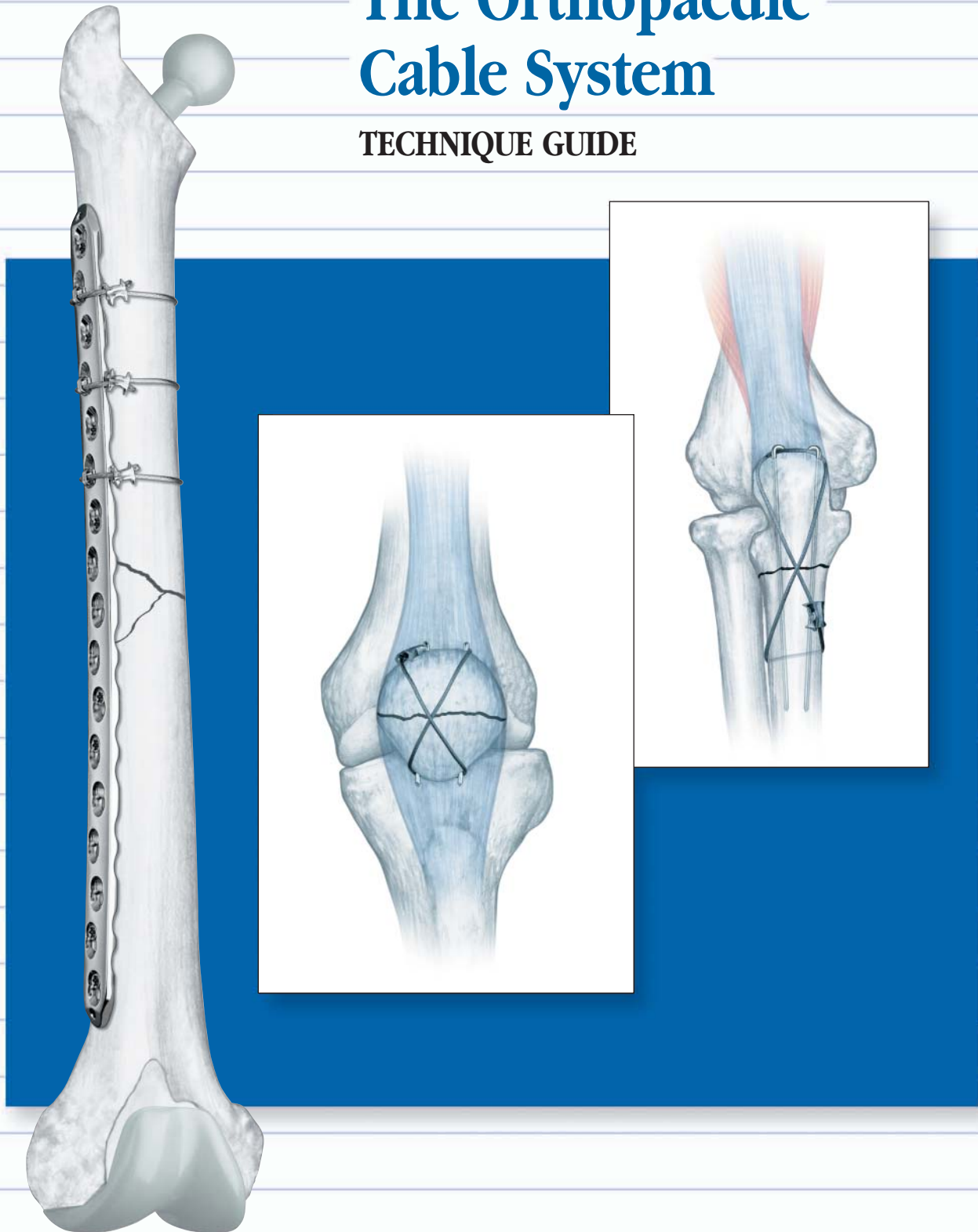


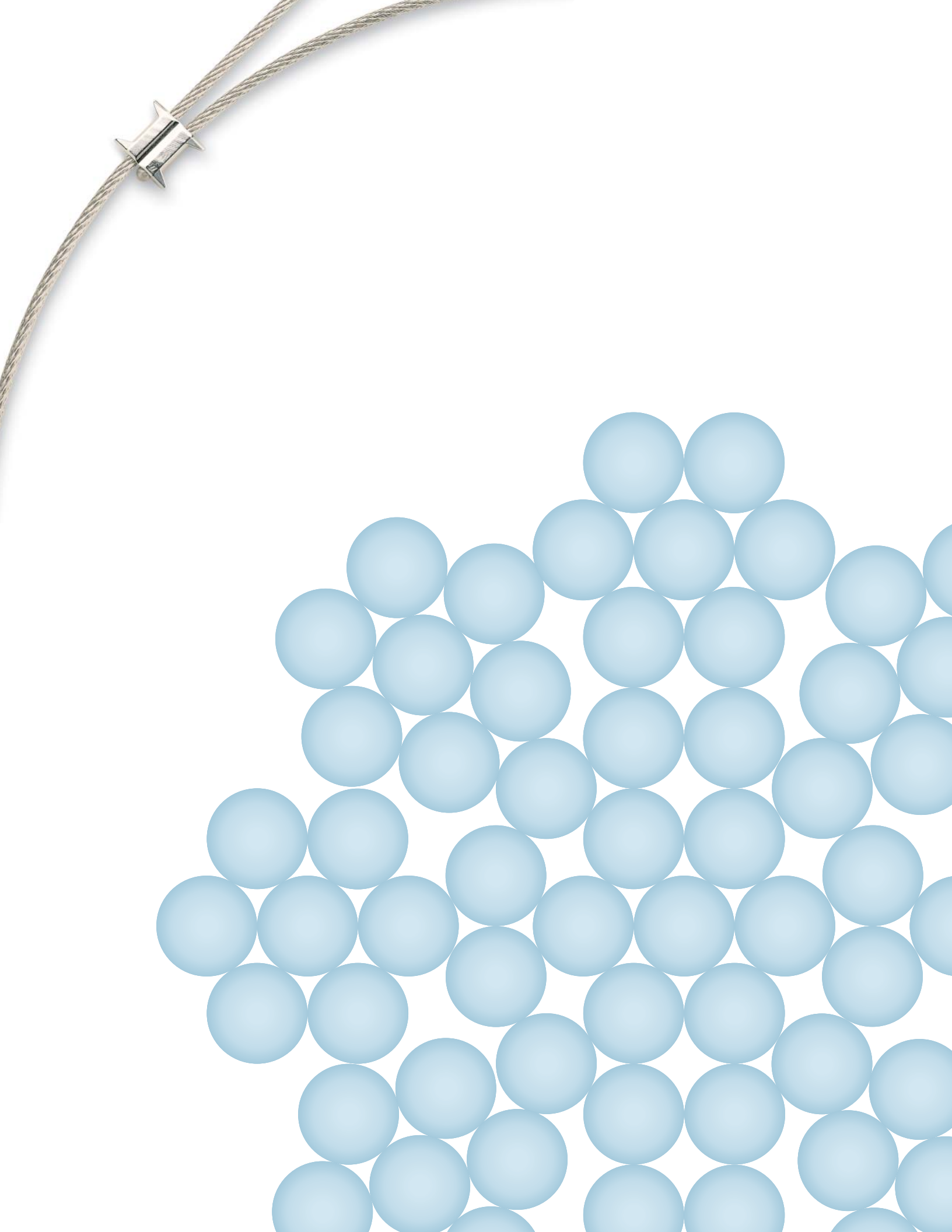
# The Orthopaedic Cable System

## TECHNIQUE GUIDE



**SYNTHES**<sup>®</sup>

*Original Instruments and Implants of the Association  
for the Study of Internal Fixation — AO ASIF*



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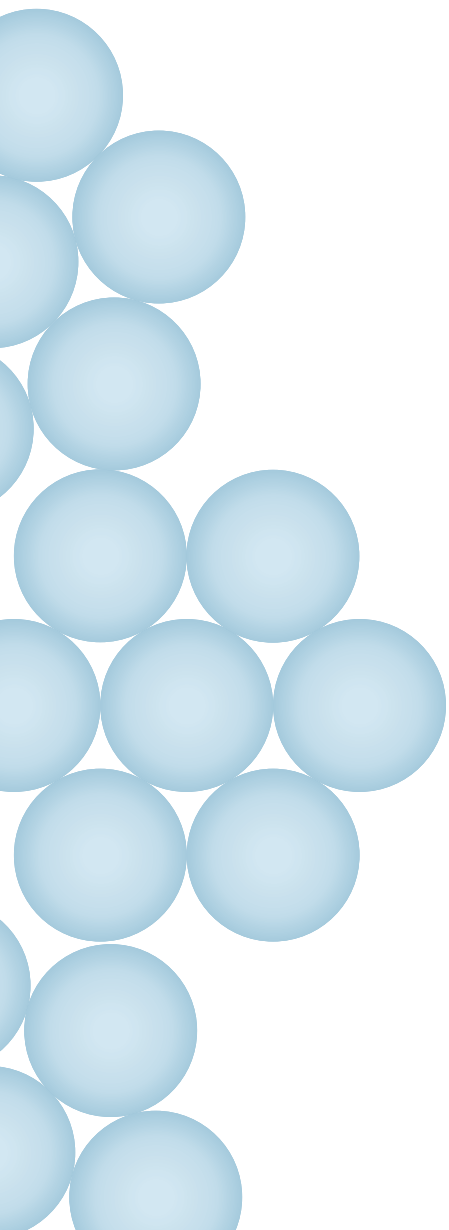
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# Orthopaedic Cable

## Indications

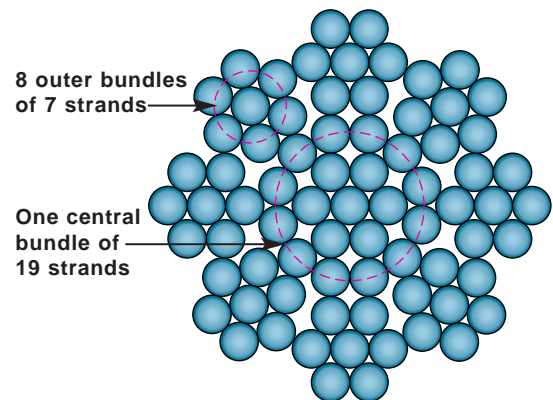
For general orthopaedic trauma surgery involving the olecranon, patella, femur (including periprosthetic fractures), humerus and ankle; acromioclavicular dislocations, pelvic and acetabular fractures, prophylactic banding during total joint procedures, and temporary reduction during open reduction procedures.

## Contraindications

The 1.0 mm Cable with Crimp is not indicated for fractures of the femur or prophylactic banding during total joint procedures.

## Features

- Available in 1.0 mm and 1.7 mm diameters with an (8 x 7) + (1 x 19) weave for greater flexibility and control
- Cable assemblies are available in 316L stainless steel, titanium alloy\* and L605 cobalt chromium alloy
- Compatible with all Synthes stainless steel or titanium plates and screws



*Cross-sectional view of cable*

\*Ti-6Al-7Nb

# Implants



## Cerclage Positioning Pins

- Used to maintain position of the cable relative to the plate hole
- No plate contouring required
- Threaded pins are used with locking plates
- Pins with posts are held in place by inserting the post in a 3.2 mm pilot hole in the bone
- For use with 3.5 mm and 4.5 mm DCP™, LC-DCP™ and LCP™ plates
- Available in commercially pure titanium or 316L stainless steel, sterile-packaged only



*Threaded  
Cerclage  
Positioning Pin*



*Cerclage  
Positioning Pin  
with Post*

## Cerclage Buttons

- Provide fixation even when a screw may not have adequate purchase
- May be used with unicortical screws around prostheses to provide fixation
- Two sizes designed to fit in the heads of 3.5 mm or 4.5 mm screws
- Available in commercially pure titanium or 316L stainless steel, nonsterile or sterile-packaged

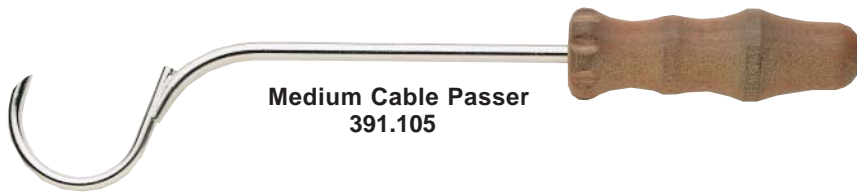


*Fits T15  
StarDrive  
and  
2.5 mm Hex*

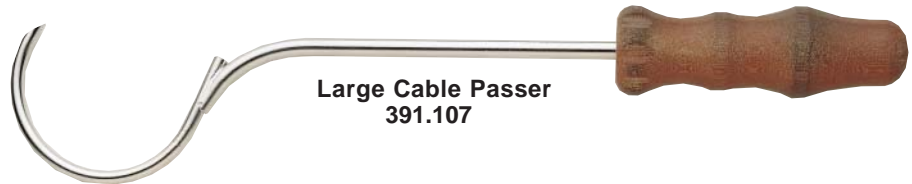


*Fits T25  
StarDrive  
and  
3.5 mm Hex*

# Instruments



Medium Cable Passer  
391.105



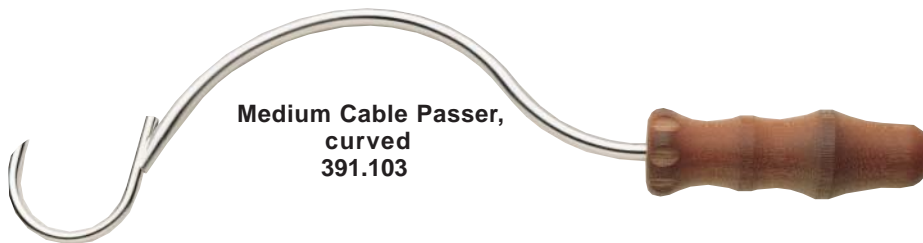
Large Cable Passer  
391.107



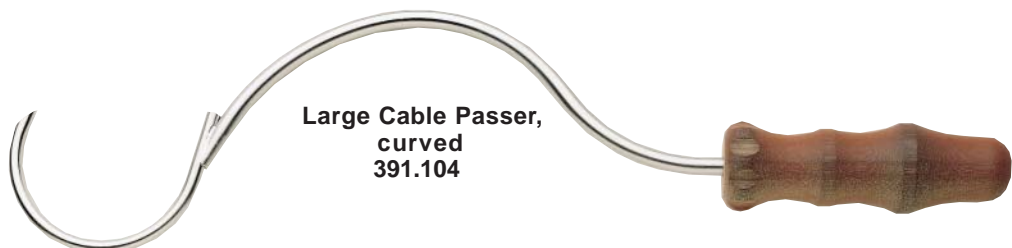
Medium Cable Passer, 45°angle  
391.106



Large Cable Passer, 45°angle  
391.108



Medium Cable Passer,  
curved  
391.103



Large Cable Passer,  
curved  
391.104



# Cerclage Technique

## 1 Pass the cable

Select the appropriate cable passer. The size and shape of the cable passer selected is dependent upon the circumference of the bone and access to the site. Select a cable passer that will allow passage of the instrument around the bone without causing significant damage to soft tissues or excessive stripping of the periosteum.

Place the cable passer around the bone. Thread the free end of the cable into the end hole of the cable passer until the cable exits through the shaft hole. Remove the cable passer leaving the cable wrapped around the bone.

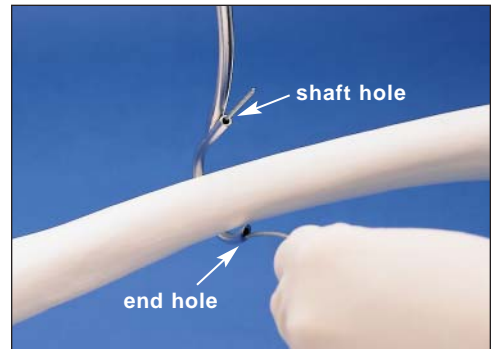
**Note:** Do not thread the cable into the shaft hole of the cable passer since the cable crimp (attached to the other end of the cable) will prevent release of the cable passer.



*Remove the cable passer leaving the cable wrapped around the bone.*



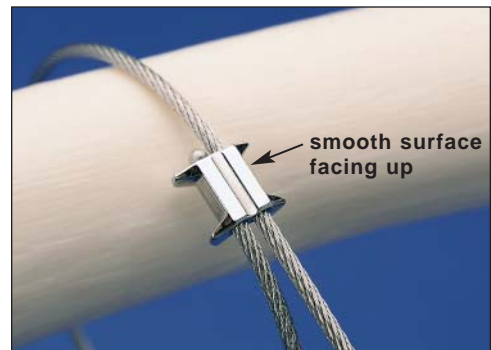
*Place the appropriate cable passer around the bone.*



*Thread the free end of the cable into the end hole of the cable passer (not the shaft hole).*

## 2 Position the cable crimp

Insert the free end of the cable into the open hole in the cable crimp and place the crimp in the desired position on the bone. The location for the crimp must allow adequate soft tissue coverage and ensure that the crimp remains fixed on the bone. Ensure that the points on the under surface of the cable crimp are in contact with the bone—the smooth surface should be facing up.



*Insert the free end of the cable into the cable crimp.*



**3 Tension the cable**

Attach the Provisional Tensioning Device [391.884] and the Attachment Bit [391.883] to the Cable Tensioner [391.201]. Turn the fluted knob at the end of the tensioner counterclockwise until it stops, and thread the cable through the Cable Tensioner. Advance the tensioner along the cable until it rests against the cable crimp. Carefully take up any slack in the cable by hand. Confirm placement of the crimp on the bone.

Turn the knob on the tensioner clockwise until the desired tension is reached. The amount of tension being applied to the cable is indicated by the position of the knob relative to the numbered lines etched on the body of the tensioner. These lines indicate tension levels from 20 Kg to 50 Kg. **Take care not to exceed 50 Kg of tension.** Applying tension at levels higher than 50 Kg may cause the cable to cut through soft or osteopenic bone. When the desired tension is reached the cable is ready for crimping.

*Note: Applying more than 40 Kg of tension to the 1.0 mm cable may cause fraying or breakage of the cable. It may also cause crushing of bone fragments and loss of reduction.*

**Optional Technique:**

The Provisional Tensioning Device may be detached from the tensioner to hold tension in the cable while additional cables are placed. Engage the cam lock by pulling back on the Provisional Tensioning Device lever. Turn the fluted knob of the tensioner counterclockwise until it stops and remove it from the Provisional Tensioning Device. Each cable can then be incrementally tensioned before final crimping.

*Note: Repeated tensioning of the cable at high loads may cause fraying of the cable.*



*Use the Provisional Tensioning Device to hold tension while additional cables are placed.*



*Attach the Provisional Tensioning Device and the Attachment Bit to the Cable Tensioner.*



*Advance the tensioner along the cable until it rests against the cable crimp. Confirm placement of the crimp on the bone.*



*Turn the knob clockwise until the desired tension is reached. Take care not to exceed 50 Kg of tension.*

# Cerclage Technique (continued)

## 4 Crimp the cable

Place the jaws of the Cable Crimper [391.882] over the cable crimp and squeeze the handles together. The ratchet mechanism in the crimper precisely controls the amount of crimp deformation, thus preventing under- or overcrimping. The crimper will automatically release when the cable has been crimped.

**Note:** Visually check to ensure that the cable crimp is centered and fully seated in the crimper jaws prior to crimping the cable. Improper placement may lead to cable slippage or crimp failure.

**Technique Tip:** Use the starter handle to begin squeezing the crimper until the outer handle can be easily grasped.

After the cable has been crimped, remove the tensioner from the cable by turning the knob counterclockwise until the cable slides freely through the tensioner. If a Provisional Tensioning Device was used, remove it at this time by pushing the Provisional Tensioning Device lever forward. Crimp additional cables using the same procedure.



Use the Cable Crimper to precisely deform the cable crimp. Check that the crimp is centered and fully seated in the crimper jaws.

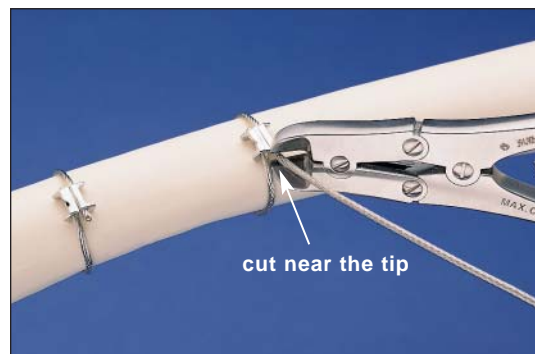


Remove the Provisional Tensioning Devices by pushing forward on the Provisional Tensioning Device lever.

## 5 Cut the cable

To cut the cable, pass the free end of the cable through the jaws of the Cable Cutter [391.905 or 391.906] and squeeze the handles together. Each cable should be cut as close to the cable crimp as possible, taking care not to damage the adjacent cable.

**Technique Tip:** Place the cable completely in the cutter jaws, but near the tip. Cut in one motion to ensure a clean cut.



Cut the cable as close to the cable crimp as possible using the Cable Cutter.

*Please note that when using cables in conjunction with plates and screws (and cerclage positioning pins or cerclage buttons), it is important to first reduce the plate to the bone. This is necessary because the fully tensioned cable will interfere with screw fixation if a gap exists between the plate and the bone.*

## Using Cerclage Positioning Pins (optional)

The Cerclage Positioning Pin [298.803S], [298.837S], [298.838S], [298.839S]\* may be used when the fracture is treated with a plate. The positioning pin maintains the location of the cable on the plate relative to the plate hole.

After reducing the plate (3.5 mm and 4.5 mm broad or narrow, DCP, LC-DCP or LCP) to the bone, select the type of Cerclage Positioning Pin to be used (post or threaded) and decide upon the location for the pin in the plate.

For 4.5 mm non-threaded pins drill a pilot hole into the bone, at the selected location for the pin, using a 3.2 mm Drill Bit [310.31] and a 4.5 mm Universal Drill Guide [323.46]. For 3.5 mm non-threaded pins, drill a pilot hole using a 2.5 mm Drill Bit [310.35] and a 3.5 mm Universal Drill Guide [323.36].

**Note:** *Since the positioning pin is asymmetrically designed to fit into the majority of Synthes plates, ensure that the pin is appropriately oriented with respect to the pilot hole in the bone and the hole in the plate before loading the pin on the cable.*

**For example:** *Consider the following situation when fixing a femur from a lateral approach using this technique. A pilot hole is drilled in the proximal half of a plate hole. The cable passer is inserted from posterior to anterior, which requires passing the cable from anterior to posterior. In this example, the non-threaded pin should be loaded onto the cable and fed down to the crimp with the post to the right when viewing the cable from the beaded end.*

Load the pin onto the cable, slide it down to the crimp

\*Titanium positioning pins [498.803S], [498.837S], [498.838S] and [498.839S] are also available.



*Drill a 3.2 mm pilot hole for the post on the Cerclage Positioning Pin [298.802S] or [498.802S].*



*Load the positioning pin onto the cable and pass the cable around the bone.*



## Cerclage Technique (continued)

before passing the cable around the bone. Pass the cable around the bone as described in Steps 1–2 (pg. 6). Placing the post of the positioning pin in the pilot hole may be done by hand or by using the Forceps for use with Cerclage Buttons and Positioning Pins [391.885]. Seat the pin in the plate hole. Complete the remaining cerclage cable technique outlined in steps 3–5 (pg. 7).

For the threaded pins, place the pin in the threaded portion of an LCP plate hole before passing the cable around the bone (this can be done either before or after implantation of the plate). Ensure that the threads properly engage the plate, and the cable slot is perpendicular to the direction the cable will be passed around the bone (threaded pins do not have to be fully tightened into the plate). Note that the cable will be passed around the bone before being inserted through the threaded pin before being inserted through the crimp. Complete the remaining cerclage cable technique outlined in Steps 3–5.

### Using Cerclage Buttons (optional)

A Cerclage Button may be used to provide additional fixation when a screw alone does not provide adequate fixation. Two sizes are available that fit screw heads with a T15 StarDrive or 2.5 mm Hex recess (01.221.002S) and T25 StarDrive or 3.5 mm Hex recess (02.221.003S).\*

Load the proper size Cerclage Button onto the cable and slide it down to the crimp before passing the cable around the bone.

Pass the cable around the bone, as described in Steps 1–2. Place the button in the head of either a 3.5 mm or 4.5 mm screw using the Forceps for use with Cerclage Buttons and Positioning Pins [391.885]. Complete the remaining cerclage cable technique outlined in Steps 3–5.



*Place a Cerclage Button in the head of a screw to provide fixation with a cable.*

\*Titanium Cerclage Buttons (04.221.002S) and (04.221.003S) are also available.

# Tension Band Technique

*Tension band technique is mainly indicated in avulsion fractures at the site of a ligament or tendon attachment, such as with fractures of the patella and olecranon. Fractures (or osteotomies) of the greater trochanter and avulsion fractures of the medial or lateral malleolus may also be treated with a tension band. If strong rotational forces act upon the fracture site, two parallel Kirschner wires may be inserted before the tension band is applied.*

## Olecranon tension band (osteotomy or transverse fracture)

### 1 Reduce the fracture

With the patient in the supine position and the arm draped free across the chest, reduce and temporarily fix the fracture, using pointed reduction forceps.

### 2 Insert Kirschner Wires

Using a drill sleeve for aiming and tissue protection, insert two parallel (1.6 mm or 2.0 mm) K-wires into the olecranon and across the fracture site. The K-wires may be drilled into the anterior cortex of the ulna or placed within the medullary canal. In hard bone, predrilling with the 2.0 mm Drill Bit [310.19] may be necessary.

Drill a 2.0 mm hole perpendicular to the long axis of the ulna and distal to the fracture site, at a distance approximately equal to the length of the proximal fracture fragment. This hole must go through both cortices and the medullary canal of the ulna and may be drilled before or after fracture reduction and K-wire placement.



*Reduce the fracture and insert two parallel K-wires in the direction of the long axis of the ulna and across the fracture site.*



*Drill a 2.0 mm hole perpendicular to the long axis of the ulna and distal to the fracture site.*

# Tension Band Technique (continued)

## Olecranon tension band (continued)

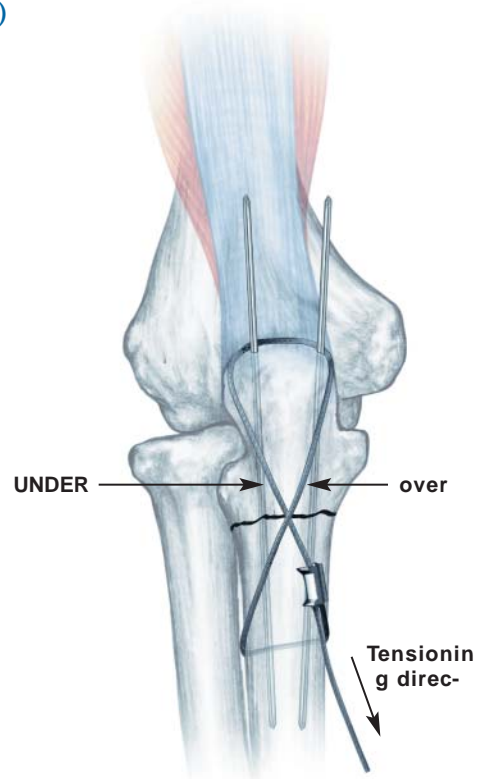
### 3 Create the Tension Band

Place the crimp alongside the ulna and pass the 1.0 mm cable through the distal drill hole. Cross the cable over the dorsal surface of the olecranon and pass it deep to the triceps tendon and behind the K-wires.

Pass the cable end UNDER the cable on the dorsal surface of the ulna in a figure-of-eight and insert it into the open hole of the crimp. Gently pull any slack out of the cable by hand.

#### Optional Technique:

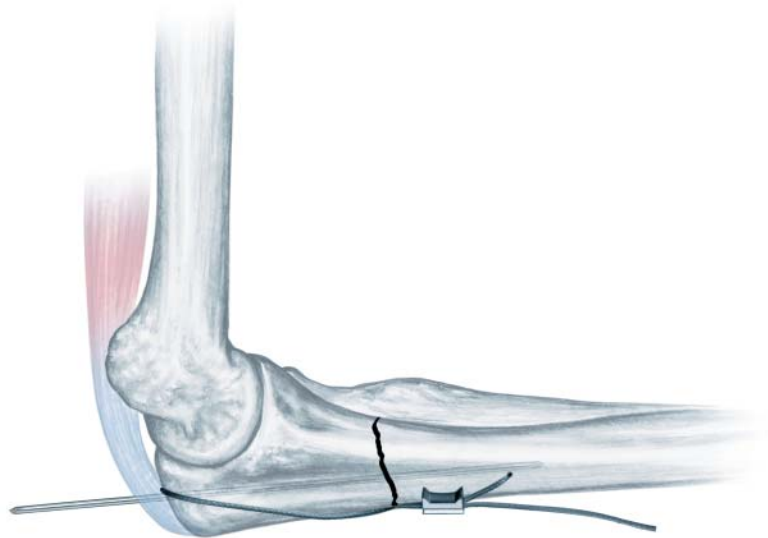
Use one or two screws (standard or cannulated) with Cerclage Buttons instead of the K-wires.



*Cross the cable over the dorsal surface of the olecranon in a figure-of-eight.*



*Optional configuration*



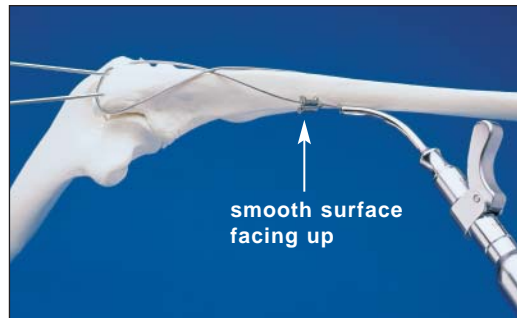
*Medial view*

#### 4 Tensioning the cable

Attach the Provisional Tensioning Device [391.884] and the Attachment Bit [391.883] to the Cable Tensioner [391.201]. Turn the fluted knob at the end of the tensioner counterclockwise until it stops, and thread the cable through the Cable Tensioner. Advance the tensioner along the cable until it rests against the cable crimp. Carefully take up any slack in the cable by hand. Confirm placement of the crimp on the bone.



*Attach the Provisional Tensioning Device and the Attachment Bit to the Cable Tensioner.*



*Advance the tensioner along the cable until it rests against the cable crimp. Confirm placement of the crimp on the bone.*

Place the elbow in extension. Turn the knob on the tensioner clockwise until the desired tension is reached. The amount of tension being applied to the cable is indicated by the position of the knob relative to the numbered lines etched on the body of the tensioner. These lines indicate tension levels from 20 Kg to 50 Kg. **Take care not to exceed 40 Kg of tension.** Applying tension at levels higher than 40 Kg may result in crushing of the fragments and loss of reduction. When the desired tension is reached the cable is ready for crimping.



*Turn the knob on the tensioner clockwise until the desired tension is reached. Take care not to exceed 40 Kg of tension.*

# Tension Band Technique (continued)

## Olecranon tension band (continued)

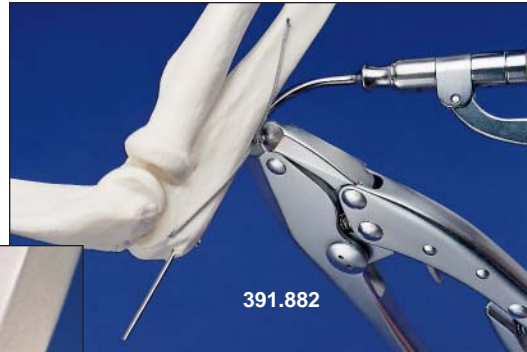
### 5 Crimp the cable

Place the jaws of the Cable Crimper [391.882] over the cable crimp and squeeze the handles together. The ratchet mechanism in the crimper precisely controls the amount of crimp deformation, thus preventing under- or overcrimping. The crimper will automatically release when the cable has been crimped.

**Note:** Visually check to ensure that the cable crimp is centered and fully seated in the crimper jaws prior to crimping the cable. Improper placement may lead to cable slippage or crimp failure.

**Technique Tip:** Use the starter handle to begin squeezing the crimper until the outer handle can be easily grasped.

After the cable has been crimped, remove the tensioner from the cable by turning the knob counterclockwise until the cable slides freely through the tensioner.



Use the Cable Crimper to precisely deform the cable crimp. Check that the crimp is centered and fully seated in the crimper jaws.



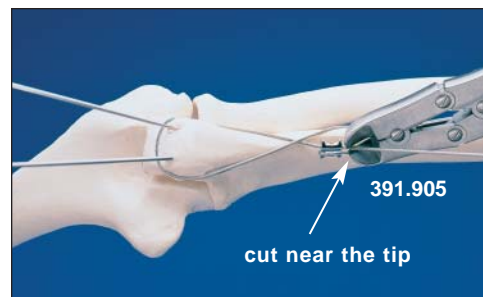
Remove the Cable Tensioner by turning the knob counterclockwise.



## 6 Cut the cable

To cut the cable, pass the free end of the cable through the jaws of the Cable Cutter [391.905] and squeeze the handles together. The cable should be cut as close to the cable crimp as possible taking care not to damage the adjacent cable.

**Technique Tip:** Place the cable completely in the cutter jaws, but near the tip. Cut in one motion to ensure a clean cut.

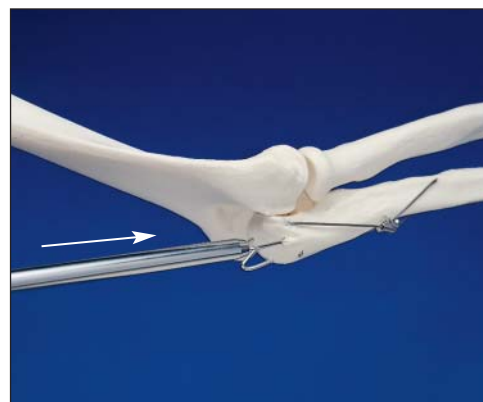


Cut the cable as close to the cable crimp as possible using the Cable Cutter.

## 7 Cut and position Kirschner Wires

Pull the K-wires back slightly and cut obliquely to create a sharp point. Using the Wire Bending Pliers [391.82], bend the K-wires past 180° to form a small hook. Using the Bending Iron for Kirschner Wires [392.00] as a punch, tap the ends into the bone making sure the cable passes under the small hook.

**Important:** Do not use the cable cutters to cut the K-wires; doing so will damage the cutters.



Bend the K-wires to form a small hook and tap the ends into the bone.

# Tension Band Technique (continued)

## Patella Tension Band (simple transverse fracture)

### 1 Reduce the fracture

Tilt the superior fracture fragment to expose the fracture surface. Using a 2.0 mm Drill Bit [310.19], drill two parallel holes in a retrograde fashion through the superior fragment.

Insert a 1.6 mm Kirschner Wire [292.16] through each hole, blunt end first, and out through the quadriceps tendon. Advance the wires until the sharp tip is fully within the superior fragment.

Reduce and provisionally fix the fracture with pointed reduction forceps. Inspect both the anterior cortical and posterior articular surfaces to ensure that the articular surface is anatomically reduced.



*Drill two parallel holes through the superior fragment of the patella and insert 1.6 mm Kirschner Wires.*

### 2 Insert Kirschner Wires

Sequentially advance the K-wires into the inferior fragment. They should be advanced at least 1 cm beyond the inferior pole of the patella. Check reduction and provisional fixation. Using the Wire Bending Pliers [391.82], bend the superior end of the K-wires posteriorly past 180° to form a small hook, and cut obliquely to form sharp points.

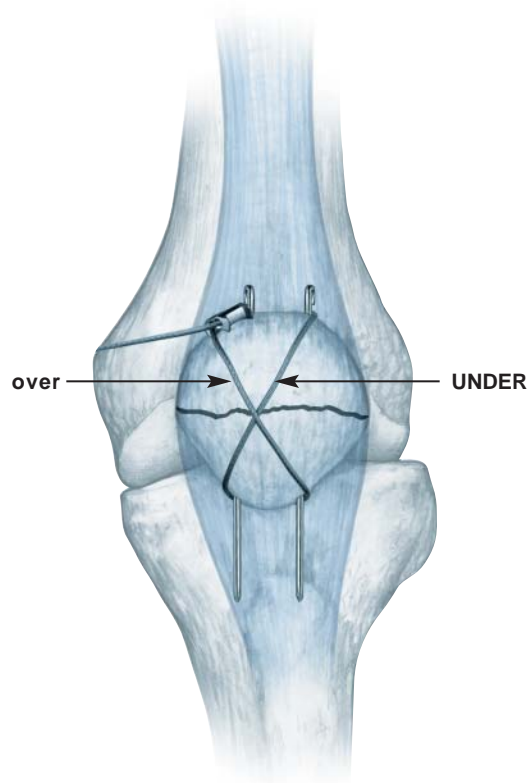


*Reduce the fracture and advance the K-wires into the inferior fragment.*

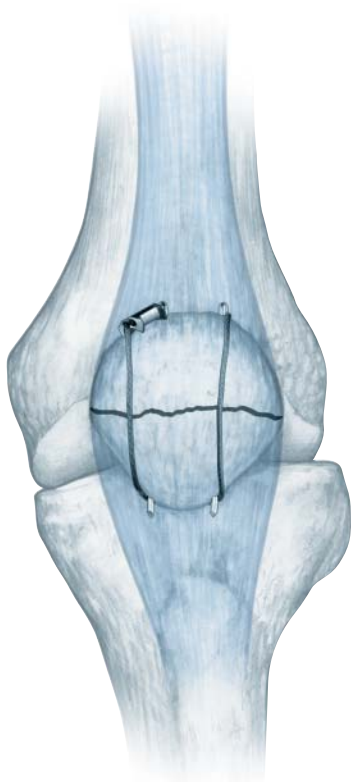
**Important:** Do not use the cable cutters to cut the K-wires; doing so will damage the cutters.

### 3 Create the tension band

Place the crimp on the lateral or medial side of either pole of the patella. Pass a 1.0 mm cable deep to the quadriceps and patellar tendons and behind the K-wires (superiorly and inferiorly), over the front of the patella in a figure-of-eight and back through the open hole in the crimp.



*Pass a 1.0 mm cable deep to the quadriceps and patellar tendons, behind the K-wires and over the front of the patella in a figure-of-eight.*



*Optional configuration*



*Lateral view*

# Tension Band Technique (continued)

## Patella Tension Band (continued)

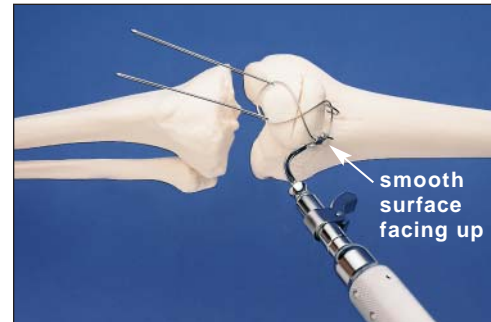
### 4 Tension the cable

Attach the Provisional Tensioning Device [391.884] and the Attachment Bit [391.883] to the Cable Tensioner [391.201]. Turn the fluted knob at the end of the tensioner counterclockwise until it stops and thread the cable through the Cable Tensioner. Advance the tensioner along the cable until it rests against the cable crimp. Carefully take up any slack in the cable by hand. Confirm placement of the crimp on the bone.

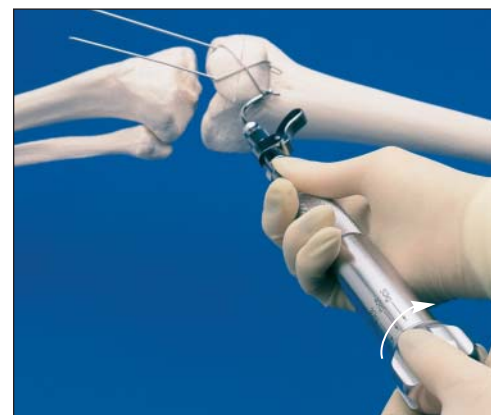
Turn the knob on the tensioner clockwise until the desired tension is reached. The amount of tension being applied to the cable is indicated by the position of the knob relative to the numbered lines etched on the body of the tensioner. These lines indicate tension levels from 20 Kg to 50 Kg. **Take care not to exceed 40 Kg of tension.** Applying tension at levels higher than 40 Kg may cause the cable to cut through soft or osteopenic bone. When the desired tension is reached the cable is ready for crimping.



*Attach the Provisional Tensioning Device and the Attachment Bit to the Cable Tensioner.*



*Advance the tensioner along the cable until it rests against the cable crimp. Confirm placement of the crimp on the bone.*



*Turn the knob clockwise until the desired tension is reached. Take care not to exceed 40 Kg of tension.*

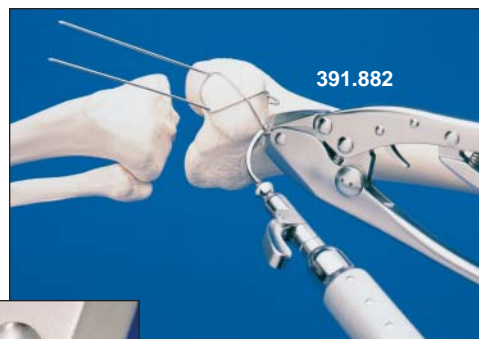
## 5 Crimp the cable

Place the jaws of the Cable Crimper [391.882] over the cable crimp and squeeze the handles together. The ratchet mechanism in the crimper precisely controls the amount of crimp deformation, thus preventing under- or overcrimping. The crimper will automatically release when the cable has been crimped.

**Note:** Visually check to ensure that the cable crimp is centered and fully seated in the crimper jaws prior to crimping the cable. Improper placement may lead to cable slippage or crimp failure.

**Technique Tip:** Use the starter handle to begin squeezing the crimper until the outer handle can be easily grasped.

After the cable has been crimped, remove the tensioner from the cable by turning the knob counterclockwise until the cable slides freely through the tensioner.



Use the Cable Crimper to precisely deform the cable crimp. Check that the crimp is centered and fully seated in the crimper jaws.



Remove the Cable Tensioner by turning the knob counterclockwise.

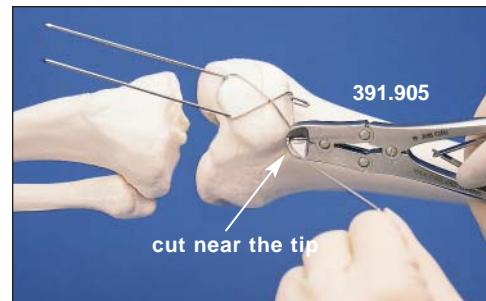
# Tension Band Technique (continued)

## Patella Tension Band (continued)

### 6 Cut the cable

To cut the cable, pass the free end of the cable through the jaws of the Cable Cutter [391.905] and squeeze the handles together. The cable should be cut as close to the cable crimp as possible taking care not to damage the adjacent cable.

**Technique Tip:** Place the cable completely in the cutter jaws, but near the tip. Cut in one motion to ensure a clean cut.



*Cut the cable as close to the cable crimp as possible using the Cable Cutter.*

### 7 Cut and position K-wires

Using the Bending Iron for Kirschner Wires [392.00] as a punch, tap the ends of the bent K-wires into the bone making sure the cable passes through the small hook. Trim the protruding distal ends of the K-wires at about 10 mm from the bone, and bend posteriorly only slightly, so that later extraction is not hampered.

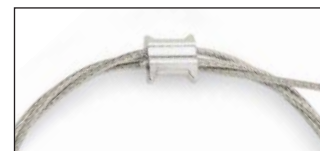
**Important:** Do not use the cable cutters to cut K-wires; doing so will damage the cutters.



*Tap the bent K-wires into the bone.*

## Implants (must be ordered seperately)

Titanium	Stainless Steel	
498.803S	298.803S	4.5 mm Threaded Cerclage Positioning Pin, sterile
498.837S	298.837S	3.5 mm Cerclage Positioning Pin, sterile
498.838S	298.838S	3.5 mm Threaded Cerclage Positioning Pin, sterile
498.839S	298.839S	4.5 mm Cerclage Positioning Pin, sterile
04.221.002S	02.221.002S	T15 StarDrive/2.5 mm Hex Cerclage Button, sterile
04.221.003S	02.221.003S	T25 StarDrive/3.5 mm Hex Cerclage Button, sterile
		Cable with Crimp, 750 mm, sterile
498.800.01S	298.800.01S	1.0 mm
	298.801.01S	1.7 mm
	298.801.10S	1.7 mm, 10 pack



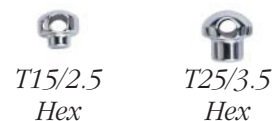
*Cable with crimp*



*Threaded*

*Post*

*Pins*



*T15/2.5  
Hex*

*T25/3.5  
Hex*

*Buttons*

### CoCr Cable with Titanium Crimp, 750 mm, sterile

611.105.01S      1.7 mm

### Trochanteric Reattachment Device with CoCr cable, sterile

498.806S      standard  
498.807S      long



*Titanium Trochanteric  
Reattachment Device with  
Cobalt Chromium Cables*



*1.7 mm stainless steel  
Cables available sterile-  
packed, single or 10-pack  
in dispenser carton.*

# Orthopaedic Cable System Instrument Set [105.924]



Orthopaedic Cable System  
Instrument Set Graphic Case  
[690.013]

## Instruments

391.105	Medium Cable Passer
391.106	Medium Cable Passer, 45° angle
391.103	Medium Cable Passer, curved
391.107	Large Cable Passer
391.108	Large Cable Passer, 45° angle
391.104	Large Cable Passer, curved
391.201	Cable Tensioner
391.882	Cable Crimper
391.883	Attachment Bit, 4 ea.
391.884	Provisional Tensioning Device, 4 ea.
391.885	Forceps for use with Cerclage Buttons and Positioning Pins
391.905	Cable Cutter, standard
391.906	Cable Cutter, large

## Also Available

199.915	Care and Maintenance Kit for Cable Tensioner, includes: 2.1 mm Cleaning Brush [319.27] 2.0 mm Cleaning Stylet [319.36] Autoclavable Oil [519.97]
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292.20	2.0 mm Kirschner Wire, with trocar point, 150 mm, 10/pkg.
310.19	2.0 mm Drill Bit, quick coupling, 100 mm
310.35	2.5 mm Drill Bit, quick coupling, 110 mm
310.31	3.2 mm Drill Bit, quick coupling, 145 mm
312.20	2.0 mm Parallel Drill Guide and Drill Sleeve
323.36	3.5 mm Universal Drill Guide
323.46	4.5 mm Universal Drill Guide
391.82	Wire-Bending Pliers, 160 mm
391.919	Impactor
392.00	Bending Iron, for 1.25 mm, 1.6 mm and 2.0 mm Kirschner Wires

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