrosion-resistant and non-toxic in a biological environment. K-wires are made of stainless steel (ASTM F138); instruments are made of stainless steel, PEEK, aluminum or titanium.

**Color Coding Concept**

APTUS Clip Case system: implants belonging to a specific system size are kept in a clip of the same color; information regarding screw diameter and thus indicating the system to which an implant belongs is organized in the implant trays according to the following color coding scheme:

<table>
<thead>
<tr>
<th>System</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTUS 1.2</td>
<td>red</td>
</tr>
<tr>
<td>APTUS 1.5</td>
<td>green</td>
</tr>
<tr>
<td>APTUS 2.0</td>
<td>blue</td>
</tr>
<tr>
<td>APTUS 2.2</td>
<td>purple</td>
</tr>
<tr>
<td>APTUS 2.3</td>
<td>brown</td>
</tr>
<tr>
<td>APTUS 2.5</td>
<td>purple</td>
</tr>
<tr>
<td>APTUS 2.8</td>
<td>orange</td>
</tr>
<tr>
<td>APTUS 3.0</td>
<td>yellow</td>
</tr>
<tr>
<td>APTUS 3.5</td>
<td>green</td>
</tr>
<tr>
<td>APTUS 5.0</td>
<td>dark blue</td>
</tr>
<tr>
<td>APTUS 7.0</td>
<td>turquoise</td>
</tr>
</tbody>
</table>

**Plates, Screws and Blades**

Special implant plates, screws and blades have their own color:

- **Implant plates gold**: Fixation plates
- **Implant plates blue**: TriLock plates (locking)
- **Implant screws gold**: Cortical screws (fixation) and cannulated compression screws
- **Implant screws blue**: TriLock screws (locking) Screws for blade fixation
- **Implant screws silver**: TriLock Express screws (locking) and transfixation screws
- **Implant screws green**: SpeedTip screws (self-drilling)
- **Implant spiral blades blue**: Spiral Blades Proximal Humerus

**Contraindications**

- Pre-existing or suspected infection at or near the implantation site
- Known allergies and/or hypersensitivity to implant materials
- Inferior or insufficient bone quality to securely anchor the implant
- Patients who are incapacitated and/or uncooperative during the treatment phase
- Growth plates are not to be blocked with plates and screws

**Possible Complications**

In most cases, potential complications have a clinical source as opposed to arising from the implants/instruments. These include among other things:

- Loosening of the implant from insufficient fixation
- Hypersensitivity to metal or allergic reactions
- Bone necrosis, osteoporosis, insufficient revascularization, bone resorption and poor bone formation that can cause premature loss of fixation
- Soft tissue irritation and/or nerve damage through surgical trauma
- Early or late infection, both superficial and deep
- Irritation of the soft tissues around the surgical area
- Complications in implant removal from improper explantation of the implant

In consideration of patient’s clinical condition and medical history, the treating physician shall ensure that the use of APTUS implants can be justified based on a patient-specific benefit/risk assessment.

**Warnings and Precautionary Measures**

- The products may only be used by medical personnel who hold relevant qualifications
- Medartis, as manufacturer, recommends that the user reads all available documents before first use and contacts other users who have practical experience with this type of treatment
- Never use products that have been damaged by transport, improper handling in the hospital, storage or third parties
- Damages (e.g. from improper cutting or bending) to and/or scratches on the instruments/implants can substantially impair the strength of the product and lead to premature breakage
- Repetitively bending the plate in opposite directions may cause the plate to break during postoperative treatment
- All of the system components have been developed and manufactured for a specific purpose and are therefore precisely adapted to each other. The user may not alter any of the components or replace them with an instrument or product from another manufacturer even if the size or shape is similar or exactly corresponds to that of the original product. The use of materials from other manufacturers, structural changes resulting from the use of third-party products and/or material impurities, as well as minor deviations or imprecise fit between the implants and instruments, or similar, can represent a risk for the user, patient or third parties

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The sterilizing cases, instrument trays and implant containers shall not be vigorously shaken or tilted over since the individual components may become damaged or fall out. Unless otherwise expressly stated on the label, the instruments can be reused. Twist drills and reamers: It is recommended not to exceed a maximum drilling speed of 1 000 revolutions per minute to avoid overheating the bone. With reamers, it is advisable to use a speed of less than 1 000 revolutions per minute, or to use a handle for controlled, manual reaming. Twist drills and reamers may only be used for a maximum of ten times. Use the indicated screwdriver for the respective system size. Make sure that the screwdriver/screw head connection is precisely aligned in axial direction. If not, there is a greater risk of damage to the implant and screwdriver blade. When inserting the screw, ensure that a sufficient axial force is used between blade and screw. At the same time, the axial force should be in certain limits in order not to damage the bone structure.

The APTUS products have not been evaluated for safety and compatibility in the MR environment. The APTUS products have not been tested for heating or migration in the MR environment. Therefore, MR-assisted imaging techniques cannot be recommended.

Implants can cause artifacts in various imaging procedures such as CT, MR.

Multidirectional, Angular Stable TriLock Locking System

Correct locking (+5°) of the TriLock screws in the plate: Visual inspection of the screw head protrusion provides an indicator of correct locking. Correct locking has occurred only when the screw head has locked flush with the plate surface (Fig. 1 and 2). However, if there is still a noticeable protrusion (Fig. 2 and 4), the screw head has not completely entered the plate and reached the locking position. In this case the screw has to be repositioned to obtain full penetration and proper locking. In case of poor bone quality a slight axial pressure might be necessary to achieve proper locking. Due to the system characteristics, a screw head protrusion of around 0.2 mm exists when using plates with 1.0 mm thickness.

Do not overtighten the screw, otherwise the locking function cannot be guaranteed anymore.

Correct: LOCKED Incorrect: UNLOCKED

Instructions for Selecting the Appropriate APTUS Products

Medartis, as manufacturer, does not recommend a specific surgical procedure for a specific patient. The operating surgeon is solely responsible for choosing the appropriate implant for the specific case. The follow-up treatment as well as the decision of whether to retain or explant the implant is the responsibility of the user.

The treating physician should beforehand become thoroughly familiarized with the procedure, for example by:
• Carefully studying all the product documentation
• Carefully reviewing the current professional literature
• Consulting with colleagues experienced in this field and with the use of this system
• Practice in handling the system, practice of the surgical procedure and postoperative treatment

Generally, implants are designed to remain in the body temporarily and be removed after sufficient (osseous) healing has taken place. They are not designed for long term bone re-placement. Where they are mechanically supporting the osteosynthesis, the regular operating period of the implants is expected to be between 30 days and 6 months.

In consideration of the individual fracture situation as well as the compliance of the patient, the surgeon shall ensure an adequate postoperative relief of the osteosynthesis in terms of adaptation or mobilization stability (e.g. splitting and/or immobilization). Postoperatively, the fixation achieved by the implants must be treated carefully until osseous healing is completed. The doctor’s aftercare instructions have to be strictly observed by the patient in order to avoid adverse loads of the implants. Early load bearing can increase the risk of loosening, migration or breakage of the devices.

In the case of complications, it might be necessary to remove the implants. For removal use the indicated screwdriver. Make sure that the screwdriver/screw head connection is precisely aligned in axial direction.

Additional Information

Additional information on the products (e.g. the surgical technique, care, cleaning, disinfection and sterilization) can be requested from your local Medartis Territory Consultant or distribution partner. In addition, all relevant information can be found on the internet at www.medartis.com.

Instructions Regarding Cleaning, Disinfection and Sterilization

All implants, instruments and containers in the APTUS systems are NON-STERILE when delivered and must be cleaned, disinfected and sterilized before each use. This also applies to the first use after delivery (after removal of the protective transport packaging).

Thorough cleaning and disinfection are essential for effective sterilization. Instruments that were used in a patient and removed, have to be discarded following the local requirements. They are not allowed to be reprocessed. Re-use may compromise the structural integrity of the implants and/or lead to device failure which may result in patient injury. Furthermore, re-use of single-use devices may create a risk of contamination e.g. due to the transmission of infectious material from one patient to another. This could result in injury of the patient or user, or implants that have come in contact with blood. Other bodily fluids or show visible contamination must be cleaned and disinfected separately before they can be placed back into the implant tray. It is your responsibility to ensure that the implants and instruments are completely sterile when used, to use delicious and product-specific procedure for cleaning/disinfection and sterilization that are sufficiently validated, to regularly service and inspect the employed devices (disinfector, sterilizer), and to ensure that the validated and/or manufacturer’s recommendations are maintained for one cycle.

The statutory regulations applicable in your country and the hospital’s hygiene requirements must also be observed. This applies in particular to the various instructions for effectively deactivating prions.

Basic Instructions

If possible, use an automated procedure (disinfector) for cleaning and disinfecting. Do not use a manual procedure even with an ultrasonic bath due to the significantly reduced efficiency and potential damage.

Pretreatment is required in both cases.

Choosing Detergents, Disinfectants and Equipment

Observing the following aspects when choosing detergents, disinfectants and equipment for all steps:
• They must be suitable for their intended use (e.g. cleaning, disinfection or ultrasonic cleaning)
• The detergents and disinfectants must be aldehyde-free (otherwise blood residues may dry and attach firmly to surfaces)
• The disinfectant used must have a proven effectiveness (such as approval by VAH/DGHM or FDA, or a GE mark)
• The detergents and disinfectants must be suitable and compatible with the products
• The manufacturers’ instructions, such as those regarding concentration, exposure time and temperature, must be followed

For cleaning materials and accessories, both for precleaning and manual cleaning, observe the following:

• Use only clean, lint-free clothes and/or soft brushes (never use metal brushes or steel wool)
• When necessary, use materials and accessories such as cleaning sponges, syringes, cannulas and bottles for cannulated products or products with a lumen

For drying accessories, Medartis recommends lint-free disposable paper wipes or medical compressed air.

For water quality, Medartis recommends that demineralized and purified water (e.g. aqua purificata) is used for cleaning, disinfection and subsequent rinsing steps.

Medartis implant trays, (steel or plastic) and implant trays made from aluminum or plastic are intended for the sterilization, transportation and storage of products. They are not intended for cleaning and disinfection when loaded. The products must be removed from the trays and then cleaned and disinfected separately.

Implant trays from the APTUS Clip Case system can undergo automated cleaning and disinfection when loaded. For manual cleaning, the clips must be removed from the system and then cleaned and disinfected separately. However, the implants must always be left in the clip and can also be cleaned and disinfected manually in this state.

Remove major contaminants in the operating room before aggregating dirty instruments. Pretreatment of dirty products can be done at the cleaning/sterilization department.

In a wet preparation method is used, place the instruments in a prepared solution directly after usage. The instruments are disassembled and cleaned as much as possible. All products (including grooves, holes, lumens, etc.) must be sufficiently covered with solution. To avoid damage to the materials, do not leave them in the solution for longer than directed.

Pretreatment Prior to Cleaning, Disinfection and Sterilization

Pretreatment Process

• Disassemble and open the instruments as far as possible. When doing so, follow the assembly and disassembly instructions, which can be found at www.medartis.com
• Empty the instrument trays completely and remove the lid if necessary
• Empty the plastic or aluminum implant trays completely and remove the lid if necessary; for steel implant trays, the implants can be left in the tray but the lid must be removed during the rinsing process and rinsed separately
• Clip system: with the implant trays from the Clip Case system, the implants must not be removed from the clip; keep the clips in the trays for pretreatment
• Clean products and individual parts under running water using soft brushes (shift moveable parts back and forth controlled, use cleaning wire, syringes and cannulas for cannulated products; for larger lumina, use a bottle brush if necessary)
• Visually inspect the implants and repeat pretreatment as required until visible contamination is no longer evident

The disassembled instruments and trays should remain dismantled for the following cleaning and disinfection process.

Manual Cleaning and Disinfection

Clips system: the clips must be removed from the trays for manual cleaning and disinfection; implants must be left in the clip.

Manual Cleaning Process

• Place the (disassembled) products in the cleaning bath with enzymatic cleaning solution for 5 minutes (the products must be adequately covered and the individual components should not be in a position to damage each other)
• Clean with a soft plastic brush
• Shift moveable parts back and forth several times
• Clean large lumina with a bottle brush
• Cannulated products (with canals whose diameter is less than or equal to 1/6 of the device’s length), e.g. cannulated drills, must be cleaned by inserting the dedicated cleaning styllet and rinsing using a suitable cannula and disposable syringe (rinse volume: 30 ml)
• Clean the products in the ultrasonic bath for 15 minutes using a suitable detergent
• Rinse with water for at least one minute (lumina and cannulated products must also be rinsed inside using syringes and suitable cannulas); hand-held water jets can also be used
• Visually inspect the products and repeat the cleaning process as required until visible contamination is no longer evident
• Inspect the products (see the section «Inspection»)

Manual Disinfection Process

• Place the (disassembled), cleaned and inspected products in the disinfection bath for 15 minutes (the products must be adequately covered and the individual components should not be in a position to damage each other)
• Shift moveable parts back and forth several times
• Large lumina must also be filled in the inside

Correct: LOCKED Incorrect: UNLOCKED

Fig. 1

Correct: LOCKED Incorrect: UNLOCKED

Fig. 2

Correct: LOCKED Incorrect: UNLOCKED

Fig. 3

Correct: LOCKED Incorrect: UNLOCKED

Fig. 4
Automated Cleaning and Disinfection

With the clip system, ensure that the implant trays have been properly sealed with their lid before automated cleaning.

The above recommendations must also be followed when choosing detergents and disinfectants for this process.

For automated cleaning, ensure that the products have been rinsed thoroughly and that there is no remaining foam.

When selecting the disinfector, make sure:

- That the cleaning process includes the following phases in accordance with EN ISO 15883:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Temperature</th>
<th>Duration</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning</td>
<td>55°C (131°F)</td>
<td>10 min.</td>
<td>Adding detergent*</td>
</tr>
<tr>
<td>Neutralization</td>
<td>Cold</td>
<td>2 min.</td>
<td>Neutralize with cold water</td>
</tr>
<tr>
<td>Rinsing</td>
<td>Cold</td>
<td>1 min.</td>
<td>Rinse with cold water</td>
</tr>
<tr>
<td>Thermal disinfection (A0 value &gt; 3’000)</td>
<td>≥ 90°C (194°F)</td>
<td>5 min.</td>
<td>With demineralized and purified water; do not add additional detergent</td>
</tr>
<tr>
<td>Rinsing</td>
<td>Device-specific</td>
<td>Device-specific</td>
<td>Rinse with demineralized and purified water</td>
</tr>
<tr>
<td>Dry</td>
<td>Device-specific</td>
<td>Device-specific</td>
<td>Drying process</td>
</tr>
</tbody>
</table>

* The information provided is based on the use of «Neodisher MediClean forte» by Dr. Weigert; times and temperatures may vary if a different detergent is used; follow the applicable information provided by the manufacturer.

When loading the disinfecter, use the loading layouts provided by the manufacturer; also follow the detailed information provided in «Instructions for Cleaning, Disinfection and Sterilization» at www.medartis.com.

Inspection (Implants and Instruments)

Before assigning the implants to the implant containers/trays, check them after cleaning and disinfection for damage and contaminants, and remove damaged and contaminated implants. Clip system: the implants must not be removed from the clip. Once removed from the clip, implants must not be re-inserted into the clip and must be discarded.

After the instruments are cleaned and disinfected, check them all for damage (e.g. corrosion, damage to surfaces, chipping, etc.), contaminants and function. Remove damaged instruments. In addition, instruments with lumina (e.g. cannulated drills) have to be checked for free passage of medical compressed air.

The disassembled and sterilized instruments should be reassembled for the following sterilization process.

**Sterilization**

Medartis recommends sterilizing the products in the specially designed APTUS sterilization container; rather, wrap it in sterilization paper and sterilize it according to state of the art techniques and using approved methods.

Steam Sterilization

All NON-STERILE products can be sterilized in an autoclave (EN 13060 and EN 285). For both initial and subsequent sterilization, the following parameters were validated by Medartis in accordance with the requirements of the current sterilization standards, EN ISO 17665 and ANSI/AAMI ST79.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Fractionated and Dynamic Prevacuum Process</th>
<th>Flow and Gravitation Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure time</td>
<td>≥ 4 min.</td>
<td>≥ 15 min.</td>
</tr>
<tr>
<td>Temperature</td>
<td>132°C/134°C</td>
<td>132°C/134°C</td>
</tr>
<tr>
<td>Drying time</td>
<td>&gt; 20 - 30 min.</td>
<td>&gt; 20 - 30 min.</td>
</tr>
</tbody>
</table>

Medartis recommends that sterilization is performed in accordance with the above validated processes. If the user utilizes other processes (e.g. flash sterilization), these must be validated by the user.