

*OptiLock® Distal
Radius Plating System*

Surgical Technique



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Introduction

The treatment of complex distal radius fractures has evolved with the advent of improved plating technologies and refined surgical approaches. The evolution of modern surgical techniques demands a distal radius plating system that is simple, reproducible and both surgeon and patient friendly. New systems must incorporate design features that facilitate minimally invasive surgical techniques and address complex distal radius fractures. In response, Biomet introduces its **OptiLock** Distal Radius Plating System with SphereLock™ technology, designed to meet such demands.

The Biomet **OptiLock** Distal Radius Plating System is a low profile system that incorporates dorsal, volar and radial plates. Volar and radial plates are pre-contoured to bone morphology with strategically placed K-wire holes, which aid surgeons intra-operatively for templating plates. All screw holes are threaded, providing surgeons with the options of using either locking or non-locking bone screws - a unique benefit of the Biomet **SphereLock** Technology.

The non-locking cortical bone screws are available in diameters of 1.9, 2.7 and 3.5mm with up to 10°, 30° and 25° of polyaxial angulation, respectively. Also available are non-locking 4.0mm cancellous bone screws, which yield up to 20° of polyaxial angulation.

The locking screws are available in both cortical 2.7 and 3.5mm and cancellous 4.0mm thread pitches. All threaded plate holes are designed with specific bone screw trajectories for optimal fixation and fracture reduction.

Biomet embraces the philosophy that no two fractures are alike and therefore no single implant can address all fracture types. The Biomet **OptiLock** Distal Radius Plating System is evidence that Biomet has collaborated with surgeons and has committed the resources to development efforts to yield a superior product to address the needs of the marketplace.



Device Description

Biomet manufactures a variety of internal fixation devices intended to aid in the alignment and stabilization of fractures to the skeletal system. These implantable devices include bone screws and bone plates. Instrumentation has been designed specifically for use with each system of implant.

Materials

316LVM Stainless Steel

Indications

The Biomet **OptiLock** Distal Radius Plating System is intended for fixation of fractures and osteotomies involving the distal radius. Patient selection factors to be considered include:

- 1) Need for alignment and stabilization of bone fractures;
- 2) Ability and willingness of the patient to follow postoperative care instructions until healing is complete; and
- 3) A good nutritional state of the patient.

Surgical Technique

Biomet OptiLock Universal Radial Plate

Exposure

Initially, a longitudinal incision is made over the first dorsal compartment, starting from the tip of the radial styloid and continuing 8-10cm proximally in the mid-axial line.

Secondly, identify the two major branches of the radial sensory nerve that bifurcate, one dorsally and one **volarly** and retract with vessel loops.

Next, release the Abductor **Pollicis** Longus (APL) and Extensor Pollicis Brevis (EPB) tendons from the first dorsal compartment. Retract them dorsally to expose the radius to the styloid tip.

The **brachioradialis** muscle may be maintained and can be useful for tissue coverage over the plate by repairing it to the adjacent **pronator quadratus** before closure.

Surgical Technique (Continued)

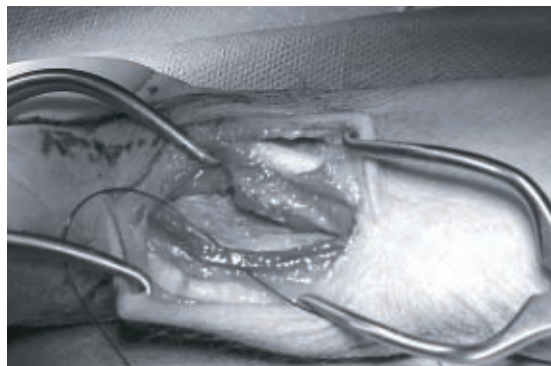
Reduction

At this point, the fracture site should be clearly visible. Should distraction be needed to maintain the reduction of the articular surface, either a traction device such as finger traps, or a temporary bridging system using an Biomet external fixator may be applied. Due to radial exposure, the external fixator can be applied dorsally between the radial shaft and the second metacarpal.

Ligamentotaxis of the major dorsal and volar column fragments can aid in reduction, but intermediate fragments will need direct manipulation. The radial styloid fragment can be pronated out of the way for better exposure of the medial column. Traction and manipulation and the use of a spoon or Freer elevators can restore articular congruence under fluoroscopic guidance. The carpus can serve as a template for reduction.

The distal radius bone forceps, which slip **submuscularly** under the pronator quadratus volarly and subcutaneously between the 4th and 5th extensor compartments dorsally, are used to reduce the radial inclination, radial length, and **palmar** tilt. The radial plate, articular manipulators and K-wires can all be inserted underneath the reduction clamp or through its tines.

Use bone filler/graft as necessary to fill the metaphyseal void. Confirmation by fluoroscopy is necessary to achieve articular congruence without step-off or diastasis.



Universal Radius Plate, 5 Hole
Available in 5, 6 and 7 Hole Plates

Plate Application

Select the appropriate pre-contoured universal radial plate and slide it under the reduction clamp until the distal tip is at the margin of the radial styloid. The 1.6mm K-wire should be drilled through the distal hole in the plate and into the radius **subchondrally** to maintain the reduction of the articular surface. This allows the plate to be used to restore the radial column length and inclination. The plate can be provisionally stabilized proximally using the plate holding forceps or a K-wire.

Using the color-coded threaded drill guide, drill and place a 2.7, 3.5, or 4.0mm locking cortical bone screw into the desired threaded holes, securing the proximal end of the plate first. In the distal metaphyseal head of the plate, the 1.9mm bone screws are non-locking, since there are no threads in the plate holes. However, along the shaft these 1.9mm bone screws mate inside the female threaded plate holes to enable locking capability.

Also, the elliptical hole in the plate shaft is grooved to allow 2.7, 3.5 and 4.0mm locking screws to lock into the plate.

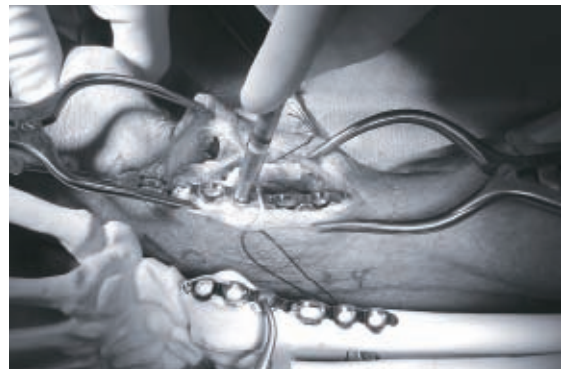
Using the color-coded threaded drill guide, drill and place the appropriate screws to secure the reduced fracture fragments. The second and third distal holes are fixed-angled, one dorsally and one volarly, to capture the dorsal and volar lunate facet fragments. The most distal screw hole in this plate is non-locking for polyaxial placement, which is usually drilled parallel to the subchondral K-wire. The non-locking bone screws can be used in any threaded plate hole to accommodate altered fracture anatomy.

In addition, the provisional K-wires can be replaced with 1.9mm screws, which are especially useful for subchondral fixation. In the distal metaphyseal head of the plate, the 1.9mm bone screws are non-locking, since there are no threads in the plate holes. However, along the shaft these 1.9mm bone screws mate inside the female threaded plate holes to enable locking capability.

Using fluoroscopy, confirm the fracture reduction and bone screw placement. Test the stability of fracture fixation through range of motion. Also, manipulate the distal **radioulnar** joint (DRUJ) using the Shuck Test to assess the integrity of the triangular fibrocartilage complex (TFCC).

Closure

Suture the brachioradialis over the plate to the pronator quadratus. The first compartment tendons will glide smoothly over the plate.



Surgical Technique (Continued)

OptiLock Volar And Flat “T” Plates

Approach

Fixed-angle locking plates have demonstrated good results when used to treat fractures with primarily dorsal comminution. However, it is important to recognize fracture patterns, which may require different surgical approaches.

Volar shear fractures can be operated on through the standard volar Henry approach, in the interval between the Flexor Carpi Radialis (FCR) and the radial artery. In these cases, depending on the quality of the bone, a standard T-plate can be used without locking screws. The Henry approach can also be used for comminuted fractures without significant carpal subluxation. If the medial column and lunate facet are involved and highly unstable, a more direct approach with better plate coverage is facilitated by the extended carpal tunnel incision. This approach allows radial retraction of the finger flexors, thus, limiting median nerve traction and neurapraxia.

The volar plate with lip provides a buttress along the radial column to assist in reduction as well as a K-wire hole for stabilization of the radial styloid fragment. The plate without the lip will allow for medial translation according to the preference of the surgeon.



*Volar plate
with optional
radial styloid lip*

Volar Plate, Left 4 Hole
Available in 4, 5, 6 and 7 Hole Plates



Flat “T” Plate, 4 Holes
Available in 4, 5, 6 and 7 Hole Plates

Plate positioning is crucial; contacting the distal volar flare is essential for buttressing and ensuring subchondral placement of the fixed-angle locking screws. The use of provisional K-wires in the head of the plate can assist with orientation, which will prevent encroachment on the distal radioulnar joint (DRUJ) conducive to oblique shaft positioning. Furthermore, these K-wires may be exchanged with 1.9mm threaded cortical bone screws for additional subchondral support of reduced articular fragments. In the distal metaphyseal head of the plate, the 1.9mm bone screws are non-locking, since there are no threads in the plate holes. However, along the shaft these 1.9mm bone screws mate inside the female threaded plate holes to enable locking capability.

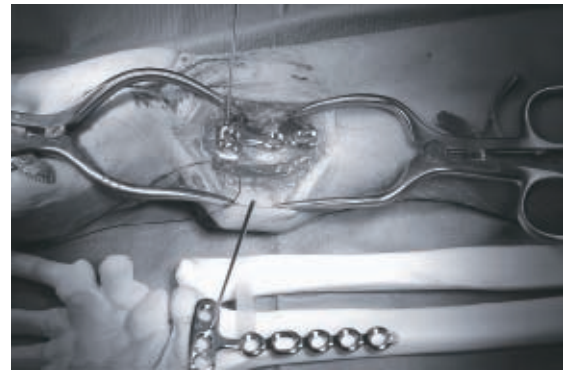
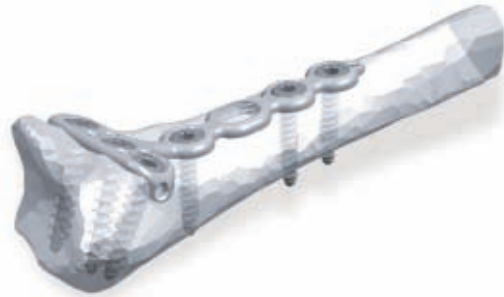
Also, the elliptical hole in the plate shaft is grooved to allow 2.7, 3.5 and 4.0mm locking screws to lock into the plate.

Reduction

Reduction is aided by traction over a rolled towel and is assessed by fluoroscopy. The volar capsule should not be routinely opened for inspection as this violates the **radioscaphocapitate** and **radioscapholunate** ligaments.

Reduction may be obtained by additional manipulative reduction outside the plate with joystick-like motioning of critical K-wires. The plate is then applied provisionally fixed with K-wires through the plate and then reduction is reassessed. If this is satisfactory, then the oval hole is drilled - through either the fixed or variable angle drill guide - and the final plate position secured with locking or non-locking cortical bone screws.

The use of bone filling materials, both autogenous and/or inorganic may be utilized to support metaphyseal voids under articular fractures.



Surgical Technique (Continued)

Surgical Approach

Biomet OptiLock Dorsal Plate

As an alternative to the volar or radial approach to treating distal radius fractures, dorsal monoblock plates are available. These dorsal plates, designed for fragment-specific fixation of the medial dorsal radial column, fit between the 4th and 5th dorsal compartment on the medial dorsal ridge (Lister's tubercle), supporting the dorsally displaced fragments and concomitant carpal translation.

A straight, longitudinal approach just radial to the distal radioulnar joint (DRUJ) is performed. Be careful to avoid extensive dorsal **retinacular** release or DRUJ capsulotomy. If desired, a proximal interosseous nerve excision for post-operative pain control may be elected, as it lies on the interosseous membrane at this level. The plate buttresses the dorsal rim fragment and maintains the carpal alignment.

While distal radius fractures are safely and effectively treated with dorsal plates, this dorsal approach is less popular to radial or volar approaches due to extensor compartment exposure and to dissection issues.



Dorsal Plate, Left 3 Holes
Available In 3 And 4 Hole Plates

Closure

After the Biomet **OptiLock** Distal Radius Plates have been successfully implanted, closure is performed in layers according to standard protocol.

Postoperative Care

Splint wrist in neutral position: Start immediate finger range of motion exercises. Depending on stability achieved and patient factors, mobilization out-of-splint for wrist motion can be instituted at 1-2 weeks. Forearm rotation will follow based on integrity of TFCC and **ulnocarpal** ligaments.

Bone Screw Information

Biomet OptiLock Locking And Non-Locking Screws



4.0mm Locking Cancellous Screw
Lengths of 14mm – 30mm (In 1mm Increments)
P/N 22714 – 22730



4.0mm Non-Locking Cancellous Screw
Lengths of 14mm – 30mm (In 1mm Increments)
P/N 22614 – 22630



3.5mm Locking Cortical Screw
Lengths of 8mm – 30mm (In 2mm Increments)
P/N 22508 – 22530



3.5mm Non-Locking Cortical Screw
Lengths of 8mm – 30mm (In 2mm Increments)
P/N 22408 – 22430



2.7mm Locking Cortical Screw
Lengths of 8mm – 30mm (In 2mm Increments)
P/N 22308 – 22330



2.7mm Non-Locking Cortical Screw
Lengths of 8mm – 30mm (In 2mm Increments)
P/N 22208 – 22230



1.9mm Non-Locking Cortical Screw
Lengths of 6mm – 30mm (In 2mm Increments)
P/N 22906 – 22930

Instruments

Biomet OptiLock Distal Radius Plating Instruments

Screw Driver Handles



Non-Ratchet (P/N 22875)



Ratchet (P/N 22880)



Drill Bits:

- Yellow = 1.5mm (P/N 22812)
- Green = 2.0mm (P/N 22810)
- Blue And Purple = 2.5mm (P/N 22805)



Screw Drivers:

- Yellow = 1.9mm (P/N 22842)
- Green = 2.0mm (P/N 22840)
- Blue And Purple = 2.5mm (P/N 22835)



Drill Adapter (P/N 22855)



Variable Angle Drill Guides:

- Yellow = 1.5mm (P/N 22832)
- Green = 2.0mm (P/N 22830)
- Blue And Purple = 2.5mm (P/N 22825)



Gelpi Tissue Retractor (P/N 22890)

Instruments (Continued)



Large Bone Clamp (P/N 22896)



Fragment Spoon (P/N 04880)



Small Bone Clamp (P/N 22894)



Freer Elevator (P/N 22892)



Plate Holding Forceps (P/N 22870)



Plate Bending Irons (P/N 22865)



Screw Depth Gauge (P/N 22860)



K-Wire Depth Gauge (P/N 04870)



Distal Radius Reduction Forceps (P/N 22800)

Product Information

Plates

Catalog #	Description
22005	Left Volar Plate, 4 Hole Shaft
22010	Left Volar Plate, 5 Hole Shaft
22015	Left Volar Plate, 6 Hole Shaft
22020	Left Volar Plate, 7 Hole Shaft
22167	Narrow Left Volar Plate, 4 Hole Shaft
22172	Narrow Left Volar Plate, 5 Hole Shaft
22177	Narrow Left Volar Plate, 6 Hole Shaft
22182	Narrow Left Volar Plate, 7 Hole Shaft
22030	Right Volar Plate, 4 Hole Shaft
22035	Right Volar Plate, 5 Hole Shaft
22040	Right Volar Plate, 6 Hole Shaft
22045	Right Volar Plate, 7 Hole Shaft
22187	Narrow Right Volar Plate, 4 Hole Shaft
22192	Narrow Right Volar Plate, 5 Hole Shaft
22197	Narrow Right Volar Plate, 6 Hole Shaft
22202	Narrow Right Volar Plate, 7 Hole Shaft
22055	Universal Radial Plate, 5 Hole
22060	Universal Radial Plate, 6 Hole
22065	Universal Radial Plate, 7 Hole
22070	Left Dorsal Plate, 3 Hole
22075	Left Dorsal Plate, 4 Hole
22080	Right Dorsal Plate, 3 Hole
22085	Right Dorsal Plate, 4 Hole
22100	Flat "T" Plate, 4 Hole
22105	Flat "T" Plate, 5 Hole
22110	Flat "T" Plate, 6 Hole
22115	Flat "T" Plate, 7 Hole
22165	Left Volar Plate, 4 Hole Shaft - No Lip
22170	Left Volar Plate, 5 Hole Shaft - No Lip
22175	Left Volar Plate, 6 Hole Shaft - No Lip
22180	Left Volar Plate, 7 Hole Shaft - No Lip
22185	Right Volar Plate, 4 Hole Shaft - No Lip
22190	Right Volar Plate, 5 Hole Shaft - No Lip
22195	Right Volar Plate, 6 Hole Shaft - No Lip
22200	Right Volar Plate, 7 Hole Shaft - No Lip

Distal Radius Plates

Volar plates are available for right and left hand shapes with 4, 5, 6 and 7 threaded holes in the plate shaft and with 3 threaded holes in the distal end. These volar plates are offered in styles with and without the radial styloid lip.

Universal radial plates are available in 5, 6 and 7 threaded hole configurations.

Flat T-shape plates are available with lengths of 4, 5, 6, and 7 threaded holes on the plate shaft and with 3 threaded holes in the distal end.

Dorsal plates are available for right and left hand shapes and in 3 and 4 threaded hole configurations.

Bone Screws

Catalog # 1.9mm Non-Locking S/T Screws

22906	1.9mm(D) x 6.0mm(L), Cortical
22908	1.9mm(D) x 8.0mm(L), Cortical
22910	1.9mm(D) x 10mm(L), Cortical
22912	1.9mm(D) x 12mm(L), Cortical
22914	1.9mm(D) x 14mm(L), Cortical
22916	1.9mm(D) x 16mm(L), Cortical
22918	1.9mm(D) x 18mm(L), Cortical
22920	1.9mm(D) x 20mm(L), Cortical
22922	1.9mm(D) x 22mm(L), Cortical
22924	1.9mm(D) x 24mm(L), Cortical
22926	1.9mm(D) x 26mm(L), Cortical
22928	1.9mm(D) x 28mm(L), Cortical
22930	1.9mm(D) x 30mm(L), Cortical

Catalog # 2.7mm Non-Locking S/T Screws

22208	2.7mm(D) x 8.0mm(L), Cortical
22210	2.7mm(D) x 10mm(L), Cortical
22212	2.7mm(D) x 12mm(L), Cortical
22214	2.7mm(D) x 14mm(L), Cortical
22216	2.7mm(D) x 16mm(L), Cortical
22218	2.7mm(D) x 18mm(L), Cortical
22220	2.7mm(D) x 20mm(L), Cortical
22222	2.7mm(D) x 22mm(L), Cortical
22224	2.7mm(D) x 24mm(L), Cortical
22226	2.7mm(D) x 26mm(L), Cortical
22228	2.7mm(D) x 28mm(L), Cortical
22230	2.7mm(D) x 30mm(L), Cortical

Catalog # 2.7mm Locking S/T Screws

22308	2.7mm(D) x 8.0mm(L), Cortical
22310	2.7mm(D) x 10mm(L), Cortical
22312	2.7mm(D) x 12mm(L), Cortical
22314	2.7mm(D) x 14mm(L), Cortical
22316	2.7mm(D) x 16mm(L), Cortical

For easy visual differentiation, all locking screws have a high polish finish and all non-locking screws have a matted finish.

The 1.9mm cortical, non-locking bone screws are available in screw lengths of 6.0 to 30mm in increments of 2.0mm.

The 2.7mm cortical bone screws are available in both locking and non-locking types, with screw lengths of 8.0 to 30mm in increments of 2.0mm.

Product Information (Continued)

Screws

Catalog # 2.7mm Locking S/T Screws

22318	2.7mm(D) x 18mm(L), Cortical
22320	2.7mm(D) x 20mm(L), Cortical
22322	2.7mm(D) x 22mm(L), Cortical
22324	2.7mm(D) x 24mm(L), Cortical
22326	2.7mm(D) x 26mm(L), Cortical
22328	2.7mm(D) x 28mm(L), Cortical
22330	2.7mm(D) x 30mm(L), Cortical

Catalog # 3.5mm Non-Locking S/T Screws

22408	3.5mm(D) x 8.0mm(L), Cortical
22410	3.5mm(D) x 10mm(L), Cortical
22412	3.5mm(D) x 12mm(L), Cortical
22414	3.5mm(D) x 14mm(L), Cortical
22416	3.5mm(D) x 16mm(L), Cortical
22418	3.5mm(D) x 18mm(L), Cortical
22420	3.5mm(D) x 20mm(L), Cortical
22422	3.5mm(D) x 22mm(L), Cortical
22424	3.5mm(D) x 24mm(L), Cortical
22426	3.5mm(D) x 26mm(L), Cortical
22428	3.5mm(D) x 28mm(L), Cortical
22430	3.5mm(D) x 30mm(L), Cortical

Catalog # 3.5mm Locking S/T Screws

22508	3.5mm(D) x 8.0mm(L), Cortical
22510	3.5mm(D) x 10mm(L), Cortical
22512	3.5mm(D) x 12mm(L), Cortical
22514	3.5mm(D) x 14mm(L), Cortical
22516	3.5mm(D) x 16mm(L), Cortical
22518	3.5mm(D) x 18mm(L), Cortical
22520	3.5mm(D) x 20mm(L), Cortical
22522	3.5mm(D) x 22mm(L), Cortical
22524	3.5mm(D) x 24mm(L), Cortical
22526	3.5mm(D) x 26mm(L), Cortical
22528	3.5mm(D) x 28mm(L), Cortical
22530	3.5mm(D) x 30mm(L), Cortical

Catalog # 4.0mm Non-Locking S/T Screws

22614	4.0mm(D) x 14mm(L), Cancellous
22615	4.0mm(D) x 15mm(L), Cancellous
22616	4.0mm(D) x 16mm(L), Cancellous
22617	4.0mm(D) x 17mm(L), Cancellous
22618	4.0mm(D) x 18mm(L), Cancellous
22619	4.0mm(D) x 19mm(L), Cancellous
22620	4.0mm(D) x 20mm(L), Cancellous
22621	4.0mm(D) x 21mm(L), Cancellous (Optional)
22622	4.0mm(D) x 22mm(L), Cancellous
22623	4.0mm(D) x 23mm(L), Cancellous (Optional)
22624	4.0mm(D) x 24mm(L), Cancellous
22625	4.0mm(D) x 25mm(L), Cancellous (Optional)
22626	4.0mm(D) x 26mm(L), Cancellous
22627	4.0mm(D) x 27mm(L), Cancellous (Optional)
22628	4.0mm(D) x 28mm(L), Cancellous
22629	4.0mm(D) x 29mm(L), Cancellous (Optional)
22630	4.0mm(D) x 30mm(L), Cancellous

The 3.5mm cortical bone screws are available in both locking and non-locking types, with screw lengths of 8.0 to 30mm (in increments of 2.0mm).

The 4.0mm cancellous bone screws are available in both locking and non-locking types, with screw lengths of 14 to 30mm (in increments of 1.0mm).

Additional Information

Catalog #	4.0mm Locking S/T Screws
22714	4.0mm(D) x 14mm(L), Cancellous
22715	4.0mm(D) x 15mm(L), Cancellous
22716	4.0mm(D) x 16mm(L), Cancellous
22717	4.0mm(D) x 17mm(L), Cancellous
22718	4.0mm(D) x 18mm(L), Cancellous
22719	4.0mm(D) x 19mm(L), Cancellous
22720	4.0mm(D) x 20mm(L), Cancellous
22721	4.0mm(D) x 21mm(L), Cancellous (Optional)
22722	4.0mm(D) x 22mm(L), Cancellous
22723	4.0mm(D) x 23mm(L), Cancellous (Optional)
22724	4.0mm(D) x 24mm(L), Cancellous
22725	4.0mm(D) x 25mm(L), Cancellous (Optional)
22726	4.0mm(D) x 26mm(L), Cancellous
22727	4.0mm(D) x 27mm(L), Cancellous (Optional)
22728	4.0mm(D) x 28mm(L), Cancellous
22729	4.0mm(D) x 29mm(L), Cancellous (Optional)
22730	4.0mm(D) x 30mm(L), Cancellous

Sterility

Unless supplied sterile, metallic internal fixation devices must be sterilized prior to surgical use. Product provided sterile is sterilized by exposure to a minimum dose of 2.5 Megarads (25kGy) gamma radiation. Where specified, do not use implants after expiration date. These guidelines also apply to devices provided sterile where the integrity of the packaging has been compromised and re-sterilization is required prior to initial use.

Pre-Vacuum Steam Sterilization

Temperature: 270° – 275°F (133° – 135°C)

Time: Fifteen (15) minutes

Drying Time: Eight (8) minutes

Since Biomet is not familiar with individual hospital handling methods, cleaning methods and **bioburden**, Biomet cannot assume responsibility for sterility even though the guideline is followed.

CAUTION: Federal Law (USA) restricts this to sale by or on the order of a physician.

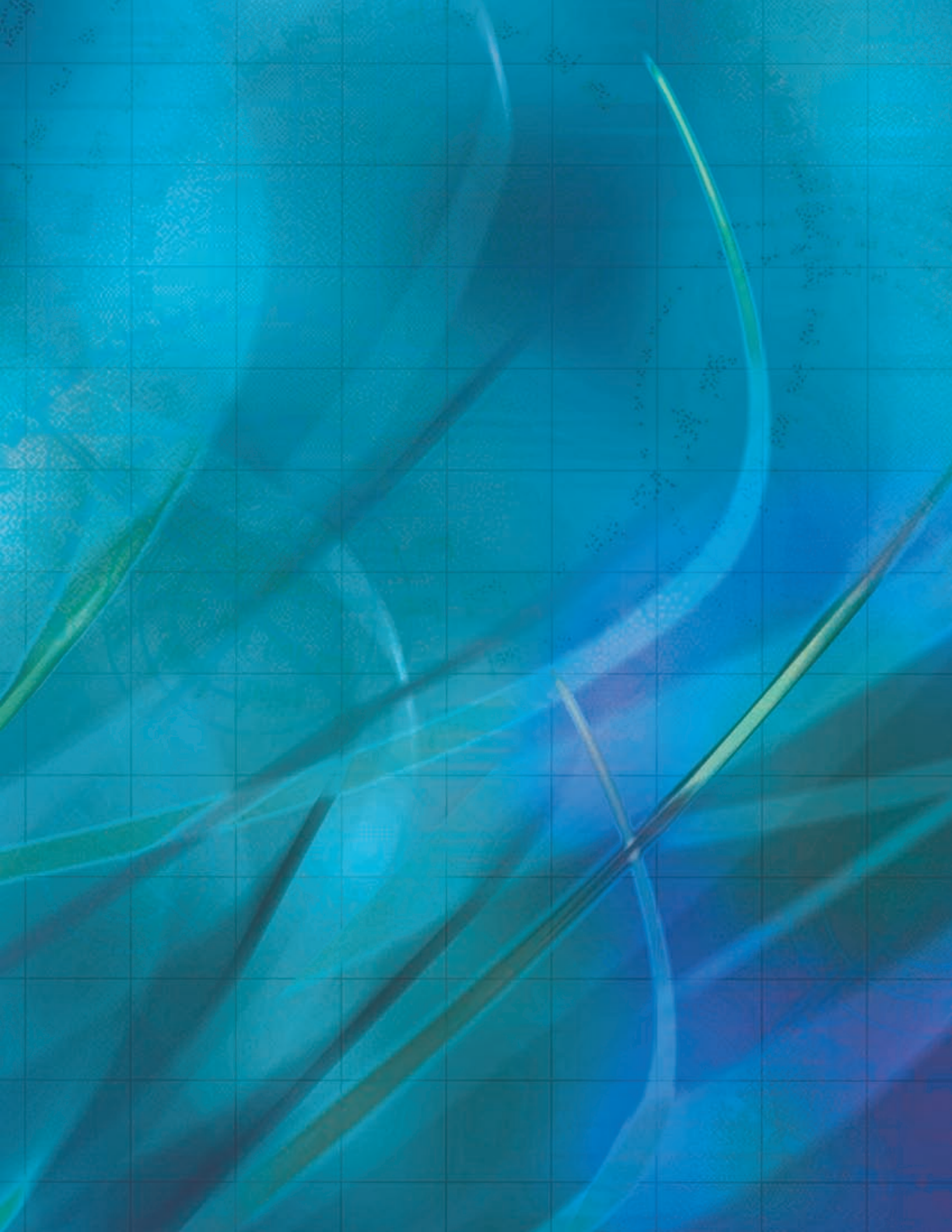
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