Sterilization of Schweickhardt Instruments
INTRODUCTION

- Most dental instruments are made of corrosion-resistant high-grade steels. The requirements for grades of steel are defined in national and international standards. Properties are adapted to meet specific functions and conditions of use. Good elasticity, high tensile strength, and good corrosion resistance are required for non-cutting instruments such as ligature holders or tweezers.

- Cutting instruments such as cutters and scissors mainly require a high hardness and resistance to wear and corrosion.
Users often think the terms “stainless steel” or “corrosion-resistant high-grade steel” mean the steels are physically indestructible and have high resistance to chemical corrosion.

Users are often surprised to learn that stainless steels can be susceptible to various types of mechanical, thermal, or chemical attack.
There are some metals that spontaneously form a thin layer on its surface that protects it from corrosion. Both aluminum and titanium form surface oxides to protect the interior.

The formation of these protective layers is called “passivation.”

For stainless steel, its corrosion-resistance is related to its internal structure; passivated surface layers protect the steel from corrosion. Chromium in the alloy, combined with oxygen, builds the passivation layer.

However, external influences can destroy these protective layers and cause severe damage to the instruments. Therefore, it is extremely important to preserve the passivated layers on the instruments by appropriate sterilization methods.
Storage of Used Instruments in the Operatory

- Staff Protection
- Lay down instruments carefully, don’t “throw” them!
Cleaning and Disinfection

There are two methods to clean and disinfect instruments:
1. Cleaning: immerse in a bath, with or without ultrasonic cleaning.
2. Clean and disinfect using an automatic washer designed for this process.
Manual Cleaning/Disinfection

Choose suitable cleaning and disinfectant agents.

Follow manufacturer instructions for:
- correct concentration of solution
- correct exposure time
- correct temperature
Manual Cleaning/Disinfection

- Prepare new solutions daily
- Completely dissolve powder products
- Open articulated instruments
- Immerse instruments completely in the solution
- Eliminate air bubbles in hollow instruments
- Rinse efficiently with water
- Dry instruments immediately
Never Use Metal Brushes

- Avoid using metal brushes due to transfer of abrasives that remain on the brush to the pliers.

- When two different metals are in contact in a solution, galvanic corrosion can result that can lead to corrosion.
Ultrasonic Cleaning

- Fill cleaning solution to the mark indicated on the unit
- Use suitable cleaning agents
- Do not exceed a temperature of 40°C
- Prepare a new solution daily
- Adhere to the specified frequency (35-60 kHz)
- When loading, cutting edges must not touch metal parts
- Rinse well with water
- Dry instruments immediately
Automatic Cleaning/Disinfection Units

Standardized cleaning and disinfection is best achieved by automatic procedures in machines using heat to disinfect.

Pliers should be stored under dry conditions before processing in automatic washers.
Automatic Cleaning/Disinfection

- Clean/disfect pliers immediately after use
- Caution: danger of foaming
- Clean/disfect instruments only at temperatures recommended by the manufacturer for heating, approximately 105°C
- Arrange instruments correctly
- Do not overload trays
- Open pliers at joints or hinges
Check Maintenance and Care Recommendations

- Check maintenance, care, and packaging recommendations before sterilization – instruments should be macroscopically clean.
- Check cleanliness at critical areas - grips, joints and hinges.
- Important - residues remaining on pliers must be entirely removed before sterilization.
Water Stains and Discoloration

Water stains and discoloration may be due to:

- Errors in procedure, e.g., new instruments were not cleaned before the first time they were sterilized.
- Cleaning agent, disinfectants, and maintenance products are not compatible.
- Insufficient final rinsing.
- Non-adherence to recommended concentrations for cleaning agents, disinfectants, and maintenance products.
Water Stains and Discoloration

- Drug residues.
- Poor water quality, e.g., due to instruments held for excessively long cycles in the ion exchangers.
- Water used for final rinsing has not been fully desalinated.
- Contaminated steam during sterilization.
- Inadequate removal of sterilization indicators.
Discoloration of Pliers- Insufficient Rinsing
Lubricating Joints and Hinges

Joints and hinges of pliers must be lubricated with a paraffin-based maintenance product before a functional check is performed. The lubricant must be permeable to steam, suitable for sterilization, and thermally stable.
Corrosion Due to Lack of Maintenance and/or No Lubricant Used
Cool Down – Functional Check

Before the functional check is performed, pliers must be cool and lubricated to avoid metal wear and abrasion.

Metal abrasion can result in corrosion.
Storage and Correct Packaging

- Be aware of special storage of sensitive parts.
- Remove defective instruments to prevent contamination of good instruments.
- Use correct packaging.
Sterilization

Autoclave
Recommended for Schweickhardt Pliers

Dry heat sterilization

Cold sterilization
Not Recommended for Schweickhardt Pliers
Autoclave

- The sterilizer and sterilization methods must comply with current standards, e.g., German Standard DIN EN 13060 Type B (for packaged / wrapped, solid, hollow and porous products) or other country standards.
- General sterilization cycles are 127°C for 15 minutes or 132°C for 5 minutes.
- Adhere to the specified routine checks and maintenance regulations.
Autoclave

- Use only fully demineralized or distilled water.
- Dirty Water = Dirty Steam
- Only autoclave specific items.
- After sterilization, open sterilizer without vacuum drying.
Dry Heat Sterilization

- When using dry heat sterilizers, the manufacturer's instructions should be strictly followed.
- It is particularly important to load the instruments correctly.
- Closely follow the specifications for sterilization time.
Dry Heat Sterilization

- Maintain, but do not exceed 180°C. Paraffin oil will form a resin and lose its lubricating function if temperatures exceed 180°C. Do not use silicone oil to avoid the danger of staining.
- Even if the temperature briefly exceeds 180°C, there is a risk of loss in hardness and impaired function.
Dry Heat Sterilization

- There is also a risk of surface changes if the temperature exceeds 180°C.
- Closely adhere to the recommended sterilization time.
- Never open the unit during the sterilization cycle.
Storage of Pliers That Have Not Been Sterilized

- Dry
- Protect from dust
- Separate from chemicals
- Secure sensitive parts
- Do not store in the open
Storage of Sterile Pliers

- Caution: unpackaged pliers are not sterile.
- For dust free and protected storage follow your country’s standard.
- Strictly separate sterile and non-sterile pliers.
New Instruments

- Remove the transportation/shipping packaging.
- Clean new instruments before sterilizing.
- New Instruments must be sterilized before their first use.
Problems with Water Affect Tarnish and Corrosion of Pliers

Drinking water
High chloride content
Stains and pitting corrosion
Discoloration
Foreign corrosion
Drinking Water

- Drinking water always contains dissolved salts and minerals.
- Excessively high concentrations of salts and minerals in drinking water can lead to staining or damage to the pliers during sterilization.
- When water dries on pliers, the dissolved ingredients are deposited as salt incrustations or stains.
Stained Pliers

Cause: Water with high salt content
High Chloride Content

- Different concentrations of chloride salts are always found in drinking water. They cannot be eliminated by a water softening process.
- In most cases, the correlation between chloride content in the water and pitting corrosion is not obvious.
- When water dries, chlorides concentrate causing pitting corrosion at some sites.
Pitting Corrosion
Stains and Pitting Corrosion

- Since water softening will not reduce the total content of dissolved salts or chloride, the use of fully desalinated water is recommended.
- Softened water is adequate for operations such as pre-rinsing, cleaning, and intermediate rinsing.
Discoloration is Not Corrosion

- Other ingredients in the water can cause brown, blue, gray, black or rainbow-colored discolorations even at low concentrations.
- This discoloration can be caused by silicates; iron, copper and manganese compounds.
- This discoloration can be removed using a suitable acidic cleaning agent.
Foreign Corrosion

- Sometimes rust is found in drinking water, in addition to the substances found naturally in water.
- Rust usually comes from corroded pipes.
- Rust is deposited on pliers during sterilization causing stains and subsequent corrosion.
Foreign Corrosion
General Problems

Discoloration
Deposits
Corrosion
Discoloration

- Pliers become discolored with time.
- These surface changes are always due to the sterilization procedure.
- Find the cause – eliminate the cause – remove discoloration.
- Removing discoloration from pliers without eliminating the cause, is not a permanent solution to the problem.
Discoloration

Discoloration can be caused by:

- Water stains when water containing dissolved salts/minerals dries on pliers.
- Irregular stains on new pliers, often with a clearly visible margin.
- Water stains can only be reliably avoided by using fully desalinated water for the final rinsing cycle.
Discoloration

Discoloration occurs when:

- Cleaning solution or disinfectant solution have not been sufficiently rinsed.
- The mineral content of these solutions dries on the surface.
- Is avoided by:
  - Improved, additional rinsing.
  - Reduced load on the trays during automated cleaning.
Discoloration

Rainbow discoloration can be avoided by:

- Using fully desalinated water in the final rinse
- Using fully demineralized water for steam generation.
- Using fully desalinated water for steam generation.
Deposits

● Rust is avoided by:
  - Using fully desalinated water for generating pure steam.

● Organic residues can be avoided by:
  - Sufficient cleaning
  - Changing baths regularly

Do not sterilize disposable items!
Corrosion

Pitting corrosion
Tensile crack corrosion
Fissure corrosion
Frictional corrosion
Contact corrosion
Surface corrosion
Pitting Corrosion

Pitting corrosion is only observed on metal materials. Stainless steels are not resistant to this type of corrosion.

Pitting corrosion is avoided by:

- Cleaning instruments immediately after use.
- Using low chloride water and only fully desalinated water for the final rinsing cycle.
Pitting Corrosion
Tensile Crack Corrosion

Tensile crack corrosion is usually observed on stainless steel pliers and may have negative effects on the service life of pliers.

Tensile crack corrosion is avoided by:
- Cleaning pliers that remain open.
- Closing pliers to the first ratchet position during sterilization. (e.g., Mathieu)
Tensile Crack Corrosion
Fissure Corrosion

Fissure corrosion is observed in narrow joints or hinges.
Fissure corrosion can be avoided by:
- Adequately drying narrow gaps in joints and hinges.
Fissure Corrosion
Corrosion Due to Friction

Joints and hinges of pliers must be treated with maintenance products based on medical grade white oil / paraffin oil to keep the joints from getting blocked. Otherwise, metal wear and abrasion will form, leading to corrosion.

Prevention:
Regular treatment of joints and hinges with medical grade white oil.
Corrosion Due to Friction

We recommended the medicine With oil Nr. 3297
Contact Corrosion

When pliers are machine-cleaned, contact corrosion may occasionally be observed.

Contact corrosion is avoided by:
- Using desalinated water for cleaning and rinsing.
- Separating stainless steel from non-stainless steel pliers.
Contact Corrosion
Surface Corrosion

Surface corrosion is particularly severe if stainless steel pliers contact non-stainless steel pliers.

Surface corrosion is avoided by:

- Removing non-stainless steel pliers having a damaged (non-passivated) protective layer.
- Not using alkaline cleaning agents in the automated cleaning of aluminum and aluminum oxide products.
Surface Corrosion
Help on the Internet

www.a-k-i.org

For problem solving and recommendations for maintenance of instruments, consult this website.