

REUSABLE SURGICAL INSTRUMENTS

MAINTENANCE AND INSPECTION

Preparing New Surgical Instruments for Use
Identification of Material Surface Conditions
Inspection and Acceptance Criteria for Surgical Instruments





1. Preparing New Surgical Instruments for Use

Relationship between the material characteristics and the preparation of new surgical instruments for use and the reprocessing process; maintenance and storage of surgical instruments



1.1 A Detailed Look at the Material

“To properly reprocess a surgical instrument and use it efficiently for many years, it is first necessary to understand the raw material characteristics of the instrument well.”

Surgical instruments must have high mechanical strength and corrosion resistance due to their requirements for use, cleaning and maintenance. Therefore, hardenable chromium steels with low to medium carbon content are used in their manufacture. A chromium content of at least 12.5% is required for sufficient corrosion resistance. As a result of sufficient oxygen reaction when the chromium in the steel comes into contact with air and water, a thin layer forms on the surface. This structure, which acts as a natural barrier against corrosion, is called the “passive layer.” With oxidation of the instrument under suitable conditions, the passive layer gradually thickens and the corrosion resistance of the steel increases.

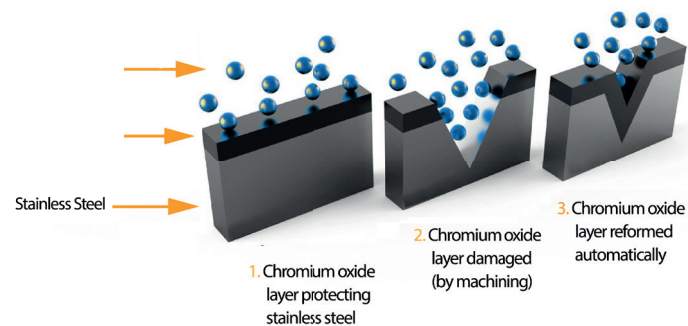


Figure A.1 - Self-repair of a damaged passive layer

During passivation, which is one of the manufacturing steps, the instruments are immersed in a citric acid mixture to obtain a certain degree of passive layer; however, this is still not considered as developed as that of an instrument that has been in long-term use. Therefore, newly manufactured instruments are less resistant to chloride-containing substances than instruments whose layers have thickened through long-term oxidation.

1.2 Relationship Between Preparation for Use and the Material

“Proper maintenance of instruments, the processes and water quality during cleaning and sterilization, the selection of suitable cleaning agents, and compliance with loading capacities directly affect the passive layer. Especially during the first sterilization, applying the correct processing steps is critically important for the service life of the instrument.”

Metal wear and physical impacts damage the passive layer, causing adverse conditions known as friction corrosion and crevice corrosion.

The passive layer may be affected by such damage and can also change due to many chemical and biological factors.

The passive layer is extremely resistant to many chemicals. However, as mentioned above, the passive layer on new instruments is naturally thinner. Therefore, chemical interaction with halogen elements - especially salts - which are the greatest enemy of the passive layer must be avoided. Chloride, the strongest and most hazardous of these salts, reacts with the passive layer and causes “pitting corrosion” and “stress corrosion.” Stainless steel instruments must therefore never be immersed in sodium chloride (NaCl) solutions. In addition, avoid contact with other corrosive chemicals.

Biologically, surgical residues such as blood, tissue, pus and other secretions contain chloride ions that cause corrosion and often appear as orange-brown stains. If these residues are left on instruments for a long period (20 minutes or longer) and allowed to dry, they leave marks and stains. Under no circumstances should instruments be left soiled for more than 6 hours; otherwise, these residues attack the passive layer, penetrate the instrument surface and cause permanent damage.

Therefore, always clean and dry every instrument thoroughly after use. Sterilize only a clean instrument. One of the most damaging practices is allowing dried residues to become baked-on stains in the autoclave. The autoclave temperature (134 °C) can cause chemical reactions that make the stain permanent. Remember: an autoclave does not clean; it only sterilizes.

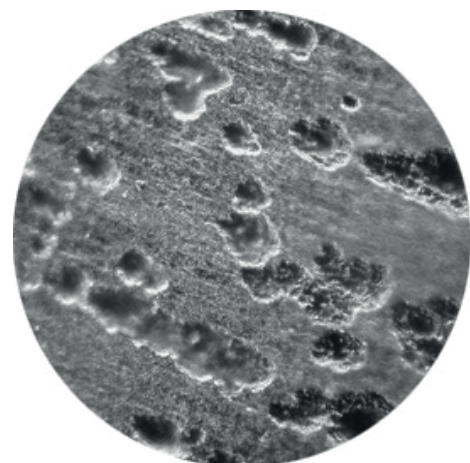
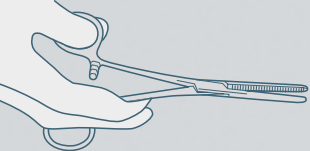


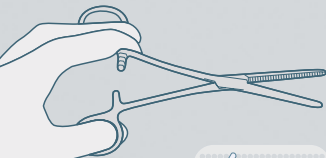
Figure A.2 - Pitting corrosion photographed under a microscope



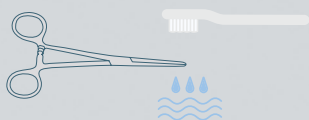
Point of Use

Wipe blood and tissue residues with a disposable cloth

Transfer instruments dry. Do not leave dry-transported instruments for more than 6 hours



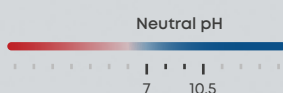
Cleaning & Disinfection



Move the movable parts so that the solution can reach all surfaces

Brush the instruments until visible soil has been removed

Prefer low alkaline cleaning agents, optimally neutral (7-10.5 pH) which is compatible with stainless steel



Perform the final rinsing with demineralized water



After Manual Cleaning, proceed to alkaline cleaning in the washer-disinfector

Follow the manufacturer's instructions when loading the instruments into the WD

* Use a washer-disinfector validated according to EN ISO 15883

Load the instruments into the WD so that they do not mechanically damage one another

Remove the instruments without delay after the cleaning program is complete

Allow the instruments to cool to room temperature before the maintenance step.





Storage

15-26°C
Nem: 30 – 50%
500-1060 hPa

The Containers maintain sterility for 12 months
under appropriate storage conditions *

* Tested according to EN ISO 11607-1



sterile
up to
12 month



Steam Sterilization



134°C



5 min



20 min

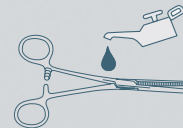


transport

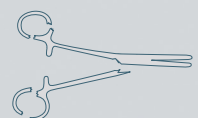


Care and Maintenance

Apply the maintenance product directly to the
connection points, articulated areas and surfaces
that rub against one another



There must be no cracks, breaks, bending, wear,
burrs, discoloration, stains, rust or corrosion on the
instrument surfaces or functional components



There must be no loose, bent, cracked, worn or broken parts.

* Refer to the guide for identification of surface conditions and product-specific
inspection and maintenance criteria



2. Identification of Material Surface Conditions

Interaction of surgical instrument materials with external factors, identification of adverse conditions, precautions and warnings



“The first area to be examined when inspecting surgical instruments is abnormalities on the material surface. Identifying these is important for continuing the maintenance process. For example, if rusting is observed on an instrument, the maintenance process should be bypassed and the instrument should be segregated after sterilization for return to the manufacturer.”

What is Rust?

Corrosion and rust are concepts that are often confused. Corrosion is a broad term that can encompass various objects, while rust specifically refers to a form of corrosion involving oxidation of iron-containing metals.

Stain or Rust?

Stains can be removed, whereas rust causes permanent damage. To practically determine whether a brown/orange discoloration is a stain or rust, perform an eraser test. Try rubbing the suspect area firmly with an eraser. If the discoloration is removed and the underlying metal is smooth and clean, it is a stain. If a pit is visible beneath the discoloration, it indicates rust.

2.1 Oxidation Colors and Water Stains

Oxidation colors are iridescent discolorations seen on moving surfaces, with a pearlescent appearance. The main factors causing them include ions and silicates present in the water used for rinsing.

Water stains have a similar appearance, but their edges are normally clearly defined. This condition is caused by high mineral concentrations (e.g., limescale) or other organic substances in sterilization steam or rinse water.

The solution is to perform the final rinse with demineralized water or to use pure steam. Stains can also be removed by vigorous rubbing of the instruments or by immersing them in solutions prepared with acidic instrument cleaning agents.

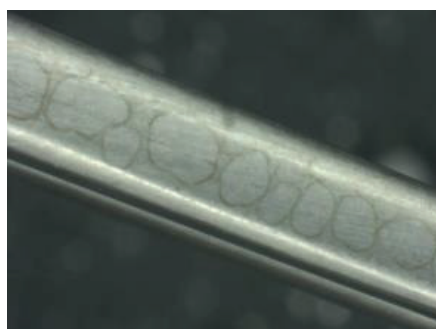


Figure B.1 - Mineral residues caused by water



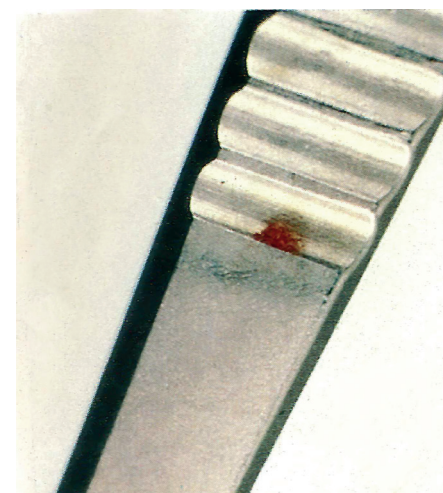
Figure B.2 - Discoloration caused by silicates

2.2 Organic Residues

Stains or deposits seen on sterilized instruments, ranging from yellowish-brown to dark brown, are often confused with rust. These adverse surface conditions are generally caused by protein-containing residues such as heavily processed or encrusted blood and tissue before cleaning.



Figure B.3 - Organic residues that have become brown and encrusted



2.3 Corrosion

Surface Corrosion

Surface corrosion occurs when the passive layer on the instrument steel is damaged by heavy metals, strong acids or caustics. Anodized aluminum medical devices are particularly prone to this type of corrosion. Highly acidic, alkaline and caustic-containing solutions are among the main causes of surface corrosion.

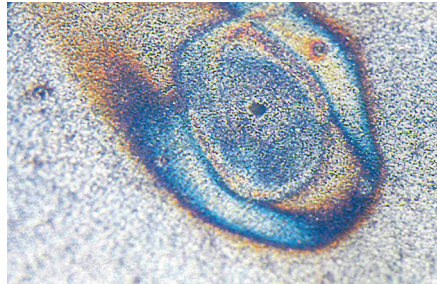


Figure B.4 - Enlarged cross-section of pitting corrosion Figure B.5 - Pitting corrosion on a chisel

Pitting Corrosion

Pitting corrosion is a common type of corrosion in surgical instruments. It may be caused by saline solutions or halide ions that attack the surface, such as chlorides. In addition, iodine tincture, surgical residues (blood, pus, tissue, etc.), unsuitable chemicals and even physical impacts are common causes of this corrosion. Pitting develops rapidly and can perforate the instrument and cause damage in a short time.

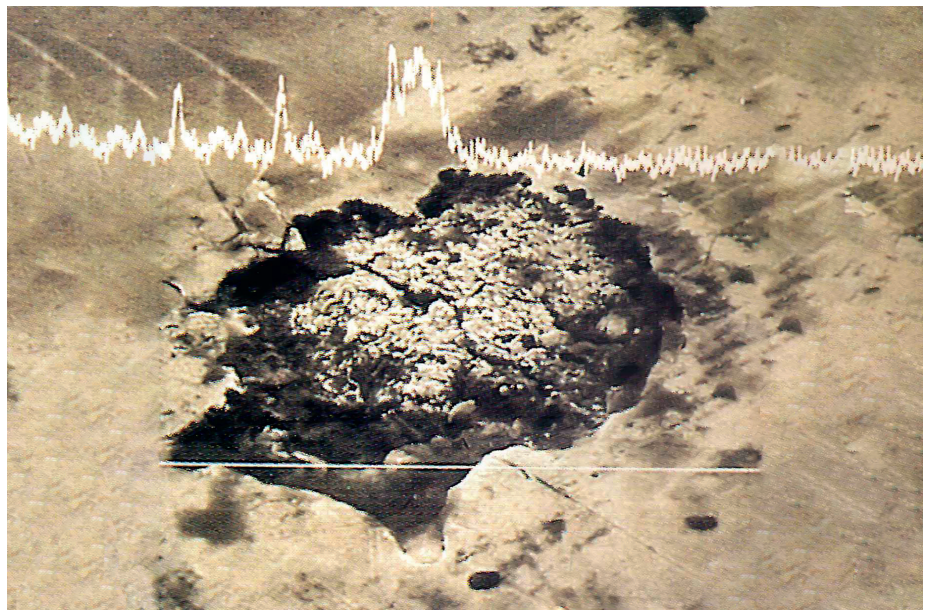


Figure B.6 - Pitting corrosion enlarged 2000 times by electron microscopy

Stress Corrosion Cracking

This type of corrosion, which occurs in the structure of steels, significantly affects the service life of surgical instruments. Although one of its main causes lies in the manufacturing process, it can also occur as a result of improper use. To prevent damage, instruments should be processed in the open position throughout the cleaning process. In particular, to prevent failures such as cracking and loss of elasticity at joints, surgical instruments with locking/ratchet mechanisms should be kept at the first lock position during sterilization to prevent stresses caused by heating and cooling.

Crevice corrosion may be seen more frequently in instruments involving steel flexing, such as clamps and forceps. However, surgical residues or cleaning residues may accumulate in instrument crevices and be confused with crevice corrosion. Correct diagnosis of crevice corrosion is only possible through laboratory tests.

Friction Corrosion

Friction corrosion is a type of corrosion frequently encountered on surfaces of surgical instruments that slide against one another. It occurs when metals abrade each other and damage their passive layers.

This condition is particularly encountered at the joints of articulated instruments, on the cutting surfaces of scissors, and in instruments with moving mechanisms such as rongeurs.

Crevice Corrosion

Crevice corrosion appears as localized rust deposits in small gaps between joined parts of instruments. In affected areas of stainless steel instruments, the natural protective passivation layer is damaged and corrosion occurs.

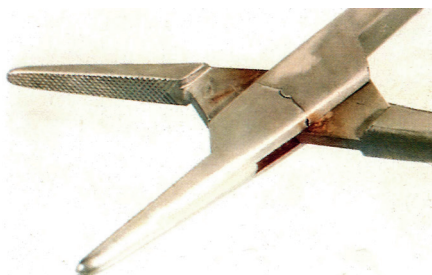


Figure B.7 - Stress-corrosion cracking and rust at the screw connection of a needle holder

To prevent this condition, instruments must be properly lubricated. When instruments are operated stiffly due to deformation or inadequate maintenance, friction-induced corrosion is inevitable. In this case, the instruments must not be used and should be sent to the manufacturer for repair/service.

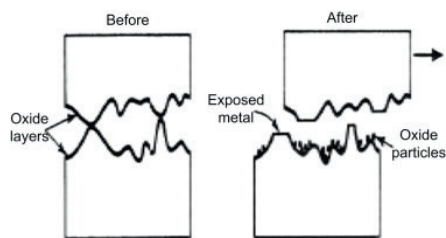


Figure B.8 - Surface movement exposed to friction corrosion

In particular, contact of stainless steel with normal steel and instruments with damaged protective surface layers (such as old, chipped chrome- or nickel-plated surfaces) causes this corrosion. In such cases, dull gray discolorations that require mechanical intervention may occur on instrument steel.

Foreign Rust

Rusty steam generated in the steam generators of sterilizers can cause a type of corrosion referred to as foreign rust.

In steam sterilizers, corrosion results from the chemical reaction between moisture and stainless steel. It appears as corrosion deposits in the inner chamber and components of the sterilizer and on the surfaces of processed instruments.

Contact Corrosion

Contact corrosion occurs when metal materials of different compositions come into contact while wet with an electrolyte such as tap water.

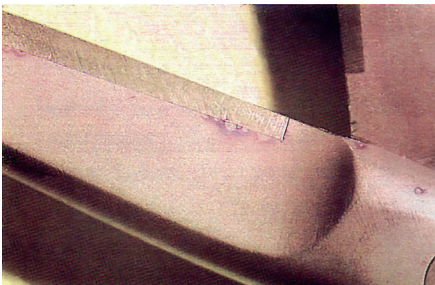


Figure B.9 - Contact corrosion caused by chloride at the welded areas of scissor cutting blades

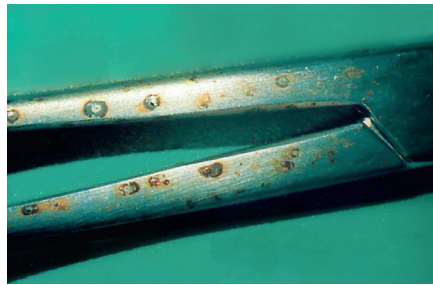
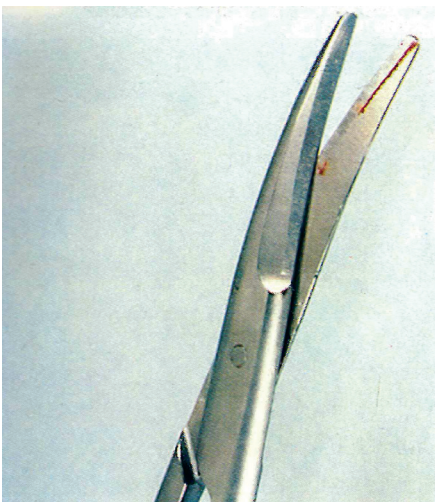
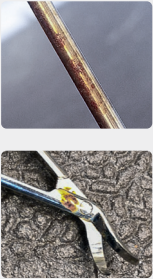
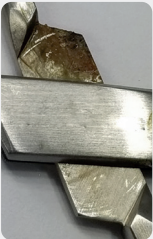


Figure B.10 - Beginning of pitting caused by rust particles in sterilization steam





	Stain Type Orange / Brown Stains (May look like rust)
	Source Cause The problem is usually caused by a phosphate layer on the instrument and may develop as a result of any of the following: • Dried blood or residue • Iodine or Betadine residue • Detergent residue • Highly alkaline detergents • Surgical wraps • Cold sterilization solutions Solution Eraser test: If the discoloration is removed with an eraser and the underlying metal is smooth and clean, the stain generally indicates dried blood and residue. If pitting is observed (i.e., wear or holes in the surface beneath the discoloration), this indicates rusting. 

	Stain Type Rust
	Source Cause Multiple surface discolorations are most often caused by excessive heat or hot spots in the autoclave. When an instrument shows these heat stains, it may have lost some of its original hardness. Similarly, when caused by silicates, these are yellowish-brown to bluish-purple discolorations, partly glossy, covering the surface or appearing as spots or droplets, seen on instruments, cleaning and disinfection devices, and sterilization chambers. • Excess silicic acid in water • Residues of silicate-containing cleaning agents due to insufficient rinsing Solution • Check the autoclave for the proper temperature setting. Perform maintenance according to the autoclave manufacturer's instructions. • Contact the manufacturer's service to remove surface deformation by polishing. • During automatic washing, rinse again with fully demineralized water free of silicic acid.



Stain Type

Pitting

Source Cause

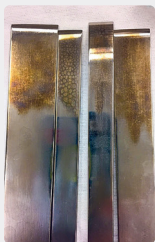
Damage to the oxide layer:

Pitting can result from exposure of the instrument to saline solutions, blood and residues, unsuitable chemicals, halogens, physical damage, etc.

Pitting removes part of the passive layer, allowing bioburden or other adverse conditions to penetrate these pits and cause rusting known as “pitting corrosion.”

Solution

- Use high-quality water; especially for final rinses, prefer fully demineralized water.
- Do not use saline solutions.
- Clean blood and other biological residues without delay because they contain chloride ions.
- Stack and protect instruments correctly against any metal damage that could remove the passive layer.
- Contact the manufacturer’s service to remove surface deformation by grinding, electropolishing and passivation.



Stain Type

Multiple Colors or Rainbow Patterns

Source Cause

Multiple surface discolorations are most often caused by excessive heat or hot spots in the autoclave. When an instrument shows these heat stains, it may have lost some of its original hardness.

Or

Similarly, when caused by silicates, these are yellowish-brown to bluish-purple discolorations, partly glossy, covering the surface or appearing as spots or droplets, seen on instruments, cleaning and disinfection devices, and sterilization chambers.

Solution

- Excess silicic acid in water
- Residues of silicate-containing cleaning agents due to insufficient rinsing
- Check the autoclave for the proper temperature setting. Perform maintenance according to the autoclave manufacturer’s instructions.
- Contact the manufacturer’s service to remove surface deformation by polishing.
- During automatic washing, rinse again with fully demineralized water free of silicic acid.



Stain Type

Light or Dark Spots

Spots are generally the result of slow evaporation of water on the instrument. The mineral content of the water may also appear on the instrument surface.

Source Cause

- Steam impurities
- Residual detergents
- Reusable wraps and surgical towels may also contribute to staining.

Solution

- Do not allow instruments to air dry while left standing; dry them promptly.
- Check steam/water quality. Prefer distilled or demineralized water.
- Rinse surgical towels thoroughly to remove detergent.



Stain Type

Dark Black Stains

The most common black stains result from acid reactions.

Source Cause

- High pH in detergents
- Exposure to ammonia

Solution

- Check detergent pH.
- Do not use harsh chemicals.



3. Inspection and Acceptance Criteria for Surgical Instruments

Inspection of surgical instruments according to differences in design and use, acceptance criteria and test materials

The information under this heading has been defined by combining DIN 96298-3:2017-10 "Medical instruments Terms, measuring methods and tests - Part 3: Tests", ASTM International standards and the manufacturer's quality management criteria.



3.1 Scissors

Form and Design

Scissor blades must not break or deform when subjected to loads appropriate to their intended use. Equivalent parts must not differ in size or symmetry.

The scissors must not snag during cutting; cutting edges must be free of nicks and burrs.

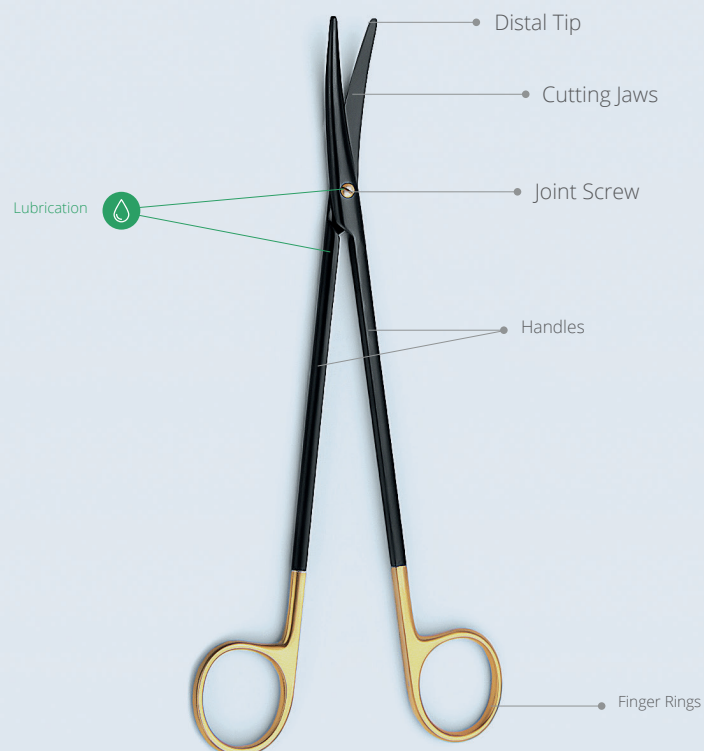
Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on cutting tips and jaws.

Screw-rivet and similar connection points must not be loose and must be inspected for cracks.

The integrity of tungsten carbide, diamond, etc. jaw inserts must not be compromised.



Functional Test

Test materials must comply with the materials specified in Table 1, Table 2 and Table 3. Before the test, clean the scissors to be tested. Perform three separate consecutive tests with each pair of scissors. The test consists of a continuous cut, perpendicular to any ribs in the test material, using 2/3 of the cutting blades of the scissors. Each cut must be made in the normal manner, with the user's fingers in the finger rings and without applying lateral pressure. The test is considered unsuccessful if the test material bends or snags at any point, including at the distal tips.

Test Materials

Table 1 - Test Materials for Lightweight, Micro, Neuro and Ophthalmic Scissors

Acceptable Material Examples	Size	Scissor Examples
Synthetic Fabric (50% polyester, 50% cotton)	0.2 mm	Iris Scissors, Strabismus Scissors, Stevens Scissors, Dissecting Scissors (Kilner), Potts-DeMartel Vascular Scissors, Joseph Nasal Scissors, etc.
Synthetic Fabric (65% polyester, 35% cotton)	0.2 mm	
Latex Rubber Band	0.1 mm - 0.3 mm	
Wet Facial Cleansing Wipe*	Double Layer	
Silicone Tube*	Ø 0.76 mm (internal diameter), Ø 1.65 mm (external diameter)	
Suture - twisted polyester fiber*	0.635 mm	

* These materials may be preferred for testing extra-fine/delicate micro, neuro and ophthalmic scissors.

Table 2 - Test Materials for Medium-Weight Scissors

Acceptable Material Examples	Size	Scissor Examples
Flannel Fabric	0.65 mm - 0.9 mm	Mayo Scissors, Metzenbaum Scissors, Uterine Scissors, Tonsil Scissors
Cotton Knit Fabric Type I	Single Layer	
Latex Rubber Band	0.1 mm - 0.3 mm	

Table 3 - Test Materials for Heavy Scissors

Acceptable Material Examples	Size	Scissor Examples
Flannel Fabric	1.27 mm - 1.78 mm (double layer)	Lister/Smith Bandage Scissors, Intestinal/Rectal Scissors, Doyen Scissors, etc.
Cotton Knit Fabric Type I	Double Layer	
Latex Rubber Band	0.1 mm - 0.3 mm	

Reference Standard: according to "ASTM F1079 - 87(2014) Standard Specification for Inserted and Noninserted Surgical Scissors"



3.2 Scalpels and Blades

Form and Design

Cutting edges must be ground and sharpened. Scalpel blades must fit fully into the handles.

Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on cutting tips and jaws.



⚙️ Functional Test

Functional testing is performed by cutting the test material. Cutting is performed with 2/3 of the distal tip of the knife or scalpel. The test is accepted if the polyethylene film is cut smoothly and evenly using normal force.

● Test Materials

Test Material Size	
Polyethylene film (PE film)	50 µm to 100 µm (micrometers)



3.3 Chisels, Gouges, Osteotomes, Rasps and Curettes

Form and Design

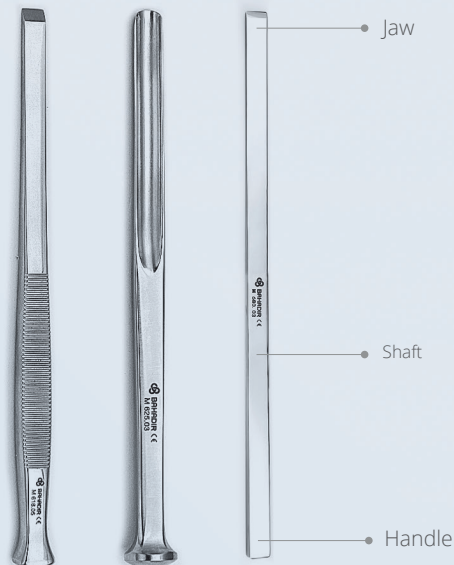
Since chisels, osteotomes, gouges, rasps and curettes are generally used to scrape/cut hard structures such as bone, it is important that sharpness is at the desired level. Therefore, ensure that the cutting/scraping jaws are completely sharp.

Chisel and osteotome corners must be 90° (figure). Osteotome tips must be conical and symmetrical.

Visual Inspection

Check the instrument for surface changes.

Cutting/scraping tips must not be blunt or deformed.



 Functional Test

According to the requirements of the instrument being tested, perform a pushing/pulling action over the test material at an angle of approximately 30°-45° without sliding it. If material can be removed from the test material with the minimum required force, the test is accepted.

● Test Materials

Test Material Size	
Plexiglass Tube	6 mm Ø



3.4 Rongeurs

Form and Design

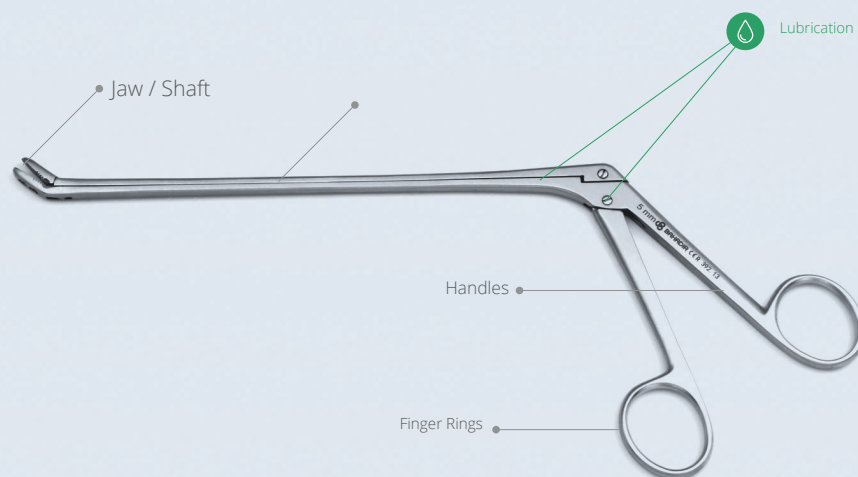
Rongeur jaws must be equal to each other and operate without snagging. When the instrument is closed, the jaws must meet each other.

Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on cutting tips and jaws.

Screw-rivet and similar connection points must not be loose and must be inspected for cracks.



Functional Test

To test the cutting function of rongeurs, make a cut in the test material. The test is accepted if the test material is cut smoothly without tearing.

To test the function of rongeurs intended to grasp mucous membranes or tissue, the test material is grasped with the rongeur. Pull the rongeur firmly; if the jaws grip the test material securely without slipping, the test is accepted.

Test Materials

Test Material	Size	Test Type
Polyethylene film (PE film)	50 µm to 100 µm (micrometers)	Cutting Operation
PTFE film (Teflon foil)	100 µm (micrometers)	Cutting Operation
Grasping Operation	PTFE film (Teflon foil) 100 µm (micrometers)	



3.5 Bone Punches, Bone Rongeurs/Forceps, Pliers

Form and Design

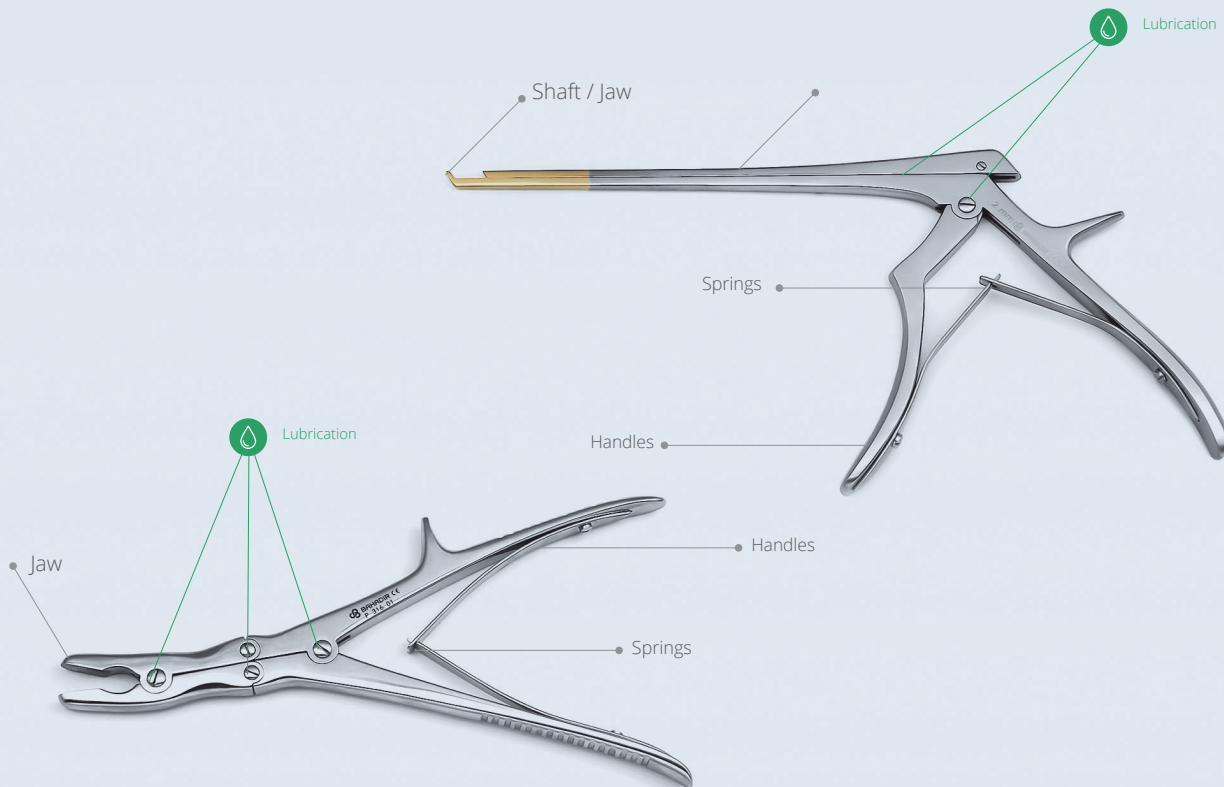
Instruments must operate smoothly and without play. There must be no nicks or burrs on cutting edges. The instrument jaws must fully close so as to provide the required cut or pressure. Screws or rivets must be tight and must not loosen even during heavy use. Cutting/biting edges must not be dull. The shape and design of the springs must retain their form even if the instruments are opened and closed frequently, and the pressure tension must not change.

Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on cutting tips and jaws.

Screw-rivet and similar connection points must not be loose and must be inspected for cracks.



Functional Test

To test the cutting function of the instruments, make a cut in the test material. The test is accepted if the test material is cut smoothly without tearing.

Test Materials

Test Material	Size
Polyethylene film (PE film)	300 µm (micrometers)
Cardboard	160 g/m²



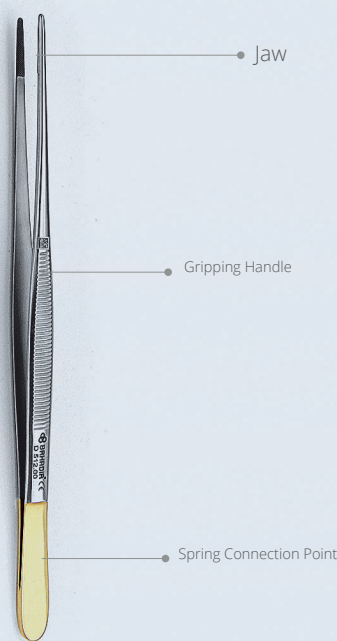
3.6 Forceps (Tweezers)

Form and Design

Forceps tips may be serrated, toothed or smooth. In every design, the surfaces must fully meet and the shapes must be symmetrical. Teeth and serrations must close without gaps and must not catch during opening and closing. There must be no deformation at the jaw edges.

Visual Inspection

- Check the instrument for surface changes.
- There must be no deformation in the gripping jaws.
- There must be no cracks in the welds at the spring connection points.



Functional Test

The physical suitability of the forceps must be verified by visual inspection. Operate the forceps; the test is accepted if there is no problem with spring action and the jaw tips meeting each other.



3.7 Retractors

Form and Design

Retractors are divided into two main groups: manual and automatic (self-retaining). Manual retractors have handles and a simple construction because they must be operated by the user. Automatic retractors have various mechanisms depending on the intended site of use and the required retraction method; therefore, their maintenance is more complex.

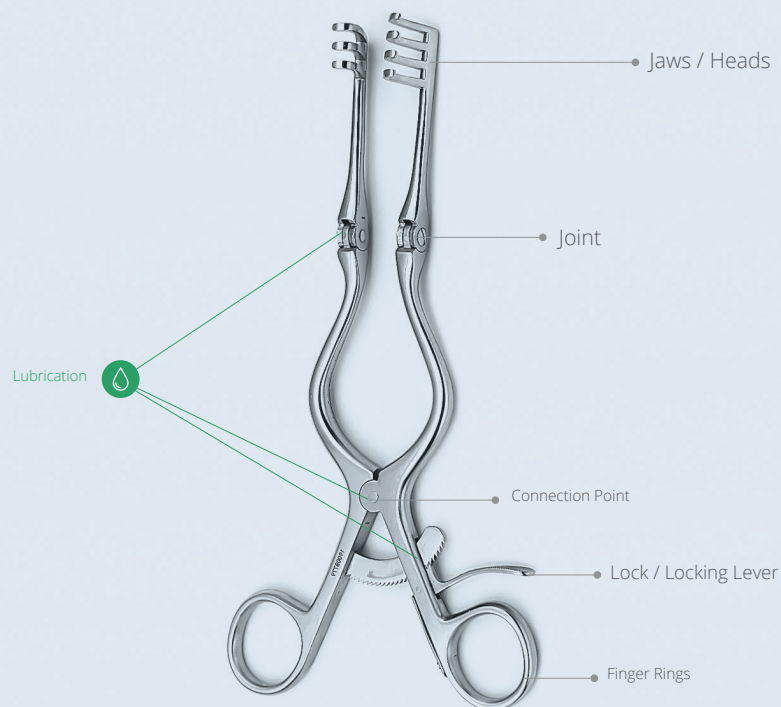
Retractor heads must be checked for bending, twisting and similar deformation. The connection points of the handles or retaining arms holding the retractor blades must be rigid. Automatic retractors must have no deformation in components such as joints, teeth, rails, screws, locking points, etc.

Visual Inspection

Check the instrument for surface changes.

There must be no deformation in the gripping jaws.

Joints and connection points must not be loose and there must be no breakage/cracks.



Functional Test

After lubrication, the components of the instruments should be moved. Retractors that move laterally on toothed rails and shafts should slide without catching. The locking mechanism should lock on any tooth and it should be ensured that the retractor is secured.

Retractors should be moved at screws, rivets and connection points and tested for any wobble or looseness. If the above conditions are met, the test is accepted.



3.8 Specula

Form and Design

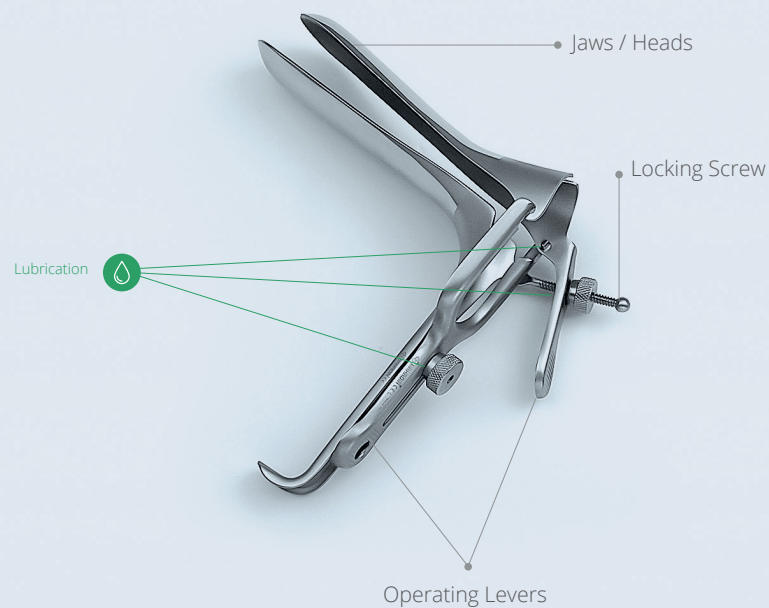
Speculum blades should be checked for bending, dents at the edges and similar deformation. The lever and locking mechanism that move the speculum blades must be rigid.

Visual Inspection

Check the instrument for surface changes.

There must be no deformation in the gripping jaws.

Joints and connection points must not be loose and there must be no breakage/cracks.



Functional Test

After lubrication, the components of the instruments should be moved. In parallel with lever pressure, the speculum blades should open and close evenly and in a balanced manner. After the instrument is fixed in an open position, the locking function should be tested by pushing the speculum jaws from the inside outward.



3.9 Clamps/Hemostats (Hemostatic Forceps)

Form and Design

The jaw surfaces must meet each other completely and the distal tips must be aligned. Teeth and serrations must close without gaps and must not catch during opening and closing. All teeth except atraumatic teeth must be sharp. The serrated edges of hemostatic forceps must have equal depth and height to provide effective gripping. Serration corners must be beveled.

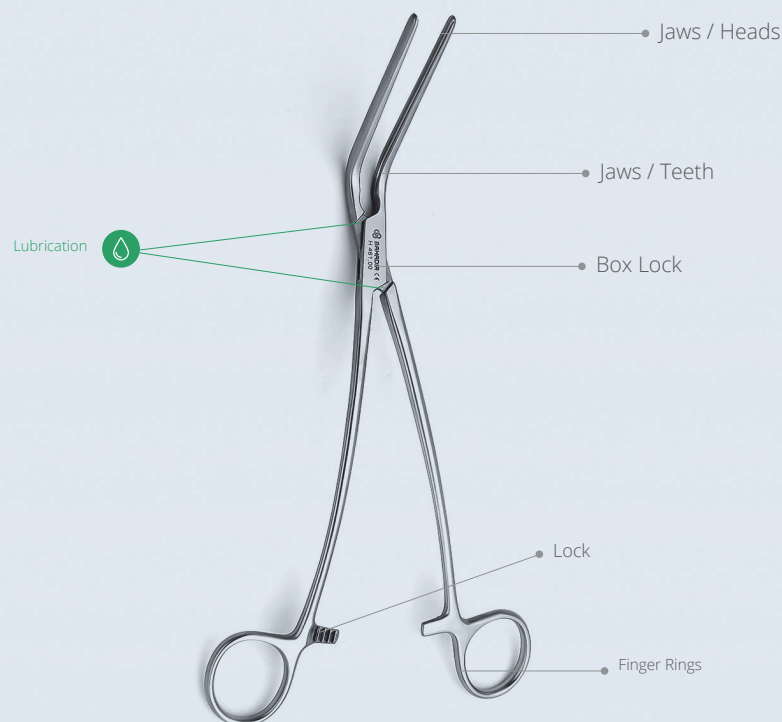
As the instruments are progressively locked, locking must occur across the entire tooth/serration profile starting from the distal tip, and the instrument must be tightly closed at the final locking level.

Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on gripping tips and jaws.

Teeth must have a gap-free profile in the fully closed position.



Functional Test

Jaw Profile Test: Place the test material between the functional surfaces and fully close the instrument. After holding for at least 2 seconds, reopen the instrument and remove the test material. The jaw profile must apply equal pressure across the entire surface of the test material and there must be no perforation at any point. If homogeneous pressure is not observed across all surfaces, the instrument function should be supported with a leak-tightness test. Using a fingertip, visually and physically check the inner surfaces of the jaw tips for any snagging, burrs, etc.

Flexibility Test: The instrument jaws must be sufficiently flexible against a certain level of physical pressure. Otherwise, they may apply disproportionate gripping force at a level that could cause severe tissue trauma.

According to Table 1, place the appropriate test material between the functional surfaces and close the instrument to the final locking level. Leave the instruments under stress for 3 hours at room temperature. After completion of the test, there must be no deformation (damage, cracks) or other permanent changes in the instrument.

Leak-Tightness Test: Apply only to instruments with atraumatic teeth/serrations. Fill a sealable bag halfway with water and seal the bag up to the area to be leak-tested. Clamp the unsealed portion crosswise with the clamp jaws and invert the bag; observe for a period whether leakage occurs from the clamped area. The teeth/serrations are also expected not to create a hole in the bag surface.

Table 1 - Test Material Thickness According to Instrument Dimensions

Instrument Length	Jaw Length	Test Material Thickness
< 10 cm	all	1 mm
10 cm - 16 cm	< 25 mm 25 mm – 30 mm > 30 mm	1,5 mm 1,5 mm 2 mm
16 cm – 22 cm	< 25 mm 25 mm – 30 mm > 30 mm	2 mm 2,5 mm 3 mm
> 22 cm	< 25 mm 25 mm – 40 mm > 40 mm	2,5 mm 3 mm 4 mm

Test Material	Size	Test Type
White carbon paper	30 gr/m ²	Jaw Profile Test
PTFE (Teflon) tape	0,2 mm Ø	Jaw Profile Test
Incompressible rigid plastic	-	Flexibility Test



3.10 Needle Holders

Form and Design

Jaw surfaces must meet each other completely and the distal tips must be aligned. There must be no breaks or cracks on the outer edges. Hard metal inserts in the needle holder jaws must be fully seated and smooth. The gripping teeth on the jaw surface must be completely symmetrical.

Visual Inspection

Check the instrument for surface changes.

There must be no breakage or crushing on gripping tips and jaws.

The integrity of tungsten carbide, diamond, etc. jaw inserts must not be compromised.



 Functional Test

Place the test material between the functional surfaces and close the instrument to the final locking level. Then reopen the needle holder and visually evaluate the test material. As shown in the image on the right, ensure that the jaws have fully contacted all surfaces and are properly positioned.

● Test Materials

Test Material Size	
PTFE (Teflon)	0.2 mm Ø