



# Product Catalog

## 2023

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## The SK® ESF Advantage

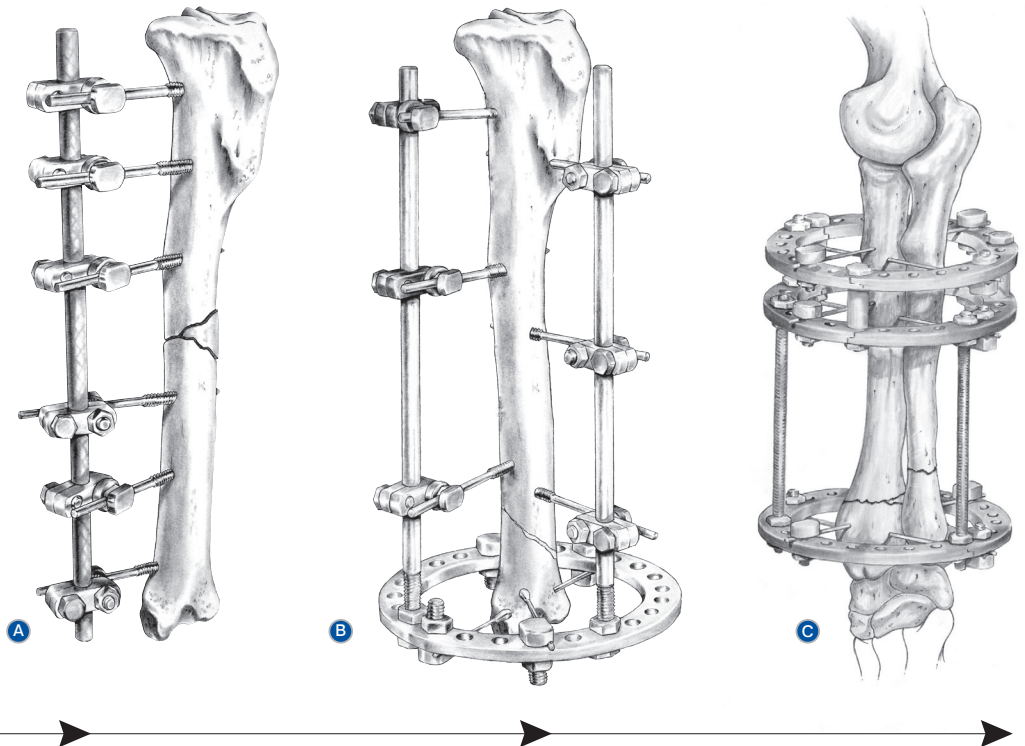
In addition to being a superior linear external skeletal fixator, the SK® ESF device was also designed to be the backbone for an entire external fixation system. Common pins, clamps, wrenches, drill sleeves and many other components are designed to function interchangeably. Modularity allows the veterinary surgeon using the IMEX® SK® linear fixator to add hybrid fixation to his/her armamentarium quickly and affordably without the need to purchase another device and/or instrument set. In addition, IMEX® circular external fixation frames were developed around the same fasteners, connectors and instruments providing an economical path for future increase in capability.

IMEX® helps you control inventory and capital expense by providing three external fixation modalities at the time and place of your choosing. This flexibility alone should lead you to choose the IMEX® SK® linear fixator for your first purchase.

Ⓐ **Linear External Fixation:** Linear ESF is the most common form of external skeletal fixation and consists of percutaneous transfixation pins attached to one or more external bars. Specialized pin gripping clamps are typically utilized to connect external bars and pins. The SK® ESF System by IMEX® is depended on by more academic teaching hospitals and private referral practices than any other ESF device.

Ⓑ **Hybrid External Fixation:** Hybrid ESF devices have characteristics of both linear and circular ESF frames. Hybrid frames are often used to manage fractures with short, juxta-articular fracture fragments. Many growth deformities can also be managed with hybrid frames. By utilizing hybrid rods or hybrid adapters, veterinary surgeons can link the most popular linear and circular veterinary ESF devices.

Modular ESF System Design



Ⓒ **Circular External Fixation:** CESF was popularized by Professor G. Ilizarov, M.D. to treat growth deformities, bone defects, and non-unions. Veterinary surgeons have successfully adapted the Ilizarov method to animals. Percutaneous fixation is usually performed by the use of small diameter fixation wires placed under tension. The IMEX® CESF device greatly simplifies application and management of CESF frames.



# The SK® ESF Advantage

## The History of SK® ESF Technology

The SK® ESF System was designed to simplify the application and management of external skeletal fixators. The SK® ESF clamp supports use of Duraface® and positive-thread pins directly through the primary pin-gripping bolt, allows the surgeon to easily add or remove a fixation clamp as needed during frame construction, and provides freedom to utilize a great variety of fixation pin diameters and styles. In addition, the SK® ESF System supports sleeved pre-drilling and targeting of fixation pins. Traditional KE frames and new KE-like frames typically depend on complex frame geometries, connecting rod augmentation, and/or multiple full-pins to achieve adequate frame strength. In contrast, the SK® ESF System features dramatically improved connecting rods that make simpler frames a clinical reality. The SK® ESF System dramatically changed standard concepts of veterinary ESF by placing less emphasis on full-pins and frame complexity while promoting biological technique and safe pin corridor philosophy. By-products of simple frame constructs include: economy of hardware, reduced operative time, and less required instrumentation. The SK® ESF System is available in three sizes: mini, small, and large.

## Review of SK® ESF Clamp Design

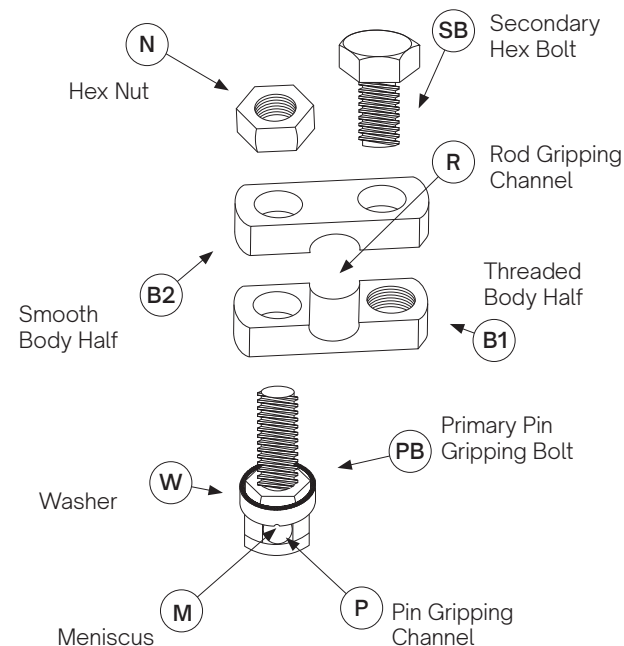
The user-friendly design of the SK® single clamp allows for pre-drilling as well as placement of Duraface® and positive-thread pins through the pin-gripping bolt. This eliminates the difficulty historically associated with the use of positive-profile threaded pins while allowing use of modern Duraface® pins. The gripping mechanism of the SK® ESF clamp allows a variety of different pin sizes and types to be utilized at the surgeon's discretion. The split nature of the SK® clamp allows quick and easy addition or removal of a clamp without requiring frame disassembly. Simple wrenches are the only required instrumentation; however, drill sleeves are available to simplify pre-drilling and targeting of ESF pins.

The aluminum clamp body is comprised of two different parts (B1 and B2). Each has a pair of holes, one to receive the primary pin-gripping bolt (PB) and one to receive the secondary bolt (SB). None of these holes have threads except for the secondary bolt hole in B1 body part.

After each use, a clamp may be disassembled for proper cleaning. The B1 and B2 body parts must not be interchanged when the clamp is reassembled for another use, or it will not work properly. Proper assembly of the clamp is shown in the illustration to the right.

The large rod-gripping channel (R) is in the center of the clamp. The primary pin-gripping bolt (PB) has a washer (W) with a slot or meniscus (M) which enables a wide range of pin diameters to be securely gripped by the clamp. The clamp is tightened by the secondary bolt and by a nut (N) on the primary pin-gripping bolt. Alternate tightening of each bolt will maximize clamp longevity and is highly recommended.

The secondary bolt should be viewed as a second pair of hands to position and hold clamps in place while aiming drill bits, drilling, and placing pins. When one becomes comfortable utilizing the secondary bolt as an assistant it becomes very easy to reduce fractures and apply frames. The secondary bolt converts an empty clamp into both a drill guide and a targeting device. While the mechanical properties of the SK® ESF System allow minimal use of full-pins, they can be easily targeted without additional expensive instrumentation.



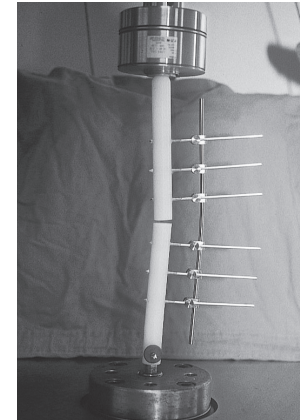
# The SK® ESF Advantage

## Review of SK® ESF Mechanics

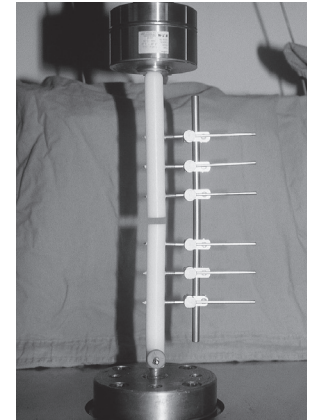
The most powerful way to simplify the ESF method lies in mechanical frame improvements that are not dependent on full-pins or complex frame geometries. In this respect, the SK® ESF System is designed to be dramatically different from the KE and KE-like systems.

Mechanical testing of KE frames reveals the connecting rod as the “weak link” of simple fixator frames. In retrospect, the choice of KE rods utilized was and still is poorly matched to veterinary pin diameters and patient demands; dictating that veterinary surgeons utilize complex ESF frames. By eliminating the weak link of simple frames, the SK® ESF System provides a simple but powerful alternative to complex frame geometry.

Simple frames, the ability of clamps to effectively grip a wide range of different pin diameters, and the need for minimal instrumentation make the SK® ESF System **the most economical ESF choice**. Reduced use of full-pins minimizes pin tracts and related morbidity while simplifying staged disassembly and postoperative care. Most importantly, use of half-pins instead of full-pins encourages and facilitates optimal pin centering and use of safe pin corridors.



Kirschner-Ehmer (KE) fixator 50 lb. load

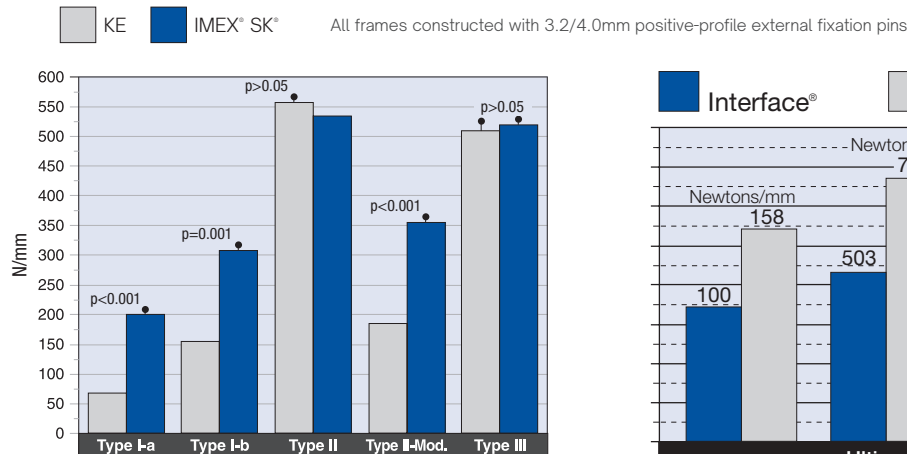
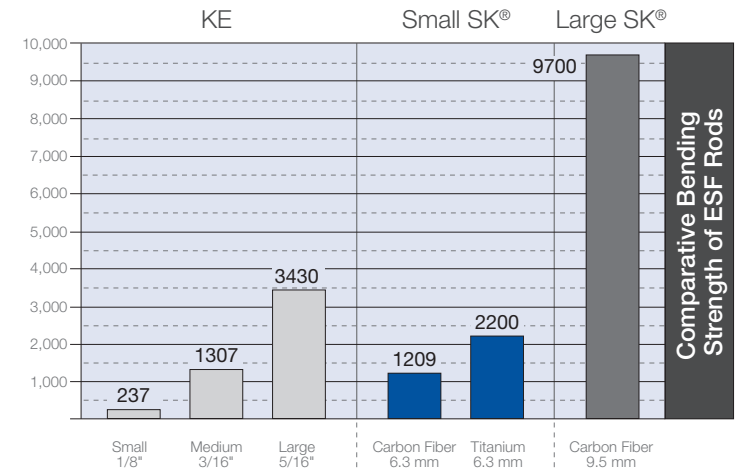


SK® external fixation device 50 lb. load

# The SK® ESF Advantage

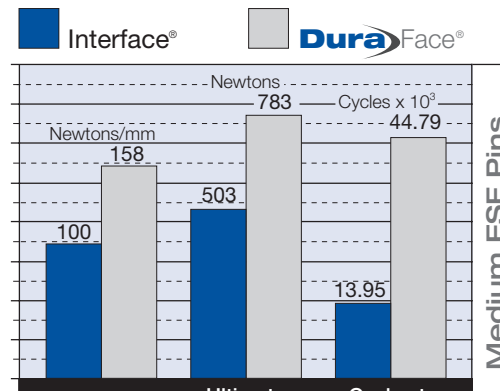
Isolated connecting rod testing does not tell the entire story. Actual testing of ESF frame models confirms that frame simplification can be accomplished by incorporating strong connecting rods. Typical ESF frames were constructed of large SK® components with medium pins as well as medium KE components with medium pins. By comparing frames with equivalent geometries and identical pins, the actual impact of the connecting rod on mechanical performance can be seen (D.G. Bronson, J.D. Ross, J.P. Toombs, R.D. Welch, Vet Comp Orthop Traumatol 2003, 2003: 84-87). Mechanical testing of currently available veterinary ESF devices confirms the ability of larger diameter connecting rods to allow clinical use of simpler frame geometries (White, D.T., Bronson, D.G., Welch, R.D.: A Mechanical Comparison of Veterinary External Skeletal Fixation Systems. Veterinary Surgery 32:507-514, 2003).

The goal of the SK® ESF System is not to generate ever-increasing frame stiffness, but to achieve clinically appropriate strength while using simple, patient friendly frames.



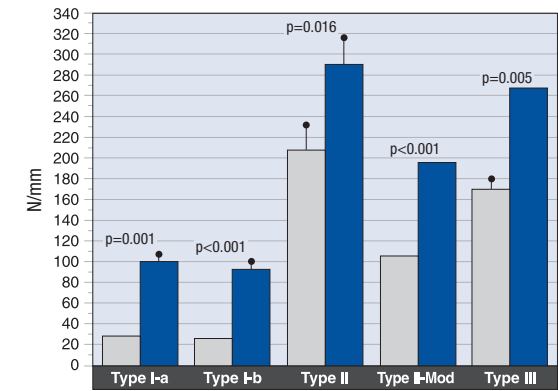
## Axial Compression

The large SK® Type I-a frame exceeds the strength of the KE Type I-a, KE Type I-b and the modified KE Type II (one full-pin per fragment with the balance being half-pins). The large SK® Type I-b provides 60% of the axial strength and stiffness of the most complex KE frame (Type III).



## Cranio-Caudal Bending

The large SK® Type I-a frame exceeds all KE frames except the Type III.



## Medio-Lateral Bending

Comparable Type I-a and I-b frames have an approximate fourfold increase in strength when constructed utilizing large SK® rods.

# SK® ESF FAQ

## What pin sizes does each SK® ESF clamp support?

The mini SK® clamp is designed to function with pin diameters from 0.9mm (0.035”) to 2.5mm. Representative pins include most miniature Interface® pins, all miniature Centerface® pins, 2.5mm Duraface® pins, 2.0/2.5mm Interface® and Centerface® pins. 1.6mm (0.062”) and 2.0mm (0.078”) miniature Interface® pins are very popular with the mini SK® ESF clamp. While the mini SK® clamp can hold pins as small as 0.9mm and is very compact, there will be kittens, toy breeds, avian patients and exotics that are simply too small for mechanical fixators. Such patients will benefit from Acrylx™ ESF frames constructed using miniature Interface® or Centerface® pins.

The small SK® clamp is designed to utilize pin diameters from 2.0mm to 4.0mm in Duraface® or positive-profile designs. Commonly used Duraface® pins include 2.5mm, 3.2mm, 3.5mm and 4.0mm. Commonly used Interface® and Centerface® pins include 2.0/2.5mm, 2.4/3.2mm, 2.8/3.5mm and 3.2/4.0mm.

The large SK® clamp is designed to handle 3.0mm to 4.8mm pin diameters in either Duraface® or positive-profile pin designs. The maximum pin diameter that can be passed directly through the clamp bolt is 4.8mm (3/16”). Representative pins include 4.0mm, 4.3mm and 4.8mm Duraface® pins. Commonly used Interface® and Centerface® pins include 3.2/4.0mm, 3.5/4.3mm and 4.0/4.8mm.

## Are through-and-through, centrally threaded (full) pins no longer utilized?

While dependency on full-pins is greatly reduced, they can occasionally be assets in challenging clinical cases, especially when combined with a strategy for staged disassembly. A review of mechanical testing confirms that simplified full-pin frames (only one full-pin per major fragment) are very powerful with the SK® ESF System. These frames are readily applied to the tibia. In addition, the distal humeral condyle remains a location in which full-pins are frequently used. Due to the anatomy of the radius, full-pins are rarely recommended regardless of the ESF device utilized. Type I-b frames are a very powerful alternative to multiple full-pin frames, providing potential for increased pin number in short fragments while utilizing safe pin corridors. Use of half-pins is supported by mechanical testing and practical results. With any ESF device, mechanical demands for stability must be weighed, and the fixation must be customized to the patient based on a fracture patient assessment; therefore across-the-board frame recommendations are not a reality. Patients with injuries to multiple limbs or other complicating factors will require increased frame rigidity.

### Pin Overlap Zone

Small SK® Construct	Mini SK® Construct	0.9mm Miniature Interface® /Centerface® *
		1.1mm Miniature Interface® /Centerface® *
		1.6mm Miniature Interface® /Centerface® *
		2.0mm Miniature Interface® *
		2.5mm Duraface®
		2.0/2.5mm Centerface®
	Large SK® Construct	2.4mm Miniature Interface® *
		3.2mm Small Duraface®
		2.4/3.2mm Small Centerface®
		3.5mm Small-Plus Duraface®
		2.8/3.5mm Small-Plus Centerface®
		3.0/3.5mm Centerface®
		4.0mm Medium Duraface®
		3.2/4.0mm Medium Centerface®
		4.3mm Medium-Plus Duraface®
		3.5/4.3mm Medium-Plus Centerface®
		4.8mm Large Duraface®
		4.0/4.8mm Large Centerface®

**Table 2** Miniature Interface® and miniature Centerface® pins continue to be named according to their smooth shaft dimensions. Standard size Centerface® naming convention now includes both shaft and thread diameter. See page 50 for modern pin terminology.

## I never utilize large ESF pins - only small and medium. Why should I consider the large SK® ESF System?

Frame simplification results in reduced surgery time and hardware cost. The medium 3.2 / 4.0mm Interface® and 4.0mm Duraface® pins have certainly been the workhorse over a variety of different patient sizes and readily function with small and large SK® ESF clamps. While any device can be pushed to support larger patients, it is easier, quicker, and less expensive to construct a simpler frame of stronger components. This is especially true with fractures of the humerus and femur where Type I-b, Type II, and Type III frames are not possible. Large 4.0 / 4.8mm Interface® and 4.8mm Duraface® pins are reserved for giant breeds.

## SK® ESF FAQs

### Tell me more about the economics of simple SK® frames.

Full-pins cost more than half-pins and require a clamp on each end. For example, a 6 pin, Type II ESF frame will require 12 clamps and two rods, while an 8 pin, Type I-b frame will require only 8 clamps and two rods. An even larger rod device might function in the same case as a 6 pin, Type I-a frame requiring only 6 clamps and a single rod. The lack of need for aiming devices, torque wrenches, and rod augmentation further reduces cost of ownership and use.

### Why are both carbon fiber and titanium rods available with the small SK® fixator?

The 6.3mm titanium rod is approximately twice the strength of the 6.3mm carbon fiber rod. On lower limbs, Type I-b or Type II minimal frames will extend the upper weight range for carbon rods. For larger patients, the added strength of titanium rods is advantageous, especially if attempting to simplify frames or in most fractures involving the humerus or femur. At some point, more complex frames need to be built or large SK® ESF rods and clamps should be utilized. Both carbon and titanium rods are in the small SK® starter kit, but customers usually re-order their ultimate preference. Differences in strength can be utilized as part of a plan for staged disassembly or rod downsizing.

### How are various SK® rods cut to length?

Carbon fiber rods are **not** to be cut with bolt cutters or pin cutters; however, they can readily be sawed with a fine-toothed hacksaw blade. Carbon fiber dust is potentially dangerous, so it is recommended that a damp paper towel be laid over the cutting area to capture any dust. Small SK® titanium rods can be cut with a **large** bolt cutter but tend to develop a significant burr that must be smoothed with a file or sanding material.

All SK® ESF System connecting rods are stocked in several length choices. The variety of lengths available should greatly reduce the need for cutting rods.

### Which rod should be used to construct contoured rod frames?

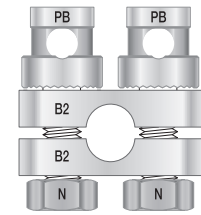
The mini SK® 3.2mm (1/8") stainless steel rod is easy to contour.

The small SK® 6.3mm titanium external rod is the only rod other than the mini SK® stainless steel rod that can be bent for this purpose. However, it is quite difficult to bend and is best bent prior to sterilization using a vise and two hand chucks. Plate benders can also be utilized. A different strategy must be used with large SK® clamps because carbon fiber composite rods cannot be contoured. Readily constructed circular/SK® hybrid frames, stable double clamps, and other alternatives to rod bending usually result in fixation superior to contoured rod frames. Contouring rods is rarely performed with modern external fixators.

## SK® ESF FAQs

### What is a simpler and more stable method of forming an adjustable articulation using SK® components?

A popular technique that has been successful for spanning joints with all sizes of SK® frames is the utilization of modified single SK® clamps to form an adjustable articulation that is quite secure. The SK® single clamp body is comprised of two different parts (see page 2 for SK® ESF clamp design): a B1 body part that is placed on the side closest to the pin-gripping portion of the primary pin-gripping bolt with a threaded hole for the secondary bolt, and a B2 body part that is placed on the opposite side with a smooth hole for the secondary bolt. Modified clamps for transarticular articulations are built with two B2 body parts, two primary pin-gripping bolts, and two nuts. The articulation is built with two of these modified clamps and two short pieces of appropriate size IM pin stock or KE rod. The angle of this articulation is adjustable and can be used to the surgeon's advantage when a transarticular fixator is employed in the management of tendon and ligament injuries.



B2 body halves contain no threaded holes

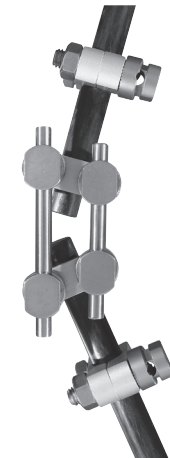
### Which size SK® ESF components should be used on a given patient?

This is the most frequently asked question regarding any ESF device. Bone size should be examined to determine appropriate pin diameter. This diameter should be approximately 25-30% of the bone diameter. Pin choice is then considered with the overall clinical demands of the patient, other injuries, and many other factors to determine not only device size, but the overall frame geometry. As previously discussed, undersized devices can be constructed to have great strength, but often become cumbersome and expensive. The better alternative is to increase inherent device strength to maintain a simpler, less expensive frame construct.

For a highly comminuted, unstable fracture in a medium/large dog, large SK® frame components and 4.0mm Duraface®, 3.2/4.0mm Interface® or Centerface® pins might be used to construct the initial frame. At approximately six weeks after surgery when staged disassembly is appropriate, small SK® components can be substituted for large SK® components as one method of reducing the support provided by the frame.

In addition to removing frame elements (i.e. conversion of Type II or Type I-b to Type I-a), carbon fiber composite rods can be substituted for titanium rods as part of the staged disassembly of a small SK® fixator. If one considers **only Type I-a** frames, the following **very general** guidelines can serve as a starting point (Table 1):

These recommendations are general guidelines only and based on the simplest Type I-a frame. On radius/ulna fractures, it is often prudent to consider the use of a Type I-b frame when unsure. With tibial fractures, also consider the use of a Type I-b frame or a minimal Type II. With fractures of the humerus/femur, it is best to use larger frame elements when unsure. These more aggressive strategies will increase the potential need for staged disassembly but will support early weight bearing and function.



Fixation System	Rod Size/Type	Weight/Size
Mini SK®	3.2mm stainless steel	kittens and small cats, small puppies, miniature breed dogs
Small SK®	6.3mm carbon fiber	large cats, dogs < 9 kg
Small SK®	6.3mm titanium	dogs > 13 kg
Large SK®	9.5mm carbon fiber	dogs > 23 kg



## SK® ESF FAQs

### Is ever-increasing stability necessary?

No, we are not always looking to build the strongest ESF frame, but desire a clinically appropriate fixator that maintains a simple frame geometry that is economical, biologically friendly, and requires minimal instrumentation.

### Tell me more about staged disassembly and rod downsizing.

Historically, as veterinary surgeons evolved from using simple KE frames to frames utilizing multiple full-pins, the axial stiffness of the frames increased dramatically. Since this high level of axial stiffness sometimes slowed bone healing, it became popular to convert complex frames to less stiff frames as early stages of healing occurred. This sequential frame disassembly may be done in one step or in several and is termed staged disassembly. The planned reduction of fixator rigidity transfers more of the load-bearing forces across the bone, stimulating callus maturation and the later stages of bone healing. Common examples of converting a complex frame to a simpler, less rigid frame include: conversion of a Type III frame to a Type II frame, conversion of a Type II frame to a less complex Type II frame, or conversion of a Type II frame to a Type I frame. The simplest and most common conversion is a Type I-b frame to a Type I-a frame.

If one begins with a simple Type I-a frame, as is frequently possible using the SK® ESF System, the previously listed options for staged disassembly are not applicable; however, two alternate strategies can be utilized. If reduction in pin number might jeopardize adequate pin bone interfaces; substituting a smaller, more flexible external rod for a larger, stronger one becomes a very attractive option to decrease the stiffness of a Type I-a frame (e.g. removal of large SK® clamps and a 9.5mm carbon fiber composite rod and replacing them with small SK® clamps and a 6.3mm titanium rod). While not truly a disassembly, rod downsizing does achieve the purpose of transferring a greater percentage of the load-bearing forces back to the bone and across the healing callus. A variation of this concept, when utilizing the small SK® device with 6.3mm titanium rods, is to replace the titanium rod with the less rigid carbon fiber composite rod of the same diameter. While not “downsizing” the connecting rod, this method does achieve a similar planned decrease in rigidity and might be useful in dogs when initial construction utilized medium fixation pins.

Since each SK® clamp is designed to grip a wide range of pin diameters, and there is an overlap zone between the different sizes of fixation pins gripped by the different SK® clamp sizes, it is frequently possible to construct the initial fixator with the larger clamps and rods and replace these components at about six weeks with those one size smaller. This wide range of pin shaft diameters that can effectively be gripped with the SK® clamp makes utilization of “overlapping pin zones” with the SK® device particularly beneficial. The adjacent chart depicts overlapping pin zones (Table 2 on page 5).

Not all fixator frames will require staged disassembly. In particular, young patients tend to produce bony callus rapidly and benefit less often from staged disassembly. All patients will benefit from early fracture stability which promotes fracture zone debridement, revascularization, and early callus formation. Only after these stages occur will the potential benefits of decreased rigidity become pertinent. With several options for converting more complex frames to less complex frames, or downstaging larger stronger rods to smaller less rigid ones, it is prudent to initially use the stronger choice with a staged exit strategy available. In skeletally mature canine patients, the optimal time period for initiating staged disassembly appears to be about 6 weeks after surgery.



## SK® ESF FAQs

### What is the first step in application of the ESF frame?

After approximate reduction of the fracture, a single pin is placed in the major proximal fragment and a single pin is placed into the major distal fragment. All fixator pins are placed through liberal release incisions. A connecting rod is secured to these first two pins using SK® single clamps. One can pre-place empty clamps onto the rod (faster) or place them one at a time later (less crowded). Accuracy of reduction is rechecked and adjusted if necessary. Some difficulty in maintaining reduction may occur until additional pins are added to stabilize the environment.

### Is there a sequence and technique for placement of subsequent pins?

Typically, the third and fourth pins placed into an ESF frame are the two pins on each side and closest to the fracture. This is not mandatory; however, it is easier to verify accuracy of reduction and ensures good pin placement. These pins are placed via liberal release incisions and through pre-drilled holes. Placing the SK® clamp over the area of soft tissue release, and using the secondary bolt to secure it in perfect alignment for the desired drill hole and pin position, ensures correct targeting and pin placement. Next, the appropriate drill sleeve is passed through the primary pin-gripping bolt to protect the soft tissue as the bone is pre-drilled. One must be careful not to crush the thin walled drill sleeve by tightening the primary pin-gripping bolt more than just enough to hold the sleeve in position. Pre-drilling is performed through the drill sleeve while exercising care not to exert undue pressure on the drill bit. Excess pressure results in drill bit flexing and a sudden “push through” of the drill bit into the opposite soft tissues as it breaks through the bone. The drill sleeve is then removed and low speed insertion of the fixator pin is performed. After placing pins three and four, recheck reduction and alignment before placing additional pins. Repeat this procedure for as many additional pins as desired.

### What is the proper way to tighten fixator nuts and bolts?

Tightening torque has the potential to disrupt fracture reduction or alignment – especially early in frame construction when pin numbers are minimal. Applying minimal torque to the pin bolts early in frame design followed by increases as subsequent pins are placed can minimize this potentially disruptive force. Tightening torque can be neutralized during clamp tightening with use of the two-wrench technique. An open-end wrench placed on the flat surfaces of the head of the primary bolt, or on the flats of the clamp body, is used to neutralize torque force while a second wrench is used to tighten the clamp. After complete frame construction and verification of reduction accuracy, apply final torque to all bolts in an alternating fashion.

## Mini SK® ESF System Components

### Mini SK® Clamp, Single

Item # 300.000

Utilizes 7mm wrenches and 3.2mm diameter stainless steel connecting rods. Supports pin diameters from 0.9mm to 2.5mm. U.S. Patent # 5,921,985



### Mini SK® Clamp, Double

Item # 300.999

Used for connecting two 3.2mm external rods. Stability provided by positive interlock between clamps. Two 7mm wrenches required.



### Mini SK® Stainless Steel Connecting Rods, 3.2mm (1/8") Diameter

Available in 25mm increments from 50mm to 150mm.

Item #	Diameter	Length	~ Inches
<b>24200</b>	3.2mm	50mm	(1/8" x 2")
<b>24300</b>	3.2mm	75mm	(1/8" x 3")
<b>24400</b>	3.2mm	100mm	(1/8" x 4")
<b>24500</b>	3.2mm	125mm	(1/8" x 5")
<b>24600</b>	3.2mm	150mm	(1/8" x 6")



### Drill Bits

Pre-drilling a pilot hole before fixation pin insertion optimizes pin-bone interface integrity. Each IMEX® fixation pin has an optimum drill bit size.



## Mini SK® ESF System Components

### Drill Sleeves

Designed for through-the-clamp pre-drilling with mini SK® single clamps but can be an effective drill sleeve for a variety of applications.

Item #	Description	Drill Bit	SK® Clamp
<b>34015</b>	1.5mm Drill Sleeve	1.5mm	Mini
<b>34020</b>	2.0mm Drill Sleeve	2.0mm	Mini or Small



### 7mm Angled Socket Wrench

**Item # 4.50004**

The primary wrench when applying mini SK® components. Sockets on each end support speed-wrench technique and final tightening. Also compatible with mini hybrid and mini circular ESF systems.



### 7mm Combination Wrench

**Item # 4.50003**

A second wrench is necessary when tightening double clamps. This wrench can also be applied to the flat surfaces of the primary pin-gripping bolt or clamp body to counter partially disruptive torque forces as the mini SK® single clamp is tightened.



### External Skeletal Fixation Pins

Mini SK® ESF clamps support pin diameters from 0.9mm to 2.5mm. Examples include: 0.9mm - 2.0mm miniature Interface® pins, 0.9mm - 1.6mm miniature Centerface® pins, 2.0/2.5mm positive-profile pins and 2.5mm Duraface® pins.

## Mini SK® ESF Starter Kits

### Mini SK® ESF Starter Kits

SK® starter kits are designed to provide all necessary hardware to construct a reliable frame on a given patient. The selection of clamps, rods, drill bits, drill sleeves and wrenches is identical for each kit option. Available in two kit choices differentiated by pointed or no-point versions of ESF pins.

Item # 300.SKTDf Includes Interface®, Duraface® and Centerface® ESF pins

Quantity	Item #	Description
10	<b>300.000</b>	Mini SK® Single Clamp*
2	<b>300.999</b>	Mini SK® Double Clamp*
2	<b>24200</b>	3.2mm x 50mm Stainless Rod
2	<b>24300</b>	3.2mm x 75mm Stainless Rod
2	<b>24400</b>	3.2mm x 100mm Stainless Rod
2	<b>24500</b>	3.2mm x 125mm Stainless Rod
2	<b>24600</b>	3.2mm x 150mm Stainless Rod
1	<b>4.50003</b>	7mm Combination Wrench
1	<b>4.50004</b>	7mm Angled Socket Wrench
1	<b>33015</b>	1.5mm ESF Drill Bit
1	<b>32020</b>	2.0mm StickTite™ Drill Bit
1	<b>34015</b>	1.5mm Drill Sleeve
1	<b>34020</b>	2.0mm Drill Sleeve
6	<b>03062</b>	1.6mm Mini Interface® Half-pin
6	<b>02062</b>	1.6mm Mini Centerface® Full-pin
8	<b>17020</b>	2.5mm Duraface® Half-pin†
4	<b>20020</b>	2.0/2.5mm Centerface® Full-pin†

Item # 300.SKTDfNP Includes Interface®, Duraface® No-Point and Centerface® No-Point ESF pins

Quantity	Item #	Description
10	<b>300.000</b>	Mini SK® Single Clamp*
2	<b>300.999</b>	Mini SK® Double Clamp*
2	<b>24200</b>	3.2mm x 50mm Stainless Rod
2	<b>24300</b>	3.2mm x 75mm Stainless Rod
2	<b>24400</b>	3.2mm x 100mm Stainless Rod
2	<b>24500</b>	3.2mm x 125mm Stainless Rod
2	<b>24600</b>	3.2mm x 150mm Stainless Rod
1	<b>4.50003</b>	7mm Combination Wrench
1	<b>4.50004</b>	7mm Angled Socket Wrench
1	<b>33015</b>	1.5mm ESF Drill Bit
1	<b>32020</b>	2.0mm StickTite™ Drill Bit
1	<b>34015</b>	1.5mm Drill Sleeve
1	<b>34020</b>	2.0mm Drill Sleeve
6	<b>03062</b>	1.6mm Mini Interface® Half-pin
6	<b>02062</b>	1.6mm Mini Centerface® Full-pin
8	<b>17020NP</b>	2.5mm Duraface® Half-pin, NP†
4	<b>20020NP</b>	2.0/2.5mm Centerface® Full-pin, NP†

\* U.S. Patent # 5,921,985

† U.S. Patent # 8,282,676

## Small SK® ESF System Components

### Small SK® Clamp, Single

Item # 400.000

Utilizes 8mm wrenches and 6.3mm diameter connecting rods. Supports pin diameters from 2.0mm - 4.0mm. U.S. Patent # 5,921,985

### Small SK® Clamp, Double

Item # 400.999

Used for connecting two 6.3mm external rods. Stability provided by positive interlock between clamps. Two 8mm wrenches required.

### Small SK® Titanium Connecting Rods, 6.3mm Diameter

Available in 50mm length increments from 50mm to 250mm. The titanium rod offers added strength compared to carbon fiber when using larger diameter pins and pushing the upper limits of the small SK® frame.

Item #	Diameter	Length	~ Inches
405.050	6.3mm	50mm	(1/4" x 2")
405.100	6.3mm	100mm	(1/4" x 4")
405.150	6.3mm	150mm	(1/4" x 6")
405.200	6.3mm	200mm	(1/4" x 8")
405.250	6.3mm	250mm	(1/4" x 10")

### Small SK® Carbon Fiber Connecting Rods, 6.3mm Diameter

Available in 50mm length increments from 50mm to 250mm. Carbon fiber rods feature near radiolucency, enabling traditional-view radiographs without interference from overlapping rods. When using 2.5mm Duraface®, 2.0/2.5mm Interface® or Centerface®, 3.2mm Duraface®, or 2.4/3.2mm Interface® or Centerface®, carbon fiber has more than adequate strength. **Autoclavable**

Item #	Diameter	Length	~ Inches
406.050	6.3mm	50mm	(1/4" x 2")
406.100	6.3mm	100mm	(1/4" x 4")
406.150	6.3mm	150mm	(1/4" x 6")
406.200	6.3mm	200mm	(1/4" x 8")
406.250	6.3mm	250mm	(1/4" x 10")



## Small SK® ESF System Components

### Drill Bits

Pre-drilling a pilot hole before fixation pin insertion optimizes pin-bone interface integrity. Each IMEX® fixation pin has an optimum drill bit size.



### Drill Sleeves

Designed for through-the-clamp pre-drilling with SK® single clamps, but can be an effective drill sleeve for a variety of applications.

Item #	Description	Drill Bit	SK® Clamp
<b>34020</b>	2.0mm Drill Sleeve	2.0mm	Mini or Small
<b>34023</b>	2.3mm Drill Sleeve	2.3mm	Small
<b>34027</b>	2.7mm Drill Sleeve	2.7mm	Small
<b>34031</b>	3.1mm Drill Sleeve	3.1mm	Small or Large



### 8mm Angled Socket Wrench

**Item # 408.802**

The primary wrench when applying small SK® components. Sockets on each end support speed-wrench technique and final tightening.



### 8mm Combination Wrench

**Item # 408.801**

A second wrench is necessary when tightening double clamps. This wrench can also be applied to the flat surfaces of the primary pin-gripping bolt or clamp body to counter potentially disruptive torque forces as the SK® single clamp is tightened.



### External Skeletal Fixation Pins

Small SK® ESF clamps support pin diameters from 2.0mm to 4.0mm. Examples include: 2.0/2.5mm to 3.2/4.0mm positive-profile pins and 2.5mm to 4.0mm Duraface® pins.

## Small SK® ESF Starter Kits

### Small SK® ESF Starter Kits

SK® starter kits are designed to provide all necessary hardware to construct a reliable frame on a given patient. The selection of clamps, rods, drill bits, drill sleeves and wrenches is identical for each kit option. Available in two kit choices differentiated by pointed or no-point versions of ESF pins.

Item # 400.SKTDf			Item # 400.SKTDfNP		
Includes Duraface® and Centerface® ESF pins			Includes Duraface® No-Point and Centerface® No-Point ESF pins		
Quantity	Item #	Description	Quantity	Item #	Description
10	<b>400.000</b>	Small SK® Single Clamp*	10	<b>400.000</b>	Small SK® Single Clamp*
2	<b>400.999</b>	Small SK® Double Clamp*	2	<b>400.999</b>	Small SK® Double Clamp*
1	<b>405.100</b>	6.3mm x 100mm Titanium Rod	1	<b>405.100</b>	6.3mm x 100mm Titanium Rod
1	<b>405.150</b>	6.3mm x 150mm Titanium Rod	1	<b>405.150</b>	6.3mm x 150mm Titanium Rod
1	<b>405.200</b>	6.3mm x 200mm Titanium Rod	1	<b>405.200</b>	6.3mm x 200mm Titanium Rod
1	<b>405.250</b>	6.3mm x 250mm Titanium Rod	1	<b>405.250</b>	6.3mm x 250mm Titanium Rod
1	<b>406.050</b>	6.3mm x 50mm Carbon Fiber Rod	1	<b>406.050</b>	6.3mm x 50mm Carbon Fiber Rod
1	<b>406.100</b>	6.3mm x 100mm Carbon Fiber Rod	1	<b>406.100</b>	6.3mm x 100mm Carbon Fiber Rod
1	<b>406.150</b>	6.3mm x 150mm Carbon Fiber Rod	1	<b>406.150</b>	6.3mm x 150mm Carbon Fiber Rod
1	<b>406.200</b>	6.3mm x 200mm Carbon Fiber Rod	1	<b>406.200</b>	6.3mm x 200mm Carbon Fiber Rod
1	<b>406.250</b>	6.3mm x 250mm Carbon Fiber Rod	1	<b>406.250</b>	6.3mm x 250mm Carbon Fiber Rod
1	<b>408.801</b>	8mm Combination Wrench	1	<b>408.801</b>	8mm Combination Wrench
1	<b>408.802</b>	8mm Angled Socket Wrench	1	<b>408.802</b>	8mm Angled Socket Wrench
1	<b>33023</b>	2.3mm ESF Drill Bit	1	<b>33023</b>	2.3mm ESF Drill Bit
1	<b>33031</b>	3.1mm ESF Drill Bit	1	<b>33031</b>	3.1mm ESF Drill Bit
1	<b>34023</b>	2.3mm Drill Sleeve	1	<b>34023</b>	2.3mm Drill Sleeve
1	<b>34031</b>	3.1mm Drill Sleeve	1	<b>34031</b>	3.1mm Drill Sleeve
8	<b>17332</b>	3.2mm Duraface® Half-pin†	8	<b>17332NP</b>	3.2mm Duraface® Half-pin, NP†
4	<b>20332</b>	2.4/3.2mm Centerface® Full-pin	4	<b>20332NP</b>	2.4/3.2mm Centerface® Full-pin, NP
8	<b>17180</b>	4.0mm Duraface® Half-pin†	8	<b>17180NP</b>	4.0mm Duraface® Half-pin, NP†
4	<b>20180</b>	3.2/4.0mm Centerface® Full-pin	4	<b>20180NP</b>	3.2/4.0mm Centerface® Full-pin, NP

\* U.S. Patent # 5,921,985

† U.S. Patent # 8,282,676

## Small SK® Range of Motion (ROM™) Hinge

Range of motion (ROM™) hinges feature an adjustable joint angle and allow a variable range of motion as selected by the surgeon. Each size contains a multi-toothed locking nut that allows the surgeon to lock-in any desired starting position or “normal standing angle.” The opposite end features a central flat that determines the locked position and two adjacent arcs that allow for a chosen degree of motion. The ability to progressively increase the allotted range of motion during the healing period is unique to the ROM™ hinge and can be utilized or ignored depending on patient management requirements.

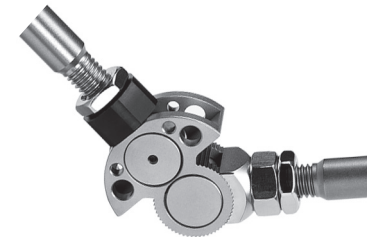
ROM™ hinges are modular by design and the hinge rods are easily interchanged to accommodate different limb length and patient anatomy. To change rods, loosen the corresponding nut or nuts and unscrew the rod from its mating hinge pin. This can usually be done by hand but a pair of pliers can be used if needed. Since the hinge pin is held in position by the rod, it must be positioned before screwing in the replacement rod. Rod insertion into the hinge pin can be achieved from one direction only; therefore, it is necessary to seat the hinge pin properly to ensure correct rod insertion.

ROM™ hinges should be reserved for challenging situations that demand controlled motion or intermittent therapy. They should not be considered for most routine transarticular fixation frames.

### Small SK® Range of Motion (ROM™) Hinge

The small ROM™ hinge utilizes standard 6.3mm SK® titanium hybrid rods as the external bars. As purchased, the small SK® ROM™ hinge comes assembled with 75mm and 100mm hybrid rods. Overall length measures approximately 185mm. Other lengths of hybrid rods can be exchanged to create a custom length ROM™ hinge assembly. Small ROM™ hinge nuts utilize two 10mm wrenches.

Item #	Overall Length	Clamp Size
<b>430.000</b>	185mm	Small SK®



### Small SK® Titanium Hybrid Rods, 6.3mm Diameter, 6mm Thread

Small SK® titanium hybrid rods are commonly utilized to construct hybrid ESF frames but are also a modular assembly element of the small SK® ROM™ hinge. Length increments from 50mm to 250mm are available allowing custom modification of small ROM™ hinge assemblies.

Item #	Diameter	Length	~ Inches
<b>407.050</b>	6.3mm	50mm	(1/4" x 2")
<b>407.075</b>	6.3mm	75mm	(1/4" x 3")
<b>407.100</b>	6.3mm	100mm	(1/4" x 4")
<b>407.150</b>	6.3mm	150mm	(1/4" x 6")
<b>407.200</b>	6.3mm	200mm	(1/4" x 8")
<b>407.250</b>	6.3mm	250mm	(1/4" x 10")





## Large SK® ESF System Components

### Large SK® Clamp, Single

Item # 500.000

Utilizes 10mm wrenches and 9.5mm diameter connecting rods. Supports pin diameters from 3.2mm - 4.8mm. U.S. Patent # 5,921,985



### Large SK® Clamp, Double

Item # 500.999

For connecting two 9.5mm external rods. Stability provided by positive interlock between clamps. Two 10mm wrenches required.



### Large SK® Carbon Fiber Connecting Rods, 9.5mm Diameter

Available in 50mm length increments from 50mm to 350mm. Tremendous rod strength compared to traditional KE type rods. Carbon fiber rods offer near radiolucency to simplify radiographic imaging. **Autoclavable**

Item #	Diameter	Length
506.050	9.5mm	50mm (2")
506.100	9.5mm	100mm (4")
506.150	9.5mm	150mm (6")
506.200	9.5mm	200mm (8")
506.250	9.5mm	250mm (10")
506.300	9.5mm	300mm (12")
506.350	9.5mm	350mm (14")



# Large SK® ESF System Components

## Drill Bits

Pre-drilling a pilot hole before fixation pin insertion optimizes pin-bone interface integrity. Each IMEX® fixation pin has an optimum drill bit size.



## Drill Sleeves

Designed for through-the-clamp pre-drilling with the SK® single clamps, but can be an effective drill sleeve for a variety of applications.

Item #	Description	Drill Bit	SK® Clamp
<b>34031</b>	3.1mm Drill Sleeve	3.1mm	Small or Large
<b>34035</b>	3.5mm Drill Sleeve	3.5mm	Large
<b>34039</b>	3.9mm Drill Sleeve	3.9mm	Large



## 10mm Angled Socket Wrench

**Item # 508.102**

The primary wrench when applying large SK® components. Sockets on each end support speed-wrench technique and final tightening. Also compatible with IMEX® hybrid and circular ESF systems.



## 10mm Combination Wrench

**Item # 2.50003**

A second wrench is necessary when tightening double clamps. This wrench can also be applied to the flat surfaces of the primary pin-gripping bolt and clamp body to counter potentially disruptive torque forces as the SK® single clamp is tightened.



## External Skeletal Fixation Pins

Large SK® ESF clamps support pin diameters from 3.2mm to 4.8mm. Examples include: 3.2/4.0mm to 4.0/4.8mm positive-profile pins and 3.5mm to 4.8mm Duraface® pins.

## Large SK® ESF Starter Kits

### Large SK® ESF Starter Kits

SK® starter kits are designed to provide all necessary hardware to construct a reliable frame on a given patient. The selection of clamps, rods, drill bits, drill sleeves and wrenches is identical for each kit option. Available in two kit choices differentiated by pointed or no-point versions of ESF pins.

Item # 500.SKTDf			Item # 500.SKTDfNP		
Includes Duraface® and Centerface® ESF pins			Includes Duraface® No-Point and Centerface® No-Point ESF pins		
Quantity	Item #	Description	Quantity	Item #	Description
10	<b>500.000</b>	Large SK® Single Clamp*	10	<b>500.000</b>	Large SK® Single Clamp*
2	<b>500.999</b>	Large SK® Double Clamp*	2	<b>500.999</b>	Large SK® Double Clamp*
1	<b>506.050</b>	9.5mm x 50mm Carbon Fiber Rod	1	<b>506.050</b>	9.5mm x 50mm Carbon Fiber Rod
2	<b>506.100</b>	9.5mm x 100mm Carbon Fiber Rod	2	<b>506.100</b>	9.5mm x 100mm Carbon Fiber Rod
2	<b>506.150</b>	9.5mm x 150mm Carbon Fiber Rod	2	<b>506.150</b>	9.5mm x 150mm Carbon Fiber Rod
2	<b>506.200</b>	9.5mm x 200mm Carbon Fiber Rod	2	<b>506.200</b>	9.5mm x 200mm Carbon Fiber Rod
2	<b>506.250</b>	9.5mm x 250mm Carbon Fiber Rod	2	<b>506.250</b>	9.5mm x 250mm Carbon Fiber Rod
2	<b>506.300</b>	9.5mm x 300mm Carbon Fiber Rod	2	<b>506.300</b>	9.5mm x 300mm Carbon Fiber Rod
1	<b>2.50003</b>	10mm Combination Wrench	1	<b>2.50003</b>	10mm Combination Wrench
1	<b>508.102</b>	10mm Angled Socket Wrench	1	<b>508.102</b>	10mm Angled Socket Wrench
1	<b>33031</b>	3.1mm ESF Drill Bit	1	<b>33031</b>	3.1mm ESF Drill Bit
1	<b>33039</b>	3.9mm ESF Drill Bit	1	<b>33039</b>	3.9mm ESF Drill Bit
1	<b>34031</b>	3.1mm Drill Sleeve	1	<b>34031</b>	3.1mm Drill Sleeve
1	<b>34039</b>	3.9mm Drill Sleeve	1	<b>34039</b>	3.9mm Drill Sleeve
8	<b>17180</b>	4.0mm Duraface® Half-pin†	8	<b>17180NP</b>	4.0mm Duraface® Half-pin, NP†
4	<b>20180</b>	3.2/4.0mm Centerface® Full-pin	4	<b>20180NP</b>	3.2/4.0mm Centerface® Full-pin, NP
8	<b>17532</b>	4.8mm Duraface® Half-pin†	8	<b>17532NP</b>	4.8mm Duraface® Half-pin, NP†
4	<b>20532</b>	4.0/4.8mm Centerface® Full-pin	4	<b>20532NP</b>	4.0/4.8mm Centerface® Full-pin, NP

\* U.S. Patent # 5,921,985

† U.S. Patent # 8,282,676

## Large SK® Range of Motion (ROM™) Hinge

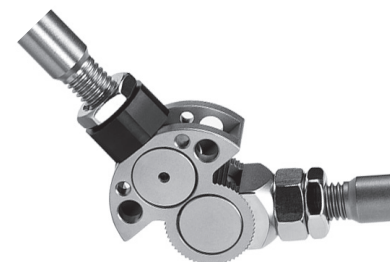
Range of motion (ROM™) hinges feature an adjustable joint angle and allow a variable range of motion as selected by the surgeon. Each size contains a multi-toothed locking nut that allows the surgeon to lock-in any desired starting position or “normal standing angle.” The opposite end features a central flat that determines the locked position and two adjacent arcs that allow for a chosen degree of motion. The ability to progressively increase the allotted range of motion during the healing period is unique to the ROM™ hinge and can be utilized or ignored depending on patient management requirements.

ROM™ hinges should be reserved for challenging situations that demand controlled motion or intermittent therapy. They should not be considered for most routine transarticular fixation frames.

### Large SK® Range of Motion (ROM™) Hinge

The large ROM™ hinge uses special titanium hinge rods with 8mm threads and a 9.5mm rod diameter that accepts large SK® ESF clamps. As purchased, the large SK® ROM™ hinge comes assembled with 100mm and 150mm hinge rods and measures approximately 260mm in length. Other lengths of large ROM™ hinge rods can be exchanged to create a custom length ROM™ hinge assembly. Requires 13mm and 15mm wrenches (not included).

Item #	Overall Length	Clamp Size
<b>530.000</b>	260mm	Large SK®



### Large Titanium ROM™ Hinge Rods, 9.5mm Diameter, 8mm Thread

The major, smooth portion of this rod supports large SK® clamps with its 9.5mm diameter. One end of the rod has 8mm threads, which mate in the large ROM™ hinge pin. Available in four lengths to provide the surgeon a modular opportunity to construct a large ROM™ hinge assembly with each rod being of appropriate length for the clinical case.

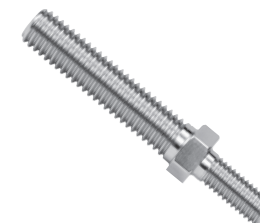
Item #	Diameter	Length
<b>530.075</b>	9.5mm	75mm (3")
<b>530.100</b>	9.5mm	100mm (4")
<b>530.150</b>	9.5mm	150mm (6")
<b>530.200</b>	9.5mm	200mm (8")



### Large SK® Range of Motion (ROM™) Hinge Adapters

Utilized to mount the large SK® ROM™ hinge to IMEX® circular fixation rings. The SK® ROM™ hinge adapter features an 8mm threaded end to mate with the large SK® ROM™ hinge and a 6mm threaded end to articulate with circular fixation rings.

Item #	Length	Thread Diameters
<b>531.045</b>	45mm	6mm/8mm
<b>531.055</b>	55mm	6mm/8mm



# Acrylx™ ESF Acrylic System Components

Acrylx™ is a methacrylate based composite resin designed to simplify construction of pin and acrylic external fixators on toy breeds, avian, exotics and mandibular fractures. Unlike other commonly used products, Acrylx™ has minimal odor and does not require pre-mixing before application. Acrylx™ is near-radiolucent while providing abrasion resistance and high strength.

## Acrylx™ Resin Cartridge

Item # 70012

A single cartridge provides 50ml of mixed product – enough material to construct several small patient frames. Maximum shelf-life is maintained by refrigerated storage. If refrigerated, it is recommended to allow the cartridge to reach room temperature before use as not to alter setting characteristics. A 12-minute set time is typical. Each cartridge purchase includes five yellow and five pink mixing tips. **External use only**



## Acrylx™ Applicator Gun

Item # 70011

The custom mixing gun accepts the divided Acrylx™ cartridge, is easy to control, durable and should last many years under normal use.



## Acrylx™ Mixing Tips

Mixing tips are available in a variety of sizes and can be ordered individually. Five yellow and five pink tips are included with each cartridge purchase.



Item #	Description
70013	Acrylx™ Mixing Tip, Fine (Blue)
70014	Acrylx™ Mixing Tip, Medium (Yellow)
70015	Acrylx™ Mixing Tip, Large (Pink)
70016	Acrylx™ Mixing Tip, Extra Large (Blue-Green)

# Acrylx™ ESF Acrylic System Components

## Acrylx™ Corrugated Tubing and Plugs

Acrylx™ is most commonly applied using thin-wall tubing as a mold. IMEX® provides two tube diameters for small patients: 6mm and 10mm. 6mm tubing is easily filled using medium, large, or extra large mixing tips. 10mm tubing utilizes an adapter plug which fits the mixing tip for a clean and smooth fill. Large or extra large mixing tips are commonly used with 10mm tubing.

Item #	Description	Max Pin Diameter
<b>70020</b>	Tubing, 6mm x 300mm	1.1mm (0.045")
<b>70050</b>	Tubing, 10mm x 300mm	2.0mm (5/64")
<b>70060</b>	Adapter Plug, 10mm	–
<b>70060R</b>	Solid Plug, 10mm	–



## Acrylx™ Accessory Pack

### Item # 70080

Accessory pack includes a variety of all mixing tips and tube sizes as well as 10mm adapter plugs. This pack is designed to provide all options at initial purchase of applicator gun and cartridge. All items in the kit are available individually for future orders or specific needs.

Qty	Item #	Description
3	<b>70013</b>	Mixing Tips, Fine (Blue)
3	<b>70014</b>	Mixing Tips, Medium (Yellow)
3	<b>70015</b>	Mixing Tips, Large (Pink)
3	<b>70016</b>	Mixing Tips, Extra Large (Blue-Green)
3	<b>70020</b>	Corrugated Tubing, 6 mm x 300 mm
3	<b>70050</b>	Corrugated Tubing, 10 mm x 300 mm
5	<b>70060</b>	10 mm Adapter Plug
5	<b>70060R</b>	10 mm Solid Plug

## Acrylx™ ESF FAQs

### I have used various hoof repair and dental methacrylate products successfully, why would I consider switching to Acrylx™?

Acrylx™ is a methacrylate based product so you will be familiar with use. However, Acrylx™ has little, if any, of the offensive odor commonly associated with use of PMMA products. In addition, Acrylx™ does not require pre-mixing or measuring so it is cleaner, easier and faster to apply than what you have previously used.

### What is the typical set up time for Acrylx™?

Twelve minutes at room temperature. You have about 2-4 minutes to adjust reduction and alignment, then the limb and column should be held **without motion** until set is complete. It is important not to have Acrylx™ (or any other resins) in motion during the actual cure period. Allow a minimum of 12 total minutes from tube fill until final anesthesia recovery or limb manipulation.

### What is the best way to determine if an Acrylx™ column has completely cured (hardened)?

The safest and most reliable method is to use a watch or timer. Allow a full 12 minutes after application before moving the frame. Up to 4 minutes after application is acceptable to fine tune reduction, then eliminate any additional motion during the cure process. **Do not wiggle or pinch the column during the cure period to determine hardness.** 12 minutes will coincide with maximum exotherm followed by a brief cooling period.

### Why does IMEX® emphasize this product for avian, exotic, feline, toy breeds and mandibular fractures?

These are cases that frequently present difficulties using traditional linear connecting bars and clamps. With very small patients, even clamps positioned adjacent to one another often result in inadequate pin number in a bone fragment. The small bone fragments and small pins required often result in pins being out of normal planes. A construct that is compact but strong, while allowing pin diameter and location freedom, is often required. Mechanical frames on mandibular fractures of larger patients are possible but difficult to apply and keep clean postoperatively. Acrylic and pin frames solve these problems.

### The Acrylx™ applicator gun appears the same as a gun I have. Can I use my gun with the Acrylx™ cartridge?

Maybe. This type of gun is commonly used in the dental and adhesive market. There is more than one style and some companies use more than one gun. The Acrylx™ applicator gun is designed for 1:1 and 2:1 cartridge systems. This information is usually on the gun. Applicator guns for ProTemp™ or Integrity® are not compatible. Check your gun for information near the handle and call IMEX® with any questions. The cost of Acrylx™ compared to many dental products is so favorable that purchase of another gun, if required, becomes insignificant.

## Acrylx™ ESF FAQs

### Does an ESF column of Acrylx™ interfere with radiographic evaluation of fracture reduction and healing?

No, IMEX® specifically formulated Acrylx™ to eliminate barium and other radiodense components that might interfere with radiographic evaluation of fracture management.

### Can I use Acrylx™ to construct ESF frames on larger patients?

Acrylx™ is similar in strength to commonly used dental two-part methacrylate resins which are sometimes used for larger patients. Large patients often require a 20 to 25mm diameter column in lengths of 200 to 250mm that may require multiple cartridges of Acrylx™ to build an adequate frame. This required volume results in traditional products being at a significant economic advantage.

### Once I have opened and used an Acrylx™ cartridge, does all of the resin have to be used or lost?

No, one of the advantages of Acrylx™ is that unused resin in the cartridge remains viable for future cases. The mixing tip used for the application is simply left on the cartridge to act as a cap until next use. At next use, the old mixing tip is removed and a new one is applied. You are then ready for another application.

### The cartridge provides multi-use potential, but how many cases will I get from a single cartridge?

This depends on the diameter and length of the external columns. Based on several avian skeleton model applications averaging a 100mm length of 6mm tube, approximately 9 cases could be performed with a single resin cartridge. A single cartridge will fill approximately 45cm of 10mm tube and 100cm of 6mm tube.

### I applied an Acrylx™ fixator and after 20 minutes the column remained pliable. What did I do wrong?

Motion of the resin column during the liquid-to-solid phase change is likely to result in a number of fissures. Fissured resin contained within corrugated tubing gives the feel of pliability when it is actually fully hardened.

### My Acrylx™ remains sticky at the surface well after it should be hardened. Does this mean the resin has not hardened properly?

No, what you feel is known as the “oxygen inhibited layer,” a by-product of the cure process. Customers filling tubing columns often do not even notice this layer, but it is obvious to those who are applying Acrylx™ over bent pins or performing similar “open” application. As long as this layer is intact and clean, one can add additional Acrylx™ and expect an excellent bond. If desired, this layer can simply be wiped away with isopropyl alcohol on a gauze pad or cotton ball.



## Acrylx™ ESF FAQs

### Does Acrylx™ generate an exothermic reaction like my hoof and dental powder and liquid products?

Yes, Acrylx™ generates heat as it sets up. Informal laser probe analysis indicates it does not generate more heat than commonly used hoof or powder/liquid dental mix products, which have proven safety records when constructing even larger columns. With the small tube diameter used to create Acrylx™ external columns, potential for bone damage at pin locations is even less likely.

### What is the shelf-life of a cartridge?

Acrylx™ shelf-life is currently labeled for 18 months from manufacture and can be prolonged by refrigeration. It is best to allow the resin to adjust to room temperature prior to clinical application; keeping viscosity and set time consistent.

### Are the mixing tips, tubes, applicator gun and cartridge sterile?

No, these are all non-sterile. Customers typically use a two-phase technique when applying acrylic and pin frames. The first phase is the sterile phase and includes surgical approach, reduction, pin application and closure. The second, non-sterile phase, includes application of tubing mold and Acrylx™ followed by any final reduction and cure. Occasionally, surgeons have sterilized these components using ethylene oxide, but it has not been proven that the actual resin is sterile.

### What are the advantages to purchasing the accessory pack?

The accessory pack is an excellent purchase for each new Acrylx™ user and he/she will find something they prefer in the pack. Future purchases are usually for these preferred items and not for repeat accessory packs. Try it and find which tips, tubes and plugs work best for you.

### What ESF pins are most commonly used with Acrylx™ frames?

Miniature Interface® and Centerface® are the most commonly used pins with acrylic frames. Use of these small diameter, threaded fixation pins prolongs longevity of the pin/bone interface and reduces patient morbidity as compared to smooth pins and K-wire.

6mm tubing is approximately the diameter of a pencil and should be reserved for the smallest of patients. The largest recommended pin for use with 6mm tubing is 1.1mm (0.045"). Pins up to 2.0mm (5/64") in diameter are acceptable for use with 10mm tubing.

Pin Size	6mm Tubing	10mm Tubing
0.9mm (0.035")	✓	✓
1.1mm (0.045")	✓	✓
1.6mm (0.062")	X	✓
2.0mm (5/64")	X	✓

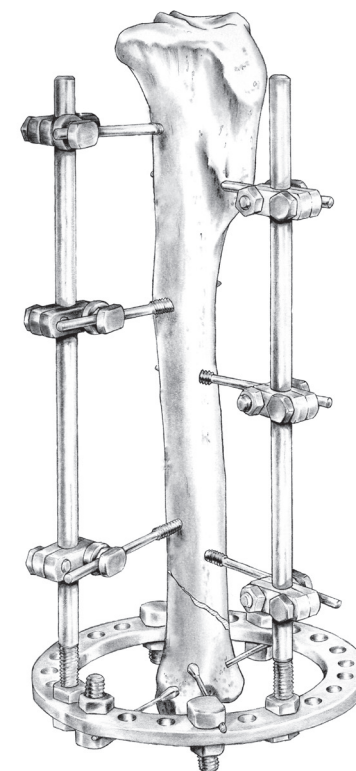
## SK® Hybrid External Skeletal Fixation

Circular fixators typically utilize fine wires placed under tension instead of normal diameter half-pins and full-pins. When loaded, fine wires under tension behave in a non-linear fashion demonstrating low stiffness early but increasing in stiffness as loading becomes greater. This non-linear stiffness is considered the basis of the Ilizarov method and some consider it to enhance the fracture healing process.

When components of traditional linear ESF and circular ESF frames are combined, the resulting frame is considered a hybrid ESF frame. Something as simple as substituting traditional pins for fine wires in a multi-ring circular ESF frame becomes a hybrid frame by definition. This is commonly done with circular ESF frames applied to the tibia to eliminate morbidity often associated with fine wires near the stifle.

By utilizing hybrid rods or hybrid adapters, the SK® linear fixator is easily coupled with circular ESF devices to form hybrid frames that consist of a single ring with fine wires. These “simple” hybrid frames are relatively inexpensive and straightforward to construct as compared to more complex circular or hybrid ESF frames. These hybrid frames are practical alternatives to transarticular ESF frames for stabilization of very small fracture fragments. In addition, hybrid frames can be alternatives to complete circular ESF frames for selected growth deformity patients.

Standard and mini hybrid ESF starter kits were developed for surgeons with existing SK® linear ESF component inventory and experience but not for those with significant inventory of circular ESF components. These kits contain a large variety of components to allow construction of advanced hybrid frames or multiple hybrid frames.



## SK® Hybrid ESF FAQs

### What are common situations where hybrid external fixators might be utilized?

Since use of small diameter wires allows the capture of small bone fragments, hybrid ESF frames are popular for fixation of fractures with a short juxta-articular bone fragment where standard ESF pins or bone plating might be difficult. In addition, many referral practices utilize hybrid frames for correction of growth deformities.

### Are small diameter wires always utilized across the ring when hybrid frames are constructed?

No, it is especially common to use standard full-pins and half-pins when repairing juxta-articular fractures of the distal humerus or distal femur. In these locations it is difficult to obtain wire divergency because of the patient anatomy. When wires do not have divergency, less stability is achieved. Attempts to increase wire divergency in these locations results in unacceptable soft-tissue morbidity. Threaded ESF pins perform well in these locations.

### When are “stopper” wires preferred over smooth wires?

Small diameter wires are not threaded and therefore are subject to micromotion. When four or more smooth wires are used with good divergency, stability is adequate. When wire number is reduced or divergency is not adequate, surgeons choose to place stopper wires (also called olive wires) to reduce micromotion and enhance stability. Stopper wires have a centrally located expanded bead designed for placement against the bone. Most situations where hybrid frames are chosen will benefit from the added stability provided by stopper wires.

### What size SK® linear ESF components can be used to construct hybrid frames?

Mini and small SK® clamps can be utilized to construct hybrid frames. The SK® ESF System is the most modular veterinary fixator available. The small SK® is the most commonly used hybrid frame due to its ability to cover a wide patient range.

### Tell me more about tensioning fixation wires.

Diameter is the key element in determining the stiffness or resistance to bending of a fixation pin. Hybrid (and circular frame) fixation wires are of small diameter, but placing them under tension can enhance their mechanical performance. IMEX® provides a wire-tensioning device for this purpose. When the distance the wire spans is short (small diameter rings) or the patient is small (mini rings), wire tensioning is not necessary. When ring diameters or patients are large, wires must be tensioned to achieve adequate mechanical stability.

## SK® Hybrid ESF FAQs

### What is the learning curve for hybrid external skeletal fixation?

Assuming one is knowledgeable and experienced with linear external skeletal fixation, the learning curve is relatively short for fracture repair using hybrid frames. The necessary details to master are proper wire placement, wire tensioning, and component selection. One should be well versed with linear fixators before attempting hybrid ESF. Many consider hybrid ESF a simpler alternative to growth deformity correction than true circular ESF frames.

### What are some other mechanical considerations with hybrid frames?

True circular ESF frames are built with three or four threaded rods spanning the length of the involved bone and supporting the ring in several places. Hybrid frames often mimic a Type I-a or Type I-b frame and only support the ring at one or two locations. With 35mm, 45mm or occasionally 50mm rings, a single support may result in a stable frame. When larger rings are used or unstable scenarios are encountered, it is mandatory to use struts or additional sidebars to stabilize the ring in two or more locations. Larger ring diameters are most secure with a construct of three or more supports (rods and struts).

### What are the economics of hybrid external fixator frames?

Most hybrid conversations begin with the assumption that the surgeon owns basic SK® linear external fixation components. Therefore, only a minimum of circular fixation components are necessary compared to a complete circular external fixation frame. Hybrid frame cost is significantly less than a complete CESF frame. The modular nature of the IMEX® system allows one to upgrade to a true CESF frame with the same components.

## SK® Hybrid ESF Rods

### Mini SK® Stainless Steel Hybrid Rod, 3.2mm Diameter, 4mm Thread

The major, smooth portion of this rod supports mini SK® clamps with its 3.2mm diameter. One end of the rod has 4mm threads for coupling with IMEX® Miniature Circular ESF System components. Hybrid frames utilize circular ESF technology for very small fracture segments without the complexity of a complete circular ESF frame. Additional use of paired spherical nuts and washers allow postoperative manipulation to fine-tune reduction. Easily cut to desired length.

Item #	Diameter	Length	~ Inches
<b>307.125</b>	3.2mm	125mm	(1/8" x 5")



### Small SK® Titanium Hybrid Rods, 6.3mm Diameter, 6mm Thread

Small SK® titanium hybrid rods are commonly utilized to construct hybrid ESF frames but are also a modular assembly element of the small SK® ROM™ hinge. Length increments from 50mm to 250mm are available allowing custom modification of small ROM™ hinge assemblies.

Item #	Diameter	Length	~ Inches
<b>407.050</b>	6.3mm	50mm	(1/4" x 2")
<b>407.075</b>	6.3mm	75mm	(1/4" x 3")
<b>407.100</b>	6.3mm	100mm	(1/4" x 4")
<b>407.150</b>	6.3mm	150mm	(1/4" x 6")
<b>407.200</b>	6.3mm	200mm	(1/4" x 8")
<b>407.250</b>	6.3mm	250mm	(1/4" x 10")



# VariBall Locking Hybrid Rods and Universal Hybrid Adapter

## VariBall Locking Hybrid Rods

The VariBall Locking Hybrid Rod (LHR) offers the surgeon approximately 100 degrees of angular freedom when creating hybrid ESF frames. The VariBall LHR features a small footprint that consumes only one hole on IMEX® circular fixation rings. Integrated 6mm bolt provides easy frame assembly onto IMEX® 50mm, 66mm, 84mm or 118mm CESF rings.

The multi-directional, locking ball is integrated with a 6.3mm carbon fiber rod for compatibility with the small SK® ESF clamp. Available in 4 lengths to minimize the need to cut carbon fiber rods.

As with most hybrid ESF frames, additional support struts or Type I-b frames are recommended.

Item #	Functional Rod Length	Overall Length	Rod Diameter
<b>420.100</b>	95mm	120mm	6.3mm
<b>420.150</b>	145mm	170mm	6.3mm
<b>420.200</b>	195mm	220mm	6.3mm
<b>420.250</b>	245mm	270mm	6.3mm

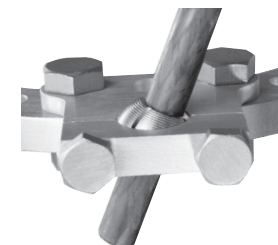


## Universal SK® Hybrid Adapter

### Item # 410.000

The small Universal SK® Hybrid Adapter offers the advantage of using standard 6.3mm titanium or carbon fiber rods to create hybrid frames. In addition, it offers up to 60 degrees of adjustment compared to 15 degrees using standard spherical nuts and washers. As with most hybrid ESF frames, additional support struts or Type I-b frames are recommended.

- Attaches easily to a 50mm, 66mm, 84mm or 118mm ring with two 6mm x 16mm hex bolts and 6mm hex nuts. Third hole can be utilized for additional hardware placement.
- Rod-gripping element fits 6.3mm rods and allows 60 degrees of adjustment. Accepts standard small SK® ESF titanium or carbon fiber rods.
- Rod-gripping bolts should alternately be tightened using a lag effect to secure the rod.
- Does not reduce the need for additional sidebar or support struts.



## SK® Hybrid ESF Starter Kits

### Small SK® Hybrid ESF Starter Kit\*

#### Item # HYSKT

Quantity	Item #	Description
2	<b>407.050</b>	Hybrid Rod, 6.3mm x 50mm
2	<b>407.075</b>	Hybrid Rod, 6.3mm x 75mm
2	<b>407.100</b>	Hybrid Rod, 6.3mm x 100mm
2	<b>407.150</b>	Hybrid Rod, 6.3mm x 150mm
2	<b>407.200</b>	Hybrid Rod, 6.3mm x 200mm
2	<b>407.250</b>	Hybrid Rod, 6.3mm x 250mm
1	<b>2.15004</b>	Stretch Ring, 50mm x 3.2mm
1	<b>2.16604</b>	Stretch Ring, 66mm x 3.2mm
1	<b>2.18404</b>	Stretch Ring, 84mm x 4.7mm
1	<b>2.15001</b>	Full Ring, 50mm x 3.2mm
1	<b>2.16601</b>	Full Ring, 66mm x 3.2mm
1	<b>2.18401</b>	Full Ring, 84mm x 4.7mm
6	<b>2.30007</b>	Hex Bolt, 6mm x 12mm
4	<b>2.30016</b>	Hex Bolt, 6mm x 16mm
2	<b>2.30003</b>	Hex Bolt, 6mm x 40mm
3	<b>2.30001</b>	Extended Nut, 6mm x 12mm
20	<b>2.30006</b>	Hex Nut, 6mm
15	<b>2.30008</b>	Flat Washer, 6mm
6	<b>2.30004</b>	Cannulated/Slotted Wire Fixation Bolt, 6mm
6	<b>2.30005</b>	Slotted Wire Fixation Washer, 6mm
4	<b>2.30009</b>	Half-pin Fixation Bolt
1	<b>2.60001</b>	Angular Hinge Assembly, 6mm
1	<b>2.50002</b>	3mm Hex Driver - "L"
2	<b>2.70005</b>	One-hole Post
2	<b>2.70006</b>	Two-hole Post
4	<b>2.70007</b>	Spherical Nut, 6mm
4	<b>2.70008</b>	Spherical Washer, 6mm

Quantity	Item #	Description
1	<b>420.200</b>	VariBall Locking Hybrid Rods, 6.3mm x 200mm
2	<b>2.40001</b>	Fixation Wire, 1.6mm x 220mm
6	<b>2.40002</b>	Stopper Fixation Wire, 1.6mm x 200mm
1	<b>2.50014</b>	Dyna™ Wire Tensioner
2	<b>2.50003</b>	10mm Combination Wrench
1	<b>508.102</b>	10mm Angled Socket Wrench
1	<b>30012</b>	Yellow Polypropylene Tray

#### Popular additions to the Small SK® Hybrid ESF Starter Kit

**Item # 2.70002** – Two-hole Plate

**Item # 410.000** – Universal SK® Hybrid Adapter

\* Small SK® components and instrumentation required for Small SK® Hybrid ESF Starter Kit

## SK® Hybrid ESF Starter Kits

### Mini SK® Hybrid ESF Starter Kit\*

Item # MHYSKT

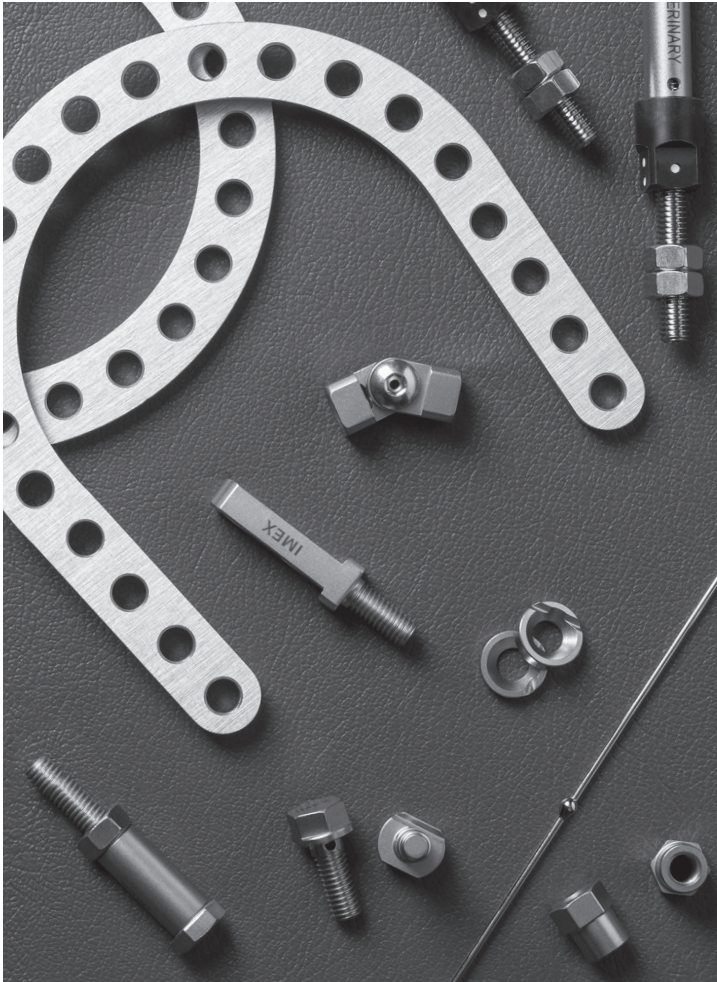
Quantity	Item #	Description
2	<b>307.125</b>	Hybrid Rod, 3.2mm x 125mm
1	<b>4.13501</b>	Full Ring, 35mm x 2.4mm
1	<b>4.14501</b>	Full Ring, 45mm x 2.4mm
1	<b>4.14504</b>	Stretch Ring, 45mm x 2.4mm
6	<b>4.30001</b>	Cannulated/Slotted Wire Fixation Bolt, 4mm
6	<b>4.30005</b>	Slotted Wire Fixation Washer, 4mm
1	<b>4.60001</b>	Angular Hinge Assembly, Mini
2	<b>4.70005</b>	One-hole Post, Mini
16	<b>4.30006</b>	Hex Nut, 4mm
10	<b>4.30008</b>	Flat Washer, 4mm
4	<b>4.70007</b>	Spherical Nut, 4mm
4	<b>4.70008</b>	Spherical Washer, 4mm
4	<b>300.003</b>	Hex Bolt, 4mm x 8mm
6	<b>4.40002</b>	Stopper Wire, 1.0mm x 125mm
1	<b>4.50003</b>	7mm Combination Wrench

\* Mini SK® components and instrumentation required for above kit.

For pins and wires larger than 1.6mm (0.062") consider using the mini SK® clamp bolt for a half-pin fixation bolt. This can be purchased separately as item number 300.001 or taken from a mini SK® clamp assembly.



## IMEX® Circular External Skeletal Fixation System



Most veterinary surgeons are acquainted with the Ilizarov method of circular external skeletal fixation for limb lengthening and correction of angular limb deformities. While circular external skeletal fixators have proven beneficial to veterinary surgeons, previous devices were too expensive or poorly designed. In addition, most circular fixators can be very difficult to manage on an outpatient basis.

The goal of the IMEX® Circular External Skeletal Fixation System is to provide the veterinary surgeon with a functional and affordable circular external skeletal fixator that meets the following criteria:

- Mechanically and biologically sound
- Affordable and available
- Relatively easy application and adjustment
- Minimal required instrumentation
- Applicable to fracture management and limb deformities

Most importantly, a system designed for outpatient limb lengthening and correction of growth deformities must be designed to simplify daily outpatient manipulations to the degree required to ensure accurate daily corrections with minimal patient morbidity.

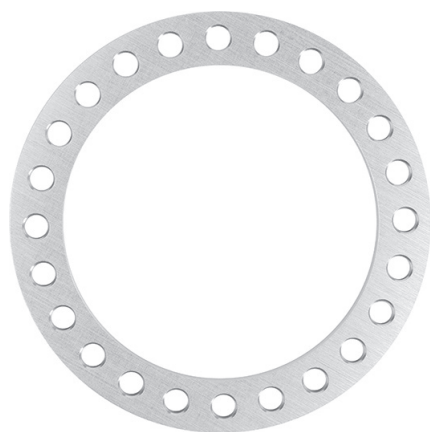
Developed in conjunction with a group of veterinary surgeons, bioengineers, and M.D.s at a leading research center, the IMEX® Circular ESF System meets this criteria. Daily manipulations are performed around a patented (U.S. Patent # 5,968,043) Zero Tolerance/Zero Motion system that is patient- and owner-friendly. The IMEX® Circular External Skeletal Fixation System is designed to be compatible with the SK® ESF System by IMEX®, thus providing a simple, cost-effective method of hybrid frame construction.

Successful application of the circular ESF method requires training and experience. However, once well-versed with the system, surgeons will realize tremendous biological and mechanical control over many limb deformity, joint incongruity and fracture scenarios.

Mechanical attributes and user-friendliness have made the IMEX® Circular ESF System a popular choice among private referral surgeons and academic institutes worldwide.

## Fixation Rings

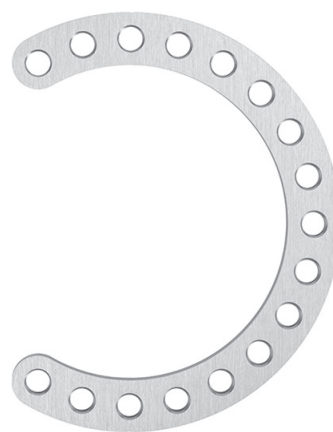
High-strength, anodized aluminum circular fixation rings are available in full, 5/8, 1/3, stretch, and spinal arches. Provides frame design simplicity.



### Full Rings

Basic building blocks of the IMEX® Circular ESF System.

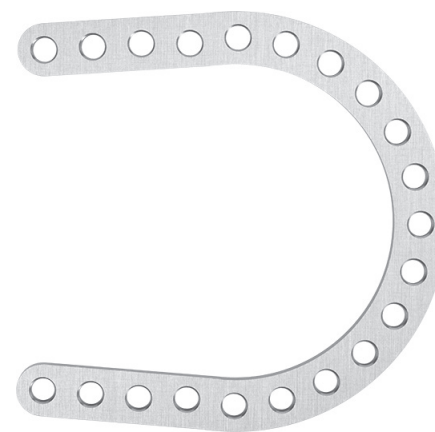
Item #	Internal Diameter	Thickness
<b>2.15001</b>	50mm	3.2mm
<b>2.16601</b>	66mm	3.2mm
<b>2.18401</b>	84mm	4.7mm
<b>2.11181</b>	118mm	6.3mm



### 5/8 Rings

Typically used alone to avoid anatomical constraints. Can be closed with 1/3 ring.

Item #	Internal Diameter	Thickness
<b>2.15002</b>	50mm	3.2mm
<b>2.16602</b>	66mm	3.2mm
<b>2.18402</b>	84mm	4.7mm
<b>2.11182</b>	118mm	6.3mm



### Stretch Rings

Popular around hock and elbow to allow range of motion without a larger ring diameter being used. Can be closed with a 1/3 ring if desired.

Item #	Internal Diameter	Thickness
<b>2.15004</b>	50mm	3.2mm
<b>2.16604</b>	66mm	3.2mm
<b>2.18404</b>	84mm	4.7mm
<b>2.11184</b>	118mm	6.3mm

## Fixation Rings



### 1/3 Rings

Can be utilized alone as a supporting element, or can be utilized to close a 5/8 ring or stretch ring if additional mechanical properties are desired.

Item #	Internal Diameter	Thickness
<b>2.15003</b>	50mm	3.2mm
<b>2.16603</b>	66mm	3.2mm
<b>2.18403</b>	84mm	4.7mm
<b>2.11183</b>	118mm	6.3mm



### Spinal Arches

A structural element for the IMEX® Circular ESF System. The large radius of the spinal arch allows temporary or permanent placement of fine wire or half-pins along the spine for reduction or repair of spinal injuries. Often used with small SK® clamps for 6mm threaded rod (**Item # 2.80001**).

Item #	Internal Diameter	Thickness
<b>2.80140</b>	140mm	6.3mm
<b>2.80220</b>	220mm	6.3mm

# Linear Motors and Threaded Rods

## Linear Distraction Motors

Available in three lengths for applying distraction or compression. When a shorter motor approaches maximum distraction, the threaded rod can be driven back into the motor and the motor removed and replaced with the next longer motor. This sequential swap method is more stable and easier than merely adding longer rods to a motor as it reaches maximum distraction. Visualization holes in the motor body enable the surgeon to determine when the motor approaches maximum distraction. U.S. Patent # 5,968,043

- Provides for simplified frame construction and patient management
- Zero Tolerance/Zero Motion design helps ensure owner compliance and patient comfort
- 3mm hex drive recess and 10mm wrench flats
- Stainless bodies and threaded rod with nylon drive bushings
- Capable of being swapped out in sequence to maintain frame integrity over long distractions
- Thread pitch = 1.0mm

Item #	Length*	Distraction Length
<b>2.25500</b>	50mm	12mm
<b>2.25700</b>	70mm	33mm
<b>2.25100</b>	100mm	60mm

\* Base of body to top of drive bushing

## Threaded Rods, 6mm

Stainless steel with 3mm hex drive recess on both ends, which allows for rapid exchange of rods. Thread pitch = 1.0mm

Item #	Thread Diameter	Length
<b>2.26600</b>	6mm	60mm
<b>2.26800</b>	6mm	80mm
<b>2.26100</b>	6mm	100mm
<b>2.26150</b>	6mm	150mm
<b>2.26255</b>	6mm	255mm



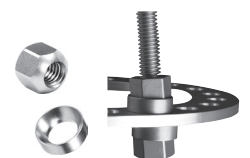
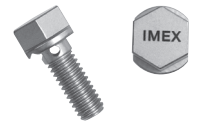
## Bolts, Nuts and Washers

ITEM #	DESCRIPTION
2.70001	<p><b>Nylon Zero Tolerance Nut, 6mm</b></p> <p>Zero Tolerance/Zero Motion design. Can be utilized to compress or distract rings, rods, and hinges. Perfect when rings are too close to mount a linear motor. Also used for bone transport. <b>Must be used in pairs.</b> Best manipulated with 10mm double wrench (<b>Item # 2.50005</b>). Thread pitch equals 1.0mm. U.S. Patent # 5,968,043</p>
2.30007	<p><b>Hex Bolt, 6mm x 12mm</b></p> <p>Utilized as fastening element for linear motors, slotted washers, hinges, and other components. Stainless steel. 10mm wrench flats.</p>
2.30016	<p><b>Hex Bolt, 6mm x 16mm</b></p> <p>A handy fastener for creation of drop wires when using thicker rings. The extra length supports placement of additional flat or slotted washers. Also used to mount the universal SK® hybrid adapter to rings. Head is marked “16” to differentiate from the more common 12mm hex bolt. Stainless steel. 10mm wrench flats.</p>
2.30003	<p><b>Hex Bolt, 6mm x 40mm</b></p> <p>Couples with 20mm spacer to provide quick, accurate assembly of minimal length ring blocks. Also used to mount angular hinges above ring. Stainless steel. 10mm wrench flats.</p>
2.30006	<p><b>Hex Nut, 6mm</b></p> <p>The basic fastening element of circular and hybrid ESF systems. Fits all rods, motors, and bolts. Stainless steel. 10mm wrench flats.</p>
2.30002	<p><b>Spacer, 20mm</b></p> <p>Couples with 40mm hex bolt to provide rapid, accurate assembly of ring blocks. Stainless steel.</p>



## Bolts, Nuts and Washers

ITEM #	DESCRIPTION
2.30001	<p><b>Extended Nut, 6mm</b></p> <p>Extended nuts are designed with an increased height of 12mm to simplify application of fasteners and components at locations that are difficult to approach with a wrench. Stainless steel.</p>
2.30008	<p><b>Flat Washer, 6mm</b></p> <p>Provides needed fill or offset during frame construction to maintain wire alignment. Stainless steel.</p>
2.30004	<p><b>Cannulated / Slotted Wire Fixation Bolt</b></p> <p>Bolt is slotted and cannulated, providing two different points to capture and anchor fixation wires to rings. 6mm thread, 10mm wrench flats. Stainless steel.</p>
2.30005	<p><b>Slotted Wire Fixation Washer</b></p> <p>Allows capture of fixation wires to rings (or rods) at locations otherwise occupied by supporting elements. Also utilized for drop-wire technique. Can be pre-placed in several locations for optimal freedom. Stainless steel.</p>
2.30009	<p><b>Half-Pin Fixation Bolt</b></p> <p>Anchors traditional half-pins or full-pins to rings. Accepts 3.0mm to 4.8mm pins. 6mm thread, 10mm wrench flats. Stainless steel. U.S. Patent # 5,921,985</p>
2.70007	<p><b>Spherical Nut, 6mm</b></p>
2.70008	<p><b>Spherical Washer, 6mm</b></p> <p>By placing a pair on each side of a ring, rod angle can be adjusted to fine-tune reduction and assembly. Six pairs will allow a ring or ring block with three rods to be adjusted. <b>Two mating pairs must be used</b> requiring two 10mm wrenches. Stainless steel.</p>



## Plates and Posts

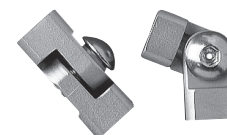
ITEM #	DESCRIPTION
2.70002	<p><b>Two-Hole Plate</b></p> <p>Can be utilized to construct frames with different diameter rings, to mount hinges “outboard” off ring surface, or to elongate partial ring assemblies. Also valuable with free-form frame construction. Stainless steel.</p>
2.70005	<p><b>One-Hole Post</b></p>
2.70006	<p><b>Two-Hole Post</b></p> <p>Mounts to ring to support additional wires, half-pins, and other elements. Stainless steel.</p>
2.80001	<p><b>Small SK® ESF Clamp for 6mm Threaded Rod</b></p> <p>Similar in design to our small SK® ESF clamp; however, it has a threaded, rod-gripping channel which mounts on 6mm threaded rods. Allows addition of clamp and half-pin anywhere along a threaded rod. U.S. Patent # 5,921,985</p>





## Angular Distraction Components and Fixation Wires

ITEM #	DESCRIPTION
2.60001	<p><b>Angular Hinge Assembly</b></p> <p>Used in pairs with angular motors for gradual correction of challenging angular deformities. Cannulated hinge screw allows for easier frame construction and utilizes a 3mm hex driver. Loosen prior to steam sterilization and adjust at surgery. Also commonly used with hybrid frames to create support struts. U.S. Patent # 5,968,043</p>



2.60002	<p><b>100mm Angular Motor</b></p>
2.60003	<p><b>150mm Angular Motor</b></p> <p>Zero Tolerance/Zero Motion design. Simplifies outpatient management of complicated angular deformities. Loosen hinge screws prior to steam sterilization and adjust at surgery. U.S. Patent # 5,968,043</p>



ITEM #	DESCRIPTION
2.40001	<p><b>Smooth Fixation Wire, 1.6mm x 220mm</b></p> <p>Free-cutting point provides for accurate wire placement. Implant quality stainless steel.</p>

2.40002	<p><b>Fixation Wire with Stopper, 1.6mm x 200mm</b></p>
2.40003	<p><b>Fixation Wire with Stopper, 1.3mm x 165mm</b></p> <p>Provides additional stability when patient anatomy does not allow optimal wire placement. Special point geometry allows free-cutting for straight application with minimal heat. Also used for fracture reduction and bone transport. Implant quality stainless steel.</p>





## Circular ESF Instrumentation

ITEM #	DESCRIPTION
2.50001	3mm Hex Driver, Straight
2.50002	3mm Hex Driver, L Used to simplify relocation or addition of threaded rods. Also used for loosening fasteners on angular hinges and motors prior to steam sterilization. The straight driver is commonly mounted on a drill to speed frame assembly and management.
2.50003	10mm Combination Wrench The basic wrench of the circular ESF system. Often used in pairs. Also compatible with large SK® Linear ESF System.
508.102	10mm Angled Open Socket Wrench Very handy and easy to use as a second 10mm wrench for various locations. Also compatible with large SK® Linear ESF System.
2.50005	10mm Double Wrench Used to turn paired nylon nuts simultaneously to achieve compression or distraction. Not for use with metal fasteners.
2.50014	Dyna™ Wire Tensioner Used to apply tension to small diameter fixation wires. Semi-calibrated.  No tension is required on 50mm rings, but the tensioner can be utilized to remove slack from the wire. The first indicator line represents maximum tension to be used on the 66mm full ring. Second and third lines represent maximum tension to be applied to 84mm and 118mm full rings, respectively. Not for use with miniature 35mm or 45mm rings.



## Circular ESF Starter Kits

### Deluxe Circular ESF Starter Kit

Item # 2.00000

Quantity	Item #	Description
3	<b>2.15001</b>	Full Ring, 50mm x 3.2mm
3	<b>2.16601</b>	Full Ring, 66mm x 3.2mm
3	<b>2.18401</b>	Full Ring, 84mm x 4.7mm
3	<b>2.11181</b>	Full Ring, 118mm x 6.3mm
1	<b>2.15002</b>	5/8 Ring, 50mm x 3.2mm
1	<b>2.16602</b>	5/8 Ring, 66mm x 3.2mm
1	<b>2.18402</b>	5/8 Ring, 84mm x 4.7mm
1	<b>2.11182</b>	5/8 Ring, 118mm x 6.3mm
1	<b>2.15004</b>	Stretch Ring, 50mm x 3.2mm
1	<b>2.16604</b>	Stretch Ring, 66mm x 3.2mm
1	<b>2.18404</b>	Stretch Ring, 84mm x 4.7mm
1	<b>2.11184</b>	Stretch Ring, 118mm x 6.3mm
3	<b>2.25500</b>	Linear Motor, 50mm
3	<b>2.25700</b>	Linear Motor, 70mm
3	<b>2.25100</b>	Linear Motor, 100mm
3	<b>2.26600</b>	Threaded Rod/Hex, 60mm
3	<b>2.26800</b>	Threaded Rod/Hex, 80mm
3	<b>2.26100</b>	Threaded Rod/Hex, 100mm
3	<b>2.26150</b>	Threaded Rod/Hex, 150mm
3	<b>2.26255</b>	Threaded Rod/Hex, 255mm
8	<b>2.70001</b>	Nylon Zero Tolerance Nut, 6mm
1	<b>2.50005</b>	10mm Double Wrench
20	<b>2.30004</b>	Cannulated / Slotted Wire Fixation Bolt
8	<b>2.30005</b>	Slotted Wire Fixation Washer
3	<b>2.30001</b>	Extended Nut, 6mm x 12mm
50	<b>2.30006</b>	Hex Nut, 6mm
12	<b>2.30007</b>	Hex Bolt, 6mm x 12mm
4	<b>2.30016</b>	Hex Bolt, 6mm x 16mm

Quantity	Item #	Description
2	<b>2.30003</b>	Hex Bolt, 6mm x 40mm
12	<b>2.30008</b>	Flat Washer, 6mm
6	<b>2.30009</b>	Half-pin Fixation Bolt
6	<b>2.40001</b>	Smooth Fixation Wire, 1.6mm
8	<b>2.40002</b>	Stopper Wire, 1.6mm
2	<b>2.60001</b>	Angular Hinge Assembly
1	<b>2.60002</b>	100mm Angular Motor Assembly
1	<b>2.60003</b>	150mm Angular Motor Assembly
3	<b>2.70002</b>	Two-hole Plate
2	<b>2.50003</b>	10mm Combination Wrench
1	<b>508.102</b>	10mm Angled Socket Wrench
1	<b>2.50002</b>	3mm Hex Driver, L
1	<b>2.50001</b>	3mm Hex Driver, Straight
1	<b>2.50014</b>	Dyna™ Wire Tensioner
1	<b>30011</b>	Beige Polypropylene Tray
1	<b>30012</b>	Yellow Polypropylene Tray

#### Popular additions to the Circular ESF Starter Kits

**Item # 2.xxxx3** – 1/3 Rings

**Item # 2.70005** – One-hole Post

**Item # 2.70006** – Two-hole Post

## Circular ESF Starter Kits

### Basic Circular ESF Starter Kit

Item # 2.00001

Quantity	Item #	Description
3	<b>2.16601</b>	Full Ring, 66mm x 3.2mm
3	<b>2.18401</b>	Full Ring, 84mm x 4.7mm
1	<b>2.16604</b>	Stretch Ring, 66mm x 3.2mm
1	<b>2.18404</b>	Stretch Ring, 84mm x 4.7mm
3	<b>2.25700</b>	Linear Motor, 70mm
3	<b>2.26600</b>	Threaded Rod/Hex, 60mm
3	<b>2.26800</b>	Threaded Rod/Hex, 80mm
3	<b>2.26100</b>	Threaded Rod/Hex, 100mm
3	<b>2.26150</b>	Threaded Rod/Hex, 150mm
3	<b>2.26255</b>	Threaded Rod/Hex, 255mm
8	<b>2.70001</b>	Nylon Zero Tolerance Nut, 6mm
1	<b>2.50005</b>	10mm Double Wrench
20	<b>2.30004</b>	Cannulated / Slotted Wire Fixation Bolt
8	<b>2.30005</b>	Slotted Wire Fixation Washer
3	<b>2.30001</b>	Extended Nut, 6mm x 12mm
50	<b>2.30006</b>	Hex Nut, 6mm
12	<b>2.30007</b>	Hex Bolt, 6mm x 12mm
4	<b>2.30016</b>	Hex Bolt, 6mm x 16mm

Quantity	Item #	Description
2	<b>2.30003</b>	Hex Bolt, 6mm x 40mm
12	<b>2.30008</b>	Flat Washer, 6mm
6	<b>2.40001</b>	Smooth Fixation Wire, 1.6mm
8	<b>2.40002</b>	Stopper Wire, 1.6mm
2	<b>2.50003</b>	10mm Combination Wrench
1	<b>508.102</b>	10mm Angled Socket Wrench
1	<b>2.50002</b>	3mm Hex Driver, L
1	<b>2.50001</b>	3mm Hex Driver, Straight
1	<b>2.50014</b>	Dyna™ Wire Tensioner
1	<b>30011</b>	Beige Polypropylene Tray
1	<b>30012</b>	Yellow Polypropylene Tray

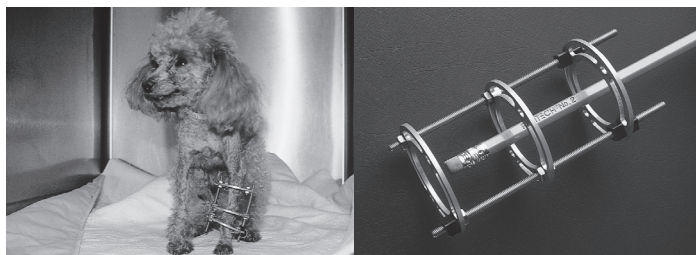
#### Popular additions to the Circular ESF Starter Kits

Item # **2.xxxx3** – 1/3 Rings

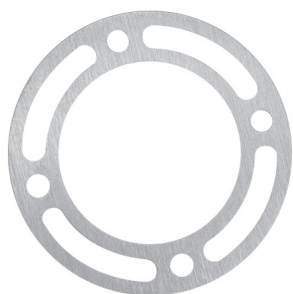
Item # **2.70005** – One-hole Post

Item # **2.70006** – Two-hole Post

## Miniature Circular External Skeletal Fixation System



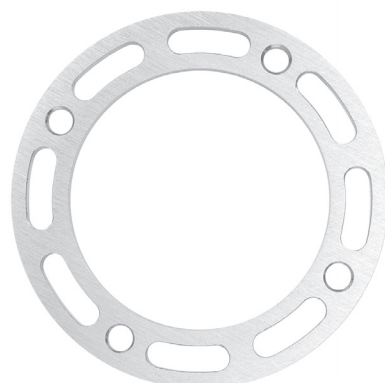
The miniature circular external skeletal fixation system expands the capability of CESF devices to include smaller patients. 1.0mm stopper wires with a trocar point are most often utilized for secure fixation, while 0.9mm and 1.1mm K-wires are also used as smooth fixation wires. All rings are aluminum and can be cut for conversion into arches or partial rings as desired. **Use of a wire tensioner is contraindicated with miniature rings.** Mini hybrid rods support construction of hybrid frames with mini SK® ESF components. Rods and fasteners are stainless steel.



### Full Ring, 35mm

The smallest ring in the Miniature CESF System. These rings are slotted for maximal wire position freedom and can be cut at holes to convert into arches or half-rings.

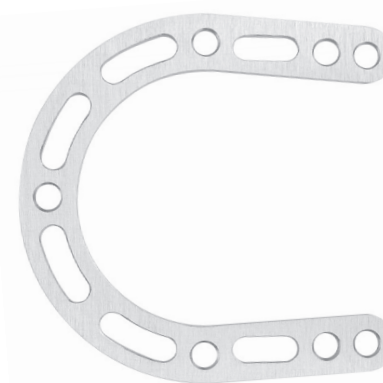
Item #	Internal Diameter	Thickness
<b>4.13501</b>	35mm	2.4mm



### Full Ring, 45mm

Expands the patient range and capability of the Miniature CESF System. Elongated hole pattern provides greater flexibility of fastener and rod placement while simplifying frame assembly. Eight short slots are provided to maintain construct integrity. Can be cut at holes to create arches and partial rings.

Item #	Internal Diameter	Thickness
<b>4.14501</b>	45mm	2.4mm



### Stretch Ring, 45mm

Increases the capability of the Miniature CESF System while providing additional options for the construction of circular and hybrid frames. Elongated hole pattern provides greater flexibility of fastener and rod placement while simplifying frame assembly. Six short slots are provided to maintain construct integrity.

Item #	Internal Diameter	Thickness
<b>4.14504</b>	45mm	2.4mm

# Miniature Circular ESF Components

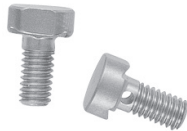
## Threaded Rods, 4mm

Thread Pitch = 0.7mm. Stainless Steel

Item #	Thread Diameter	Length
4.26050	4mm	50mm
4.26075	4mm	75mm
4.26100	4mm	100mm



ITEM #	DESCRIPTION
4.30001	<h3>Mini Cannulated / Slotted Wire Fixation Bolt</h3> <p>Slotted and cannulated, the wire fixation bolt provides two different points to capture and anchor fixation wires to rings. Stainless steel with 4mm threads and 7mm wrench flats. Simplifies accurate wire capture on rings. Supports 0.9mm to 1.1mm K-wires and 1.0mm stopper wires. Mini SK<sup>®</sup> pin-gripping bolts (Item # 300.001) can also be utilized for half-pin fixation bolts when larger wires or pins are needed. Sold in packs of 6.</p>
4.30005	<h3>Mini Slotted Wire Fixation Washer</h3> <p>Allows capture of fixation wires and miniature Interface<sup>®</sup> pins to rings (or rods) at locations otherwise occupied by supporting elements. Also utilized for drop-wire technique. Can be pre-placed in several locations for optimal freedom. Multiple slots available to simplify capture of 0.9mm to 1.1mm K-wires and 1.0mm stopper wires. Stainless steel. Sold in packs of 6.</p>
4.30006	<h3>Hex Nut, 4mm</h3> <p>The basic fastening element of the Mini CESF and Mini Hybrid ESF Systems. 7mm wrench flats and 0.7mm thread pitch. Stainless steel.</p>



## Miniature Circular ESF Components

ITEM #	DESCRIPTION
4.30008	<p><b>Flat Washer, 4mm</b></p> <p>Provides needed fill or offset during mini frame construction to maintain wire alignment. Stainless steel.</p>
4.40002	<p><b>Fixation Wire with Stopper, 1.0mm x 125mm</b></p> <p>1.0mm diameter x 125mm length with stopper. Provides additional stability when patient anatomy does not allow optimal wire placement. Also used for fracture reduction and bone transport. Trocar point. Implant quality stainless steel.</p>
4.50003	<p><b>7mm Combination Wrench</b></p> <p>The basic wrench of the mini circular ESF system. Often used in pairs. Also compatible with mini SK® linear ESF components.</p>
4.50004	<p><b>7mm Angled Open Socket Wrench</b></p> <p>A quick and handy extra wrench that fits many hard-to-reach areas. Also compatible with mini SK® linear ESF components.</p>
4.50005	<p><b>7mm Double Wrench</b></p> <p>Utilized to span rings and turn paired nylon nuts simultaneously to achieve compression or distraction. Not for use with metal fasteners.</p>
4.60001	<p><b>Mini Angular Hinge Assembly</b></p> <p>Similar in design to the standard CESF hinge but designed to function with the miniature CESF system. Most commonly used to construct articulations when building simple hybrid ESF frames, but can also be coupled with mini SK® hybrid rods to create a simple, hinged transarticular external fixator. Loosen hinge screw prior to steam sterilization and adjust at surgery.</p>



## Miniature Circular ESF Components

ITEM #	DESCRIPTION
4.70001	<p><b>Nylon Zero Tolerance Nut, 4mm Thread</b></p> <p>Zero Tolerance/Zero Motion design. Used to compress or distract rings, rods, and hinges. Also used for bone transport. <b>Must be used in pairs.</b> Best manipulated with a 7mm double wrench (Item # 4.50005). Thread pitch equals 0.7mm. U.S. Patent # 5,968,043</p>
4.70005	<p><b>Mini One-Hole Post</b></p> <p>Mounts to a ring for support of additional wires, half-pins, and other fixation elements. Commonly used in many free-form circular frames and in hybrid frame applications. Stainless steel.</p>
4.70007	<p><b>Spherical Nut, 4mm</b></p>
4.70008	<p><b>Spherical Washer, 4mm</b></p> <p>By placing a pair on each side of a ring, rod angle can be adjusted to fine-tune reduction and assembly. Six pairs will allow a ring or ring block with three rods to be adjusted. <b>Must be used as mating pairs</b> requiring two 7mm wrenches. Stainless steel.</p>
300.003	<p><b>Hex Bolt, 4mm x 8mm</b></p> <p>Used as a general-purpose fastener with the mini CESF system. This bolt is also a component of the mini SK® ESF clamp assembly and may be useful for drop wire technique off rings or off one-hole posts. In addition, this bolt can be used to mount mini angular hinges to rings but may require flat washers acting as spacers. Stainless steel.</p>



## Miniature Circular ESF Starter Kit

### Miniature Circular ESF Starter Kit

Item # 4.00001

Quantity	Item #	Description
4	<b>4.13501</b>	Full Ring, 35mm x 2.4mm
3	<b>4.14501</b>	Full Ring, 45mm x 2.4mm
1	<b>4.14504</b>	Stretch Ring, 45mm x 2.4mm
3	<b>4.26050</b>	Threaded Rod, 4mm x 50mm
3	<b>4.26075</b>	Threaded Rod, 4mm x 75mm
3	<b>4.26100</b>	Threaded Rod, 4mm x 100mm
1	<b>4.50005</b>	7mm Double Wrench
8	<b>4.70001</b>	Nylon Zero Tolerance Nut, 4mm
2	<b>4.70005</b>	Mini One-hole Post

Quantity	Item #	Description
18	<b>4.30001</b>	Cannulated/Slotted Wire Fixation Bolt
6	<b>4.30005</b>	Slotted Wire Fixation Washer
6	<b>300.003</b>	Hex Bolt, 4mm x 8mm
50	<b>4.30006</b>	Hex Nut, 4mm
12	<b>4.30008</b>	Flat Washer, 4mm
2	<b>4.50003</b>	7mm Combination Wrench
1	<b>4.50004</b>	7mm Angled Socket Wrench
8	<b>4.40002</b>	Stopper Wire, 1.0mm x 125mm



## Evolution of ESF Pins

The mainstay of external fixation in North America and much of the world for many years was the Kirschner-Ehmer (KE) device, and because of its long history, fixation pin development and terminology were centered on pins for use with that clamp.

Fixation pins evolved from smooth pin, to negative-thread, to single cortex negative-thread, to positive-profile threaded fixation pins. IMEX® was the first company to market positive-profile pins sized to all three KE clamps and has developed many additional diameter and length choices since.

As positive-profile pins such as the Interface® and Centerface® became routinely utilized, increased pin longevity and decreased patient morbidity were attributed to these modern pins. However, difficulty using positive-profile pins when combined with the KE clamp led to development of new external fixation devices to simplify their use. Unfortunately, the historical dominance of the KE clamp and pins developed for it inhibited development of even better fixation pins and related devices. Four historical errors associated with positive-profile pins developed for the KE device that inhibited improvements in ESF technology include:

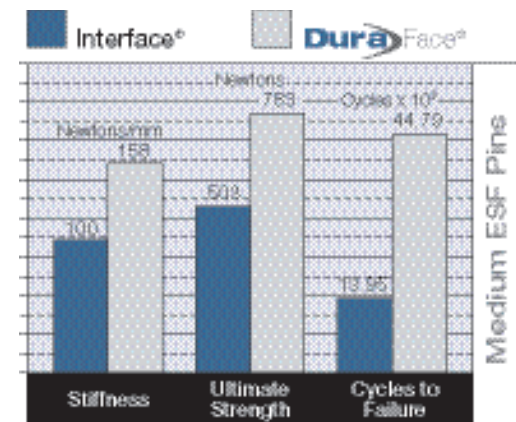
- Allowing positive-profile pins to dictate future pin development
- Allowing positive-profile pins to define ESF pin terminology
- Assuming that positive-profile pins are inherently superior to other thread profiles
- Allowing positive-profile pin dimensions to dictate future clamp design

The SK® ESF device overcame these mistakes by supporting both positive- and negative-thread profiles while allowing a variety of pin diameters to function with each clamp size. Ultimately, breaking free of these assumptions led to the development of Duraface® ESF pin technology. Although a negative-profile pin, the Duraface® pin achieves mechanical improvements when compared to positive-profile pins of the same thread size by increasing shaft diameter and attenuating the thread/non-thread junction with a tapered thread-run-out feature (U.S. patent #8,282,676). These changes in pin geometry result in increased mechanical performance outlined as follows.

### Duraface® Half-Pin Mechanical Attributes

Duraface® fixation half-pins contrasted to our legendary Interface® half-pins demonstrate:

- 55% Increase in average pin stiffness
- 54% Increase in average pin ultimate strength
- 2.3 - 4.9 fold increase in cyclic fatigue life



Griffin H, Toombs JP, Bronson DG, et al. Mechanical evaluation of a tapered thread-run-out half-pin designed for external skeletal fixation in small animals. Vet Comp Orthop Traumatol 2011; 4: 257-261.

## Modern ESF Pin Terminology

For many years, external fixation pin use centered around the Kirschner-Ehmer (KE) external fixation device and newer modifications of it. This resulted in potentially confusing pin terminology that is poorly suited to the use of improved external fixation devices such as the IMEX® SK® external fixator. Modern, accurate terminology will clear up potential ordering errors and provide educators with a consistent vocabulary to train students, residents and practitioners. These changes will greatly simplify future pin discussion as well.

Using the medium KE clamp and a 3.2mm (1/8") smooth pin as a common example, note that the term “medium” continues to be used for smooth pins, negative-profile pins and positive-profile pins, regardless of the fact that each creates a significantly different size and shape of pin tract in the patient’s bone. Since veterinarians were forced into using Kirschner terminology, a 3.2mm shaft positive-profile pin continued to be called a 3.2mm (1/8") pin even though the thread diameter engaging the bone is actually 4.0mm.

Bone screw diameters are defined by the thread diameter of the screw regardless of the screw head diameter and it is logical to use the same terminology with external fixation pins. In other words, the portion of the implant that limits diameter choice is the portion that is implanted into bone, not the portion outside of the bone.

An example of a customer order using historic terminology for a positive-profile ESF pin might be:

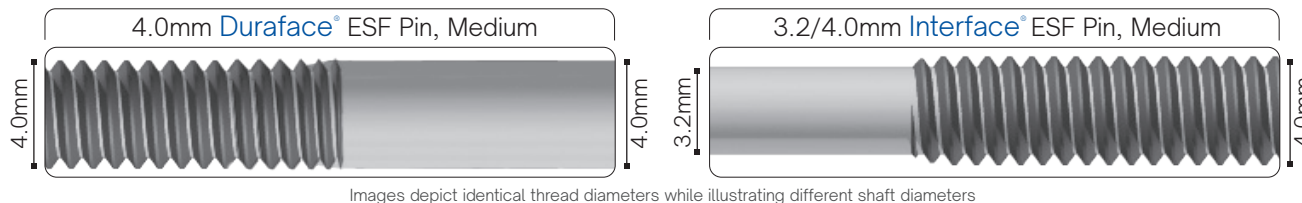
*“I want to order a 3.2mm (1/8”), medium, Interface® pin” or “I used a 3.2mm (1/8”), medium, positive-profile pin.”* This pin has a 3.2mm (1/8") shaft and 4.0mm thread diameter. It is unclear if the 3.2mm dimension describes shaft or thread diameter.

An example of a representative customer order or inquiry for a 3.2mm (1/8") Interface® positive-profile, medium pin, based on modern terminology would be:

*“I want to order a 3.2/4.0mm Interface® pin” or “I used a 3.2/4.0mm positive-profile pin.”* The term medium could be included with either description but is not necessary. Mentioning both shaft and thread diameters eliminates any potential for error while accurately providing both the shaft diameter, and more importantly, the thread diameter.

A likely ordering conversation using proper modern terminology for a “medium” Duraface® pin might be:

*“I want a 4.0mm Duraface® pin.”* Since the shaft and thread diameters of Duraface® pins are the same, it is not necessary to discuss the pin as a 4.0/4.0mm Duraface® pin.



Note both the medium, 3.2/4.0mm Interface® and the medium, 4.0mm Duraface® pin both have the same thread diameter engaging the bone and utilize the same 3.1mm drill bit for pre-drilling. Discussing only shaft diameters can be confusing.

Using item numbers helps eliminate any potential ordering errors.

## Duraface® Frequently Asked Questions (FAQs)

### Are Duraface® half-pins considered positive-profile?

No. Duraface® half-pins are intelligently designed negative-profile pins. However, based on mechanical testing they outperform currently marketed positive-profile ESF pins of comparable thread diameter.

### I thought positive-profile threads were responsible for superior fatigue life. How does a negative-thread pin demonstrate increased fatigue life compared to a positive-profile pin of the same thread diameter?

Pin ultimate strength and deflection under load are two key factors involved in determining a pin's fatigue life. We see improvements to pin ultimate strength, deformation under load, and fatigue life by starting with the geometry of a positive-profile pin and adding shaft diameter while at the same time blending and minimizing the stress riser effect. The patented tapered TRO (thread-run-out) technology from IMEX® mitigates the stress riser effect and contributes to the mechanical performance of Duraface® half-pins.

### Will I need to purchase different drill bits to properly pre-drill for Duraface® half-pins?

No. A key design feature of these pins was to increase stiffness without changing the pin tract diameter in the bone. As such, the same drill bits used to pre-drill IMEX® Interface® and Centerface® fixation pins are compatible with Duraface® half-pins.

### If Duraface® pins are mechanically superior to positive-profile Interface® pins and use the same drill bits and sleeves while not costing more, is there any reason I should continue using positive-profile half-pins?

There is no reason not to make the switch. The only negative is past history and experience. For example, technicians and nurses preparing surgery packs, without training on “new” pins may continue to consider shaft diameter as the “pin” size and not look at actual bone engagement diameters. This may lead to pack or ordering errors. It may be best to make a clean switch and not mingle Interface® and Duraface® pins in the same pack.

### When comparing Duraface® half-pins to positive-profile pins, why is it important to consider the pin tract diameter in the bone?

Bone size is the first consideration when choosing the appropriate fixation pin diameter. If a pin diameter is selected that is too large compared to the corresponding bone, the risk of iatrogenic fracture increases. In cases where increased pin stiffness is desired, the usual approach is to use a larger pin, but again, bone diameter often limits selection of larger ESF pins. So to compare stiffness and fatigue life of pins, it is appropriate to focus on pins that create the same “hole size” in the patient bone. Bone screws have always been defined by thread diameter and ESF pins should as well.

## Duraface® Frequently Asked Questions (FAQs)

### Will Duraface® half-pins function in any brand of ESF clamp?

The SK® ESF clamp from IMEX® was designed to function over a greater range of pin diameters than other ESF clamps. The SK® ESF clamp was also designed to grip any pin style (smooth, positive-profile, and negative-profile) effectively. Most other ESF clamps have a much smaller range of pin choices. Clamps that have pin diameter ranges compatible with certain Duraface® half-pins will hold these pins; however, it is likely the surgeon using non-SK® clamps will not have as great a pin diameter choice as with the SK® ESF clamp by IMEX®. This is also true when standard positive-profile pins are used.

### What is the best way to determine the size of an unlabeled Duraface® pin in a sink or tray?

Work through the problem just like an Interface® pin. Use a pin gauge and a complimentary wall chart from IMEX®. As discussed in pin history, it is best to consider the thread diameter to determine a pin's size. Develop a habit of determining Duraface® pins, and for that matter Interface® pins, based on thread diameter. Then compare pin length and thread length on the wall chart as a secondary verification. If you do not have a complimentary IMEX® pin wall chart, please contact us today to obtain one.

### What are some ways to avoid ordering errors?

When converting to Duraface® pins, the best way to avoid ordering errors is to order by item number. Duraface® item numbers are the same as the corresponding Interface® item numbers except the first two digits are 17 instead of 15. For example, a 3.2/4.0mm Interface® pin is item number 15180 and a 4.0mm Duraface® pin is item number 17180. Both pins have a 4.0mm thread diameter and use a 3.1mm drill bit for pre-drilling. Both can be used in the small or the large SK® clamp.

### In effect, this is an improved Interface® pin. If so, why did IMEX® improve it while others are staying with traditional positive-profile pins?

The patented technology behind the Duraface® pin is quite simple. Most importantly, the Duraface® pin supports simple frames based on half-pin use which is a philosophy that separates IMEX® from other ESF companies. All of this can be achieved without added cost or instrumentation.

## Duraface® Frequently Asked Questions (FAQs)

### I am concerned about ESF frame constructs being too stiff. Is this a concern with Duraface® half-pins?

Excess frame stiffness is possible with any ESF pin. However, the major cause of excess frame stiffness is the use of multiple full-pins. Full-pins are considered very stiff and with older devices were actually necessary to yield adequate frame stiffness when using weak external bars. IMEX®, with release of the SK® ESF device, was the first to pioneer the concept of simple ESF frames built primarily with half-pins. Use of these half-pin frames creates excess frame strength much less often than constructs containing multiple full-pins. High frame strength is considered appropriate early in fracture repair. Appropriately constructed frames predominately using half-pins are easier to destabilize while allowing the surgeon to place pins in safe corridors more consistently than those based on full-pins. If you have been hesitant to reduce full-pin use, the Duraface® half-pin may be what you have been waiting for.

### What are some clinical scenarios where pin mechanical improvements might prove beneficial to my patient?

There are many clinical scenarios where increased pin stiffness and cyclic fatigue life would potentially benefit patient management. Some examples include: short fracture fragments, fractures of the humerus and femur, highly comminuted fractures, transverse fractures, overly active or obese patients, or multiple limb injuries.

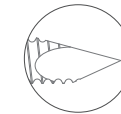
# Duraface® Fixation Half-Pins

## Tapered Thread-Run-Out (TRO) Technology

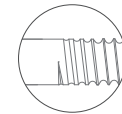


Duraface® fixation half-pins represent a significant breakthrough in veterinary external fixation pin technology. Available in sizes comparable to Interface® half-pins, while providing increased stiffness, strength and durability. Pre-drilling is recommended. Drill bit requirements are the same for Interface® half-pins with same thread size. Implant Quality 316LVM Stainless Steel. U.S. patent #8,282,676.

Name Item #	Shaft / Thread Diameter**	Fractional Equivalent	Recommended Drill Bit	Functional Thread Length †	Overall Length
<b>2.5mm</b>					
<b>17020</b>	2.5mm / 2.5mm	–	2.0mm	20mm	95mm
<b>3.2mm</b>					
<b>17332</b>	3.2mm / 3.2mm	1/8" / 1/8"	2.3mm	25mm	100mm
<b>1733L*</b>				31mm	150mm
<b>3.5mm</b>					
<b>17764</b>	3.5mm / 3.5mm	9/64" / 9/64"	2.7mm	28mm	110mm
<b>1776L*</b>				50mm	150mm
<b>4.0mm</b>					
<b>17180</b>	4.0mm / 4.0mm	5/32" / 5/32"	3.1mm	31mm	115mm
<b>1718L*</b>				50mm	150mm
<b>4.3mm</b>					
<b>17964</b>	4.3mm / 4.3mm	–	3.5mm	35mm	130mm
<b>1796L*</b>				54mm	175mm
<b>4.8mm</b>					
<b>17532</b>	4.8mm / 4.8mm	3/16" / 3/16"	3.9mm	38mm	150mm
<b>1753L*</b>				57mm	200mm



Trocar



TRO

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

\*\* Unlike positive-profile fixation pins, Duraface® pins have a larger shaft diameter that is equal to its thread diameter. Core diameter at the thread root is the same as the corresponding size (small, medium, etc.) positive-profile pin and determines what drill bit is used for pre-drilling.

† Actual thread length appears 2-3mm longer to allow for tapered thread-run-out (TRO) feature. Duraface® pins feature a TRO or tapered run-out junction where the shaft meets the threads. The thread root tapers over approximately three threads in order to attenuate the otherwise acute nature of the shaft-thread junction. This portion of the thread length tapers enough that it may cause bone damage if driven into bone and is not considered functional thread length. Functional thread length of Duraface® pins is identical to the same size and length version of Interface® pins. Duraface® short pins do not have an equivalent length version of Interface® pin.

## Duraface® Fixation Half-Pins, No-Point

### Tapered Thread-Run-Out (TRO) Technology

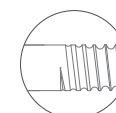


The No-Point (NP) version of Duraface® fixation half-pins feature a truncated, blunt trocar for improved surgeon safety and decreased patient morbidity. As with application of any ESF pin, attention should be given to proper pin alignment with a pre-drilled hole. Use of the SK® ESF clamp's secondary bolt will keep the clamp and drill hole oriented. In addition, liberal soft tissue release and retraction will simplify pin placement by allowing visualization. Duraface® fixation half-pins represent a significant breakthrough in veterinary external fixation pin technology. Available in sizes comparable to Interface® half-pins, while providing increased stiffness, strength and durability. **Pre-drilling is mandatory.** Drill bit requirements are the same for Interface® half-pins with same thread size. Implant Quality 316LVM Stainless Steel. U.S. patent #8,282,676.

Name Item #	Shaft / Thread Diameter**	Fractional Equivalent	Recommended Drill Bit	Functional Thread Length †	Overall Length
<b>2.5mm</b>					
17020NP	2.5mm / 2.5mm	–	2.0mm	20mm	95mm
<b>3.2mm</b>					
17332NP	3.2mm / 3.2mm	1/8" / 1/8"	2.3mm	25mm	100mm
1733LNP*				31mm	150mm
<b>3.5mm</b>					
17764NP	3.5mm / 3.5mm	9/64" / 9/64"	2.7mm	28mm	110mm
1776LNP*				50mm	150mm
<b>4.0mm</b>					
17180NP	4.0mm / 4.0mm	5/32" / 5/32"	3.1mm	31mm	115mm
1718LNP*				50mm	150mm
<b>4.3mm</b>					
17964NP	4.3mm / 4.3mm	–	3.5mm	35mm	130mm
1796LNP*				54mm	175mm
<b>4.8mm</b>					
17532NP	4.8mm / 4.8mm	3/16" / 3/16"	3.9mm	38mm	150mm
1753LNP*				57mm	200mm



No-Point



TRO

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

\*\* Unlike positive-profile fixation pins, Duraface® pins have a larger shaft diameter that is equal to its thread diameter. Core diameter at the thread root is the same as the corresponding size (small, medium, etc.) positive-profile pin and determines what drill bit is used for pre-drilling.

† Actual thread length appears 2-3mm longer to allow for tapered thread-run-out (TRO) feature. Duraface® pins feature a TRO or tapered run-out junction where the shaft meets the threads. The thread root tapers over approximately three threads in order to attenuate the otherwise acute nature of the shaft-thread junction. This portion of the thread length tapers enough that it may cause bone damage if driven into bone and is not considered functional thread length. Functional thread length of Duraface® pins is identical to the same size and length version of Interface® pins. Duraface® short pins do not have an equivalent length version of Interface® pin.

## Duraface® Short Fixation Half-Pins, No-Point

### Tapered Thread-Run-Out (TRO) Technology

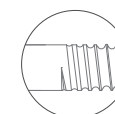


Duraface® short half-pins are designed to maximize pin stiffness when placing ESF half-pins into shallow bone applications. Type I-b frames applied to the radius are a common example. Keeping the TRO junction close to the bone maximizes the length of the larger diameter pin shaft between clamp and bone; better resisting deflection under load. **Pre-drilling is mandatory.** Duraface® short half-pins are available only in no-point (NP) versions. Implant Quality 316LVM Stainless Steel. U.S. patent #8,282,676.

Name Item #	Shaft / Thread Diameter*	Fractional Equivalent	Recommended Drill Bit	Functional Thread Length †	Overall Length
<b>2.5mm</b> 17020SNP	2.5mm / 2.5mm	–	2.0mm	10mm	80mm
<b>3.2mm</b> 17332SNP	3.2mm / 3.2mm	1/8" / 1/8"	2.3mm	15mm	90mm
<b>3.5mm</b> 17764SNP	3.5mm / 3.5mm	9/64" / 9/64"	2.7mm	18mm	95mm
<b>4.0mm</b> 17180SNP	4.0mm / 4.0mm	5/32" / 5/32"	3.1mm	21mm	100mm
<b>4.3mm</b> 17964SNP	4.3mm / 4.3mm	–	3.5mm	24mm	120mm
<b>4.8mm</b> 17532SNP	4.8mm / 4.8mm	3/16" / 3/16"	3.9mm	27mm	140mm



No-Point



TRO

\* Unlike positive-profile fixation pins, Duraface® pins have a larger shaft diameter that is equal to its thread diameter. Core diameter at the thread root is the same as the corresponding size (small, medium, etc.) positive-profile pin and determines what drill bit is used for pre-drilling.

† Duraface® pins feature a tapered thread-run-out (TRO) junction where the shaft meets the threads. The thread root tapers over approximately three threads in order to attenuate the otherwise acute nature of the shaft-thread junction. This portion of the thread length tapers enough that it may cause bone damage if driven into bone and is not considered functional thread length. Functional thread length of Duraface® pins is identical to the same size and length version of Interface® pins. Duraface® short pins do not have an equivalent length version of Interface® pin.

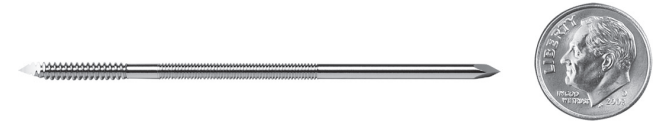


## Miniature Interface® Fixation Half-Pins

### Miniature Interface® Fixation Half-Pins

These small pins are K-wire size versions of our popular Interface® fixation half-pins.

Most commonly used with acrylic fixators on toy breeds, kittens, avian patients and small exotic pets. These pins have trocar points on both the smooth and threaded ends. The central area of the pin shaft is factory-roughened to enhance the interface between the acrylic frame and pin. This central area is not a thread, and attempts to use this implant as a full-pin are contraindicated. Nomenclature is based on the smooth shaft diameter. Implant Quality 316LVM Stainless Steel.



Item #	Recommended Drill Bit	Shaft / Thread Diameter	Inch Equivalent	Thread Length	Total Length	Pins per Pack
<b>03035</b>	0.8mm	0.9mm / 1.1mm	0.035" / 0.045"	12mm	75mm	6
<b>03045</b>	1.1mm	1.1mm / 1.4mm	0.045" / 0.056"	12mm	75mm	6
<b>03062</b>	1.5mm	1.6mm / 1.9mm	0.062" / 0.075"	12mm	75mm	6
<b>03078</b>	1.8mm	2.0mm / 2.3mm	5/64" / 0.091"	15mm	75mm	6
<b>03094*</b>	2.0mm	2.4mm / 2.9mm	3/32" / 0.114"	17mm	75mm	1



\* 03094 has the same 2.4mm shaft as the 2.0/2.5mm Interface® fixation half-pin but has a smaller thread profile. This pin is less frequently used with long bone fractures but finds more routine use with acrylic and pin ESF frames applied to mandibular fractures. The 2.9mm thread diameter will not traverse the 2.5mm mini SK® clamp bolt.

# Interface® Fixation Half-Pins



## Standard Thread Profile

Interface® fixation half-pins are end-threaded with positive-thread profiles. The threaded end has a trocar point. Pre-drilling is recommended. Standard thread profile pins can be utilized at all bone locations. Standard length versions are most popular, but extended length versions are occasionally useful when additional thread length is needed to span areas of larger bone diameter. Interface® fixation pins do not feature the thread profile of a bone screw, but are designed with the unique environmental and mechanical differences between a bone screw and ESF pin being taken into design consideration. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
<b>2.0/2.5mm</b>					
<b>15020</b>	2.0mm / 2.5mm	–	2.0mm	20mm	95mm
<b>2.4/3.2mm</b>					
<b>15332</b>	2.4mm / 3.2mm	3/32" / 1/8"	2.3mm	25mm	100mm
<b>1533L*</b>				31mm	150mm
<b>2.8/3.5mm</b>					
<b>15764</b>	2.8mm / 3.5mm	7/64" / 9/64"	2.7mm	28mm	110mm
<b>1576L*</b>				50mm	150mm
<b>3.0/3.5mm</b>					
<b>15030</b>	3.0mm / 3.5mm	–	3.0mm	30mm	110mm
<b>3.2/4.0mm</b>					
<b>15180</b>	3.2mm / 4.0mm	1/8" / 5/32"	3.1mm	31mm	115mm
<b>1518L*</b>				50mm	150mm
<b>3.5/4.3mm</b>					
<b>15964</b>	3.5mm / 4.3mm	9/64" / 11/64"	3.5mm	35mm	130mm
<b>1596L*</b>				54mm	175mm
<b>4.0/4.8mm</b>					
<b>15532</b>	4.0mm / 4.8mm	5/32" / 3/16"	3.9mm	38mm	150mm
<b>1553L*</b>				57mm	200mm



Trocar



Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

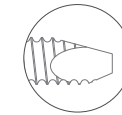
## Interface® Fixation Half-Pins, No-Point

### Standard Thread Profile

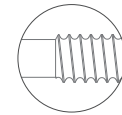


Interface® No-Point (NP) fixation half-pins lack the sharp trocar point found on standard Interface® pins. **Pre-drilling is required for pin placement.** As with application of any ESF pin, attention should be given to proper pin alignment with the pre-drilled hole. Use of the SK® ESF clamp's secondary bolt will keep the clamp and drill hole oriented. In addition, liberal soft tissue release and retraction will simplify pin placement by allowing visualization. The blunt trocar reduces opportunity for morbidity created by a sharp point remaining in soft tissue. This truncated trocar pin is also safer for the operating surgeon. Lengths, diameters, and recommended drill bits are common with standard Interface® pins. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
<b>2.0/2.5mm</b> 15020NP	2.0mm / 2.5mm	–	2.0mm	20mm	95mm
<b>2.4/3.2mm</b> 15332NP 1533LNP*	2.4mm / 3.2mm	3/32" / 1/8"	2.3mm	25mm 31mm	100mm 150mm
<b>2.8/3.5mm</b> 15764NP 1576LNP*	2.8mm / 3.5mm	7/64" / 9/64"	2.7mm	28mm 50mm	110mm 150mm
<b>3.2/4.0mm</b> 15180NP 1518LNP*	3.2mm / 4.0mm	1/8" / 5/32"	3.1mm	31mm 50mm	115mm 150mm
<b>3.5/4.3mm</b> 15964NP 1596LNP*	3.5mm / 4.3mm	9/64" / 11/64"	3.5mm	35mm 54mm	130mm 175mm
<b>4.0/4.8mm</b> 15532NP 1553LNP*	4.0mm / 4.8mm	5/32" / 3/16"	3.9mm	38mm 57mm	150mm 200mm



No-Point



Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

# Interface® Fixation Half-Pins

## Cancellous Thread Profile

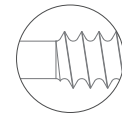


Interface® fixation half-pins with cancellous thread profile feature a deep thread with larger pitch than standard thread Interface® fixation pins. These pins have proven particularly effective in soft metaphyseal bone application where adequate bone stock is present to support the increased thread diameters. **Acceptable locations include the proximal tibia, the distal femur, and the proximal humerus only.** Pre-drilling is very important. These pins are contraindicated in diaphyseal bone, in the radius or ulna, and in the hard bone of the humeral condyle. Rarely is more than one cancellous pin used per long-bone fracture. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
2.4/3.5mm Cancellous					
16332	2.4mm / 3.5mm	3/32" / 9/64"	2.3mm	28mm	115mm
1633L*				31mm	150mm
3.2/4.8mm Cancellous					
16180	3.2mm / 4.8mm	1/8" / 3/16"	3.1mm	35mm	125mm
1618L*				50mm	150mm
4.8/6.3mm Cancellous					
16316	4.8mm / 6.3mm	3/16" / 1/4"	4.7mm	50mm	150mm
1631L*				57mm	200mm



Trocar



Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

# Miniature Centerface® Fixation Full-Pins

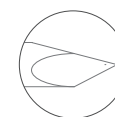
## Miniature Centerface® Fixation Full-Pins

The world's smallest centrally-threaded, positive-profile external fixation pins.

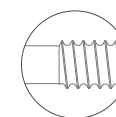
Mini Centerface® fixation full-pins are available in shaft sizes of 0.9mm, 1.1mm and 1.6mm and are compatible with mini SK® ESF clamps. Most commonly used with acrylic fixators on toy breeds, kittens, avian patients and small exotic pets. A single trocar point is included to clearly identify the lead-end of the pin and simplify application. Implant Quality 316LVM Stainless Steel.



Item #	Recommended Drill Bit	Shaft / Thread Diameter	Inch Equivalent	Thread Length	Total Length	Pins per Pack
<b>02035</b>	0.8mm	0.9mm / 1.1mm	0.035" / 0.045"	11mm	80mm	6
<b>02045</b>	1.1mm	1.1mm / 1.4mm	0.045" / 0.056"	12mm	80mm	6
<b>02062</b>	1.5mm	1.6mm / 1.9mm	0.062" / 0.075"	12mm	80mm	6



Trocar



Positive-profile

## Centerface® Fixation Full-Pins

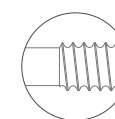
### Standard Thread Profile

Centerface® fixation full-pins are centrally-threaded with a positive-thread profile. Pre-drilling is recommended. The standard thread profile can be used at all bone locations. Standard length versions are the most popular, but limited numbers of extended length versions should be available for special circumstances. Centerface® fixation pins do not feature the thread profile of a bone screw, but are designed with the unique environmental and mechanical differences between a bone screw and ESF pin being taken into design consideration. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
<b>2.0/2.5mm</b> 20020	2.0mm / 2.5mm	–	2.0mm	15mm	95mm
<b>2.4/3.2mm</b> 20332 2033L*	2.4mm / 3.2mm	3/32" / 1/8"	2.3mm	19mm 25mm	100mm 150mm
<b>2.8/3.5mm</b> 20764 2076L*	2.8mm / 3.5mm	7/64" / 9/64"	2.7mm	25mm 35mm	115mm 165mm
<b>3.0/3.5mm</b> 20030	3.0mm / 3.5mm	–	3.0mm	28mm	120mm
<b>3.2/4.0mm</b> 20180 2018L*	3.2mm / 4.0mm	1/8" / 5/32"	3.1mm	30mm 45mm	125mm 175mm
<b>3.5/4.3mm</b> 20964 2096L*	3.5mm / 4.3mm	9/64" / 11/64"	3.5mm	35mm 50mm	140mm 190mm
<b>4.0/4.8mm</b> 20532 2053L*	4.0mm / 4.8mm	5/32" / 3/16"	3.9mm	38mm 57mm	150mm 200mm



Trocar



Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

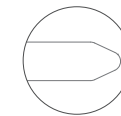
## Centerface® Fixation Full-Pins, No-Point

### Standard Thread Profile

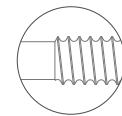


Centerface® No-Point (NP) fixation full-pins lack the trocar point found on standard Centerface® pins. **Pre-drilling is required for pin placement.** Lack of a trocar point reduces potential for injury to the surgeon or patient during pin placement. Lengths, diameters, and recommended drill bits are common with standard Centerface® pins. The IMEX® ESF pin ordering guide can be used for trocar and no-point (NP) versions. When pre-drilling, this should be the centrally-threaded pin of choice. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
<b>2.0/2.5mm</b> 20020NP	2.0mm / 2.5mm	–	2.0mm	15mm	95mm
<b>2.4/3.2mm</b> 20332NP 2033LNP*	2.4mm / 3.2mm	3/32" / 1/8"	2.3mm	19mm 25mm	100mm 150mm
<b>2.8/3.5mm</b> 20764NP 2076LNP*	2.8mm / 3.5mm	7/64" / 9/64"	2.7mm	25mm 35mm	115mm 165mm
<b>3.2/4.0mm</b> 20180NP 2018LNP*	3.2mm / 4.0mm	1/8" / 5/32"	3.1mm	30mm 45mm	125mm 175mm
<b>3.5/4.3mm</b> 20964NP 2096LNP*	3.5mm / 4.3mm	9/64" / 11/64"	3.5mm	35mm 50mm	140mm 190mm
<b>4.0/4.8mm</b> 20532NP 2053LNP*	4.0mm / 4.8mm	5/32" / 3/16"	3.9mm	38mm 57mm	150mm 200mm



No-Point

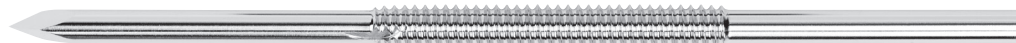


Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.

## Centerface® Fixation Full-Pins

### Cancellous Thread Profile



Centerface® fixation full-pins with cancellous thread profile feature a deep thread with larger thread pitch than standard thread Centerface® fixation full-pins. These pins have proven particularly effective in metaphyseal bone application where adequate bone stock is present to support the increased thread diameters.

**Acceptable locations include the proximal tibia and the distal femur only.** Pre-drilling is very important. These pins are contraindicated in diaphyseal bone, in the radius or ulna, and in the hard bone of the humeral condyle. Rarely is more than one cancellous pin used per long-bone fracture. Implant Quality 316LVM Stainless Steel.

Name Item #	Shaft / Thread Diameter	Fractional Equivalent	Recommended Drill Bit	Thread Length	Overall Length
2.4/3.5mm Cancellous					
21332	2.4mm / 3.5mm	3/32" / 9/64"	2.3mm	20mm	100mm
2133L*				25mm	150mm
3.2/4.8mm Cancellous					
21180	3.2mm / 4.8mm	1/8" / 3/16"	3.1mm	32mm	140mm
2118L*				45mm	175mm
4.8/6.3mm Cancellous					
21316	4.8mm / 6.3mm	3/16" / 1/4"	4.7mm	50mm	150mm
2131L*				63mm	200mm



Trocar



Positive-profile

\* L = Extended Length - occasionally used when additional thread length is needed to span areas of larger bone diameter.



# Pin Caps, Pin Gauge and Ordering Guide

## Pin Caps

Autoclavable pin caps for protecting IM pin and ESF pin points during sterilization and storage. Also covers cut ends of external fixation pins, protecting owners and patients during bandage changes. Approximately 50 per pack.

Item #	Accepted Pin Sizes
<b>Capblack</b>	2.0mm
<b>Capwhite</b>	2.4mm and 2.8mm
<b>Capblue</b>	3.2mm and 3.5mm
<b>Capgray</b>	4.0mm and 4.8mm



## ITEM # DESCRIPTION

### 30009 IM Pin Gauge / Scale

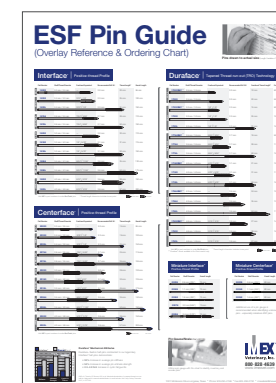
Includes both metric and inch / fractional units to accurately measure lengths and diameters of K-wires, ESF pins and IM pins in your unit of choice. Gauge-holes range from 0.9mm (0.035") to 6.3mm (1/4") for pins and wires with a dedicated section available for sizing common external fixation and plating drill bit diameters (1.1mm to 4.7mm). Stainless Steel.

Use in conjunction with our ESF Pin Ordering Guide to effectively identify unknown pins, simplify reordering and manage inventory.



### Complimentary ESF Pin Ordering Guide

Includes the entire range of external fixation pins drawn to scale. References item numbers and recommended drill bits. Utilize this 19" x 27" (48.26cm x 68.58cm) wall chart to identify unknown pins and assist in inventory management. Can be used during surgery to reference appropriate drill bits. Call today for your complimentary chart.



## Large Animal Transfixation Pinning

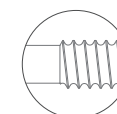
### Large Animal Transfixation Pins, Duraface® Full-Pins for Large Animals

These pins feature a larger shaft on the “near” end of the pin and a tapered thread-run-out (TRO) junction at the thread-shaft junction to attenuate any potential stress riser, resulting in a pin with increased bending resistance and enhanced cyclic fatigue life compared to positive-profile pins (Vet Comp Orthop Traumatol 2011; 4:257-261).

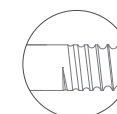
These pins along with related drill bits and taps are designed for lower limb application in large animal patients. Typically, fiberglass casting is used to incorporate the pins and hoof. Both pin sizes incorporate three chuck flats on the blunt end for securing the pin into a Jacobs chuck. **Pre-drilling and tapping are required.** U.S. patent #8,282,676.



Item #	Shaft Diameters	Thread Diameter	Thread Length	Overall Length	Required Tap	Required Drill Bit
<b>2231LA</b>	4.8mm/6.3mm	6.3mm	64mm	200mm	<b>PN 2131T</b>	<b>PN 33047</b>
<b>22140</b>	6.3mm/8.0mm	8.0mm	65mm	200mm	<b>PN 2114T</b>	<b>PN 32062</b>



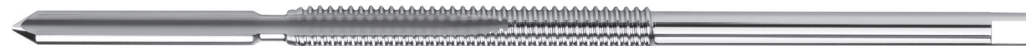
Positive-profile (Trocar End)



TRO (Drive End)

### Large Animal Transfixation Taps

Used with Duraface large animal transfixation pins for lower limb applications in large animal patients. Both sizes incorporate three chuck flats on the blunt end for securing the pin into a Jacobs chuck.



Item #	Shaft Diameter	Thread Diameter	Overall Length	Transfixation Pin	Required Drill Bit
<b>2131T</b>	4.8mm	6.3mm	185mm	<b>PN 2231LA</b>	<b>PN 33047</b>
<b>2114T</b>	6.3mm	8.0mm	180mm	<b>PN 22140</b>	<b>PN 32062</b>

### Drill Bits

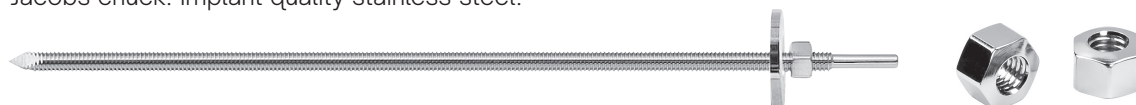


Pre-drilling a pilot hole before fixation pin insertion optimizes pin-bone interface integrity. Each IMEX® large animal transfixation pin has an optimum drill bit size.

## Trans-ilial Rods / Nuts and Multi-Purpose Orthopedic Washers

### Trans-ilial Rods and Nuts

Fully-threaded rods designed to provide additional stability during the repair of unilateral or bilateral sacro-iliac luxations and sacral fractures. Often used in addition to lag screws and can be combined with other implants. Available in 3.2mm, 4.0mm, and 4.7mm diameters with a single trocar point. Paired nuts can be applied to each end to provide secure, locked fixation. A short length of non-threaded area is available to eliminate thread damage when applying a Jacobs chuck. Implant quality stainless steel.



Item #	Description	Diameter / Length	Core Diameter	Required Wrench
<b>57032</b>	Trans-ilial Rod	3.2mm x 125mm	2.3mm	—
<b>57040</b>	Trans-ilial Rod	4.0mm x 155mm	3.0mm	—
<b>57047</b>	Trans-ilial Rod	4.7mm x 175mm	3.7mm	—
<b>57132</b>	Trans-ilial Nut	3.2mm	—	*7mm Wrench
<b>57140</b>	Trans-ilial Nut	4.0mm	—	*7mm Wrench
<b>57147</b>	Trans-ilial Nut	4.7mm	—	†8mm Wrench

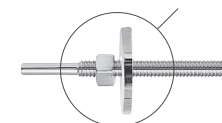
### Multi-Purpose Orthopedic Washers

Originally designed for use with trans-ilial rods and nuts, multi-purpose orthopedic washers can also be used with standard bone screws. When using trans-ilial rods to augment repair of sacro-iliac luxations or pelvic fractures, these washers can be placed between the bone and trans-ilial nut to increase surface area; preventing compression into soft bone. Implant quality stainless steel.

Item #	Washer Size	Trans-ilial Rod Diameter	Bone Screw
<b>57232</b>	9mm	3.2mm	2.7mm
<b>57240</b>	10mm	4.0mm	3.5mm
<b>57247</b>	11mm	4.7mm	4.5mm



Washer fits securely  
between the trans-ilial  
nut and bone



## TPLO Support Products



### Ventura Stifle Thrust Levers

A versatile stifle distraction device, the Ventura Stifle Thrust Lever (VSTL) is designed for use during open arthrotomy or arthroscopic stifle exploration to provide unimpeded, stable visualization of the medial stifle compartment.

The uniquely contoured shape paired with a round shaft protects the articular cartilage while sturdy construction provides longevity and allows autoclave sterilization.

Item #	Description	Patient Size	Overall Length
<b>29400</b>	Mini VSTL	< 20kg	200mm
<b>29500</b>	Standard VSTL	20 -60kg	280mm

### SCAT™ TPLO Jig Pins



SCAT™ TPLO jig pins are used as temporary jig fixation pins when performing TPLO surgery. Surgeons performing TPLO surgery find SCAT™ pins ideal for temporary attachment of the alignment jig during the procedure. Contraindicated for external fixation. Implant quality stainless steel.

Item #	Diameter	~Fractional	Thread Length	Overall Length
<b>22222</b>	1.6mm	(1/16")	10mm	90mm
<b>23222</b>	2.0mm	(5/64")	10mm	100mm
<b>24222</b>	2.4mm	(3/32")	12mm	115mm
<b>25030</b>	3.0mm	–	15mm	150mm
<b>25222</b>	3.2mm	(1/8")	14mm	125mm

### TPLO Reduction Pins



These pins are designed for use as temporary or permanent osteotomy reduction pins during application of TPLO plates. These pins feature a long thread length and a single trocar point with two diameters available. Implant quality stainless steel.

Item #	Diameter	Thread Length	Overall Length
<b>29016</b>	1.6mm	45mm	130mm
<b>29020</b>	2.0mm	65mm	155mm

## TPLO Support Products

ITEM #	DESCRIPTION
29000	<p><b>TPLO Saw Blade Adapter</b></p> <p>Designed to couple Synthes® TPLO saw blades to Stryker®-type saws, allowing a Synthes® TPLO saw blade to be secured in the preferred Slocum method of mounting the blade on the long axis of the saw. Secured with a T15 screwdriver.</p>
29210	<p><b>Parallel Pin Guide, 1.6 / 2.0mm Holes, 105mm</b></p>
29211	<p><b>Parallel Pin Guide, 2.4 / 3.2mm Holes, 230mm</b></p> <p>Surgeons performing TPLO surgery utilize parallel pin guides to ensure both jig pins are parallel resulting in accuracy of jig placement and less pinching of the saw blade during osteotomy. Features alternating hole diameters providing the ability to utilize different pin diameters in the same patient.</p> <p>Originally developed by Dr. Barclay Slocum to simplify construction of Type-II external fixation frames, the primary indication is TPLO surgery.</p>
29200	<p><b>Mini TPLO Jig</b></p>
29216	<p><b>Mini TPLO Jig Limb, 1.6mm</b></p> <p>This mini TPLO jig provides the reduction in size and weight needed to perform accurate osteotomies in small patients where mini TPLO plates are used; a must for surgeons performing TPLOs on small and toy breeds.</p> <p>Screw-in aiming bars feature knurled shaft ends for ease of placement while simplifying use. Preassembled with 2.0mm jig limbs to support use of 2.0mm temporary SCAT™ TPLO jig pins.</p> <p>An optional, dedicated 1.6mm jig limb supports use of 1.6mm diameter jig pins and is easily swapped with the 2.0mm limb. Set screw included.</p>



Optional, dedicated  
1.6mm Mini TPLO Jig Limb

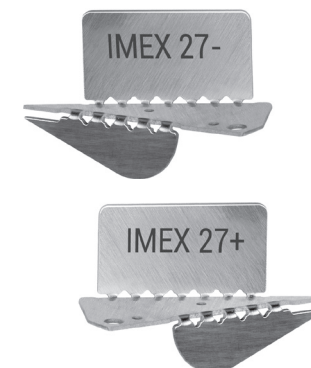
# CrossCut Wedge Osteotomy Guides

## CrossCut Wedge Osteotomy Guides\*

Designed to provide increased accuracy while simplifying the corrective osteotomy procedure. Guides include a hole for organization onto a small plate clip or wire loop. Temporary k-wires are supported through a separate 0.9 mm (0.035") hole.

The small guide tab is placed into the initial (partial) osteotomy while the larger tab is used for matching the saw blade orientation to the selected angle.

Each angle includes a mirrored positive and negative fixed-angle pair with size options of 9 degrees to 45 degrees (3-degree increments) and 50 degrees to 60 degrees (5-degree increments). Each guide is 0.5 mm thick and manufactured from stainless steel.



Item #	Description	Item #	Description
<b>36-09</b>	9° Fixed-angle Positive/Negative Pair	<b>36-33</b>	33° Fixed-angle Positive/Negative Pair
<b>36-12</b>	12° Fixed-angle Positive/Negative Pair	<b>36-36</b>	36° Fixed-angle Positive/Negative Pair
<b>36-15</b>	15° Fixed-angle Positive/Negative Pair	<b>36-39</b>	39° Fixed-angle Positive/Negative Pair
<b>36-18</b>	18° Fixed-angle Positive/Negative Pair	<b>36-42</b>	42° Fixed-angle Positive/Negative Pair
<b>36-21</b>	21° Fixed-angle Positive/Negative Pair	<b>36-45</b>	45° Fixed-angle Positive/Negative Pair
<b>36-24</b>	24° Fixed-angle Positive/Negative Pair	<b>36-50</b>	50° Fixed-angle Positive/Negative Pair
<b>36-27</b>	27° Fixed-angle Positive/Negative Pair	<b>36-55</b>	55° Fixed-angle Positive/Negative Pair
<b>36-30</b>	30° Fixed-angle Positive/Negative Pair	<b>36-60</b>	60° Fixed-angle Positive/Negative Pair

## CrossCut Wedge Osteotomy Guides, Complete Set

A complete set of 32 wedges (16 positive and negative pairs)

Item # 36-SKT

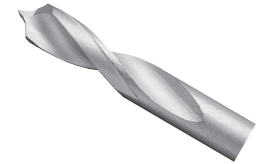
\* Concept and design: Alan Cross, DVM, DACVS – BluePearl Georgia  
Product refinement: Derek Fox, DVM, DACVS – University of Missouri

## Drill Bits

### StickTite™ Drill Bits

These premium drill bits feature a special point geometry designed to engage the periosteum and prevent drill bits from “walking” or skidding at the beginning of the drilling process. StickTite™ point geometry is especially beneficial when hole placement is critical and with freehand drilling applications. Compared to other drill bits, StickTite™ bits are much easier to start and drill accurately when not drilling perpendicular to the bone.

StickTite™ drill bits are **designed to drill with minimal forward pressure** and if forced into the opposite bone wall, they will engage rapidly with potential for damage to the bit. The sharp cutting geometry will also attempt to cut or grab when hitting screws or pins – resulting in damaged drill bits. If hitting a pin or screw is likely, standard ESF drill bits should be used. Hardened stainless steel.



Item #	Diameter	Length	Item #	Diameter	Length
32020	2.0mm	120mm	32031	3.1mm	150mm
32023	2.3mm	125mm	32035	3.5mm	160mm
32025	2.5mm	135mm	32039	3.9mm	165mm
32027	2.7mm	140mm	32062	6.2mm	180mm

### Standard ESF Drill Bits

ESF drill bits tolerate inadvertent contact with implants better than StickTite™ drill bits. Hardened stainless steel.

Item #	Diameter	Length	Item #	Diameter	Length
33011	1.1mm	75mm	33039	3.9mm	160mm
33015	1.5mm	85mm	33047	4.7mm	170mm
33023	2.3mm	130mm	33060	6.0mm	180mm
33031	3.1mm	150mm			



### VetKISS® Drill Bits

Each IMEX® VetKISS® screw has an optimal pilot hole diameter. Available in 0.8mm, 1.15mm, and 1.3mm diameters.

## Drill Sleeves

### ESF Drill Sleeves

Designed for through-the-clamp pre-drilling with SK® single clamps, but can be an effective drill sleeve for a variety of applications.

Item #	Description	Drill Bit	SK® Clamp
<b>34015</b>	1.5mm Drill Sleeve	1.5mm	Mini
<b>34020</b>	2.0mm Drill Sleeve	2.0mm	Mini and Small
<b>34023</b>	2.3mm Drill Sleeve	2.3mm	Small
<b>34027</b>	2.7mm Drill Sleeve	2.7mm	Small
<b>34031</b>	3.1mm Drill Sleeve	3.1mm	Small or Large
<b>34035</b>	3.5mm Drill Sleeve	3.5mm	Large
<b>34039</b>	3.9mm Drill Sleeve	3.9mm	Large





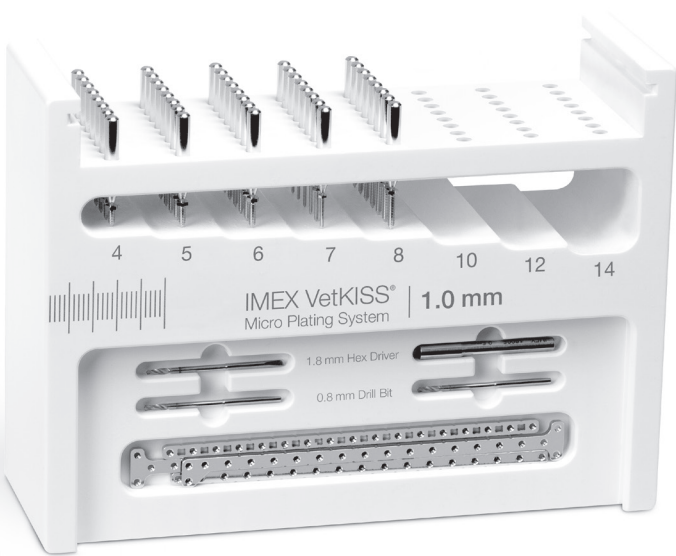
# VetKISS<sup>®</sup> Micro Plating System

Keep It Simple Surgeon | Smallest, clinically tested veterinary locking plate system

The VetKISS<sup>®</sup> micro plating system represents the world’s smallest, clinically tested veterinary locking plate system. The KISS approach (Keep It Simple Surgeon) defined the development of this user-friendly and cost-effective osteosynthesis system. VetKISS<sup>®</sup> is appropriate for a variety of feline, toy breed, and exotic patients, as well as metacarpal and metatarsal fractures in larger patients.

Developed in conjunction with Switzerland based RISystem, AG, the world leader in micro implants for research. Refined with feedback from IMEX’s beta users.

- Available in 3 sizes: 1.0mm, 1.4mm, and 1.6mm
- Symmetrical design allows for use as a left- or right-handed plate
- Cut-to-length plates minimize inventory requirements
- Common instrumentation across all sets reduces capital cost



## X-Plates

VetKISS<sup>®</sup> X-plates are reconstruction plates and contourable in the second plane (side to side). While easily contoured, this plate is less strong than the corresponding size rigid plate (R-plate) and **should be avoided in mechanically demanding situations**. When contouring the X-plate, bends will naturally occur at the “X” protecting screw hole integrity. 316LVM stainless steel.

Item #	Description	Width x Length	Thickness	Screw Diameter
70-3101X	1.0mm X-plate, Straight	2.6mm x 50mm	1.0mm	1.0mm
70-3141X	1.4mm X-plate, Straight	3.0mm x 73mm	1.2mm	1.4mm
70-3161X	1.6mm X-plate, Straight	3.0mm x 83mm	1.5mm	1.6mm
70-3102X	1.0mm X-plate, TL	2.6mm x 50mm	1.0mm	1.0mm
70-3142X	1.4mm X-plate, TL	3.0mm x 75mm	1.2mm	1.4mm
70-3162X	1.6mm X-plate, TL	3.0mm x 85mm	1.5mm	1.6mm



Actual Size: 1.0mm X-plate, Straight



Actual Size: 1.6mm X-plate, TL

# VetKISS® Plates

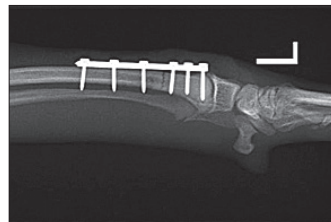
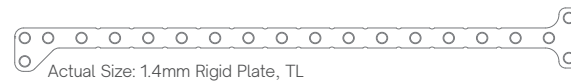
## Rigid Plates

The most commonly used VetKISS® plates, R-plates (rigid plates) should be used in most long bone fracture scenarios and are not designed to be contoured from side to side. When contouring R-plates one should use two forceps and direct the contour between screw holes as to avoid potential screw hole damage.

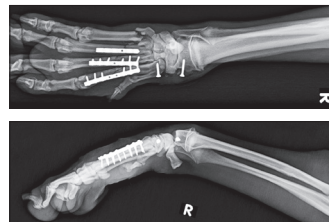
These cut-to-length plates are available in two options: straight and shaped. The shaped plate features a “T” and an “L” on opposite ends allowing the surgeon to choose appropriate plate geometry while minimizing inventory. Symmetrical design allows for use as a left- or right-handed plate. 316LVM stainless steel.



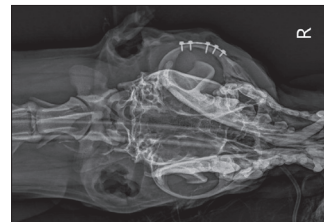
Item #	Description	Width x Length	Thickness	Screw Diameter
<b>70-3101R</b>	1.0mm Rigid Plate, Straight	2.6mm x 50mm	1.0mm	1.0mm
<b>70-3141R</b>	1.4mm Rigid Plate, Straight	3.0mm x 73mm	1.2mm	1.4mm
<b>70-3161R</b>	1.6mm Rigid Plate, Straight	3.0mm x 83mm	1.5mm	1.6mm
<b>70-3102R</b>	1.0mm Rigid Plate, TL	2.6mm x 50mm	1.0mm	1.0mm
<b>70-3142R</b>	1.4mm Rigid Plate, TL	3.0mm x 75mm	1.2mm	1.4mm
<b>70-3162R</b>	1.6mm Rigid Plate, TL	3.0mm x 85mm	1.5mm	1.6mm



Chihuahua, 1.6 kg  
1.4mm Rigid Plate, Straight



Boxer, 17 kg  
1.4mm Rigid Plate, Straight



Terrier Cross, 12 kg  
1.0mm X-Plate, Straight

# VetKISS® Screws and Drill Bits

## Screws

VetKISS® screws share a common 3.0mm shaft that utilizes a single, precision driver across all screw diameters (1.0, 1.4, and 1.6mm). Once locked, VetKISS® screws should be rocked to and fro along the long axis of the plate as to remove shafts leaving the hex screw head in place. Screws can be removed using the appropriately sized hex driver. Most surgeons will install three or more screws to maintain reduction and stability before removing screw shafts. 316LVM stainless steel.



Ø 1.0mm Screws		Ø 1.4mm Screws		Ø 1.6mm Screws	
Item #	Length	Item #	Length	Item #	Length
70-1004	4mm	70-1404	4mm	70-1604	4mm
70-1005	5mm	70-1405	5mm	70-1605	5mm
70-1006	6mm	70-1406	6mm	70-1606	6mm
70-1007	7mm	70-1407	7mm	70-1607	7mm
70-1008	8mm	70-1408	8mm	70-1608	8mm
70-1010	10 mm	70-1410	10 mm	70-1610	10 mm
		70-1412	12 mm	70-1612	12 mm
Required		Required		Required	
1.8mm hex driver		2.5mm hex driver		2.5mm hex driver	
0.8mm drill bit		1.15mm drill bit		1.3mm drill bit	

## 1.5mm Shaft Drill Bits

VetKISS® 1.5mm shaft diameter drill bits feature a tapered quick connector for use with the Micro Drill. These drill bits can also be used in a 3-jaw chuck. Hardened tool steel and titanium nitride coated. **Not included in implant starter kits.**

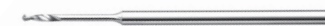
Item #	Diameter	Shaft	Length	Max Depth
70-4080	0.8mm	1.5mm	30mm	14mm
70-4115	1.15mm	1.5mm	30mm	16mm
70-4130	1.3mm	1.5mm	30mm	18mm



## 2.35mm Shaft Drill Bits

VetKISS® 2.35mm shaft diameter drill bits are designed for use with pneumatic drills/burrs (Hall Air Drill, Brassler BSP, and other 2.35mm shaft compatible drills). These drill bits can also be used in a 3-jaw chuck. Hardened stainless steel. **Not included in implant starter kits.**

Item #	Diameter	Shaft	Length	Max Depth
70-4080P	0.8mm	2.35mm	50mm	18mm
70-4115P	1.15mm	2.35mm	53mm	18mm
70-4130P	1.3mm	2.35mm	56mm	18mm



## VetKISS® Instrumentation

ITEM #	DESCRIPTION
70-5018	1.8mm Hex Driver
70-5025	2.5mm Hex Driver
	Hex drivers feature a 3mm shaft and like VetKISS® screws couple with the finger converting the screwdriver into a hex driver for screw removal. Alternatively, if a screw shaft breaks off prematurely, the hex driver and finger driver can be used to complete screw insertion or alternatively screw removal and replacement. <b>Included in implant starter sets.</b> Stainless Steel.
	1.8mm hex driver: 1.0mm screws 2.5mm hex driver: 1.4mm and 1.6mm screws
70-6002	Finger Driver
	The VetKISS® equivalent of screwdrivers, finger drivers are short and lightweight providing watchmaker's precision feel when applying screws. <b>Not included in implant starter sets.</b> Stainless steel.
70-6004	Depth Gauge
	Small and lightweight as not to damage bone. This unique depth gauge functions with all 3 implant sets and allows accurate depth measurement even through 0.8mm holes. <b>Not included in implant starter sets.</b> Stainless steel and PEEK. Max depth: 16mm.
70-6005	Micro Drill
	This battery powered, autoclavable drill provides fingertip precision for accurate hole placement. A tapered quick connect mechanism supports easy insertion and removal of VetKISS® 1.5mm shaft drill bits. Readily available CR123A photo batteries (3 required) not included. Remove batteries prior to sterilization.
	In hard bone of mature patients, the Micro Drill can be power limited requiring repeated pecking motions resulting in prolonged drilling times. Consider pneumatic drills (i.e., Hall Air Drill, Brasseler BSP, and others) compatible with 2.35mm shaft drill bits in these applications to simplify pre-drilling.



## VetKISS® Instrumentation and Implant Caddies

ITEM #	DESCRIPTION
70-6001	<b>Multifunction Plier</b> Used to contour or shape VetKISS® plates as desired.
70-6003	<b>Plate Cutter</b> Used to cut VetKISS® plates to desired length. 1.6mm rigid plates would benefit from larger plate cutters. Stainless steel.



### Implant Caddies

VetKISS® implant caddies allow for easy storage and retrieval of screws, plates, drill bits and hex drivers. Both durable and functional, these implant caddies make for simple storage and reorder of VetKISS® components. Implant caddies are designed to lay with the screws in a horizontal position during surgery to provide easy access to contents. Caddy base constructed from autoclavable polypropylene with translucent radel lids. **Included with implant starter kits.**

Item #	Description
70-7010	Implant Caddy for 1.0mm VetKISS® Set
70-7014	Implant Caddy for 1.4mm VetKISS® Set
70-7016	Implant Caddy for 1.6mm VetKISS® Set



## VetKISS® Starter Sets

VetKISS® starter sets contain an assortment of screw lengths, plates and an appropriate hex driver in an autoclavable caddy. Tiered design provides a quick and easy method for sorting screw lengths. Available in 1.0, 1.4, and 1.6mm sets. **Drill bits (3 recommended), finger driver (2 recommended), and depth gauge not included.**

### Ø 1.0mm Starter Set

Item # 70-0010

Quantity	Item #	Description
8	<b>70-1004</b>	1.0 x 4mm Screws
8	<b>70-1005</b>	1.0 x 5mm Screws
8	<b>70-1006</b>	1.0 x 6mm Screws
8	<b>70-1007</b>	1.0 x 7mm Screws
8	<b>70-1008</b>	1.0 x 8mm Screws
8	<b>70-1010</b>	1.0 x 10mm Screws
2	<b>70-3101R</b>	1.0mm Rigid Plate, Straight
2	<b>70-3102R</b>	1.0mm Rigid Plate, TL
1	<b>70-5018</b>	1.8mm Hex Driver
1	<b>70-7010</b>	1.0mm Implant Caddy

#### Required (not included)

Item # 70-4080 - 0.8mm / 1.5mm Shaft Drill Bit **or**  
 Item # 70-4080P - 0.8mm / 2.35mm Shaft  
 Item # 70-6002 - Finger Driver  
 Item # 70-6004 - Depth Gauge

### Ø 1.4mm Starter Set

Item # 70-0014

Quantity	Item #	Description
8	<b>70-1404</b>	1.4 x 4mm Screws
8	<b>70-1405</b>	1.4 x 5mm Screws
8	<b>70-1406</b>	1.4 x 6mm Screws
8	<b>70-1407</b>	1.4 x 7mm Screws
8	<b>70-1408</b>	1.4 x 8mm Screws
8	<b>70-1410</b>	1.4 x 10mm Screws
8	<b>70-1412</b>	1.4 x 12mm Screws
2	<b>70-3141R</b>	1.4mm Rigid Plate, Straight
2	<b>70-3142R</b>	1.4mm Rigid Plate, TL
1	<b>70-5025</b>	2.5mm Hex Driver
1	<b>70-7014</b>	1.4mm Implant Caddy

#### Required (not included)

Item # 70-4115 - 1.15mm / 1.5mm Shaft Drill Bit **or**  
 Item # 70-4115P - 1.15mm / 2.35mm Shaft  
 Item # 70-6002 - Finger Driver  
 Item # 70-6004 - Depth Gauge

### Ø 1.6mm Starter Set

Item # 70-0016

Quantity	Item #	Description
8	<b>70-1604</b>	1.6 x 4mm Screws
8	<b>70-1605</b>	1.6 x 5mm Screws
8	<b>70-1606</b>	1.6 x 6mm Screws
8	<b>70-1607</b>	1.6 x 7mm Screws
8	<b>70-1608</b>	1.6 x 8mm Screws
8	<b>70-1610</b>	1.6 x 10mm Screws
8	<b>70-1612</b>	1.6 x 12mm Screws
8	<b>70-1614</b>	1.6 x 14mm Screws
2	<b>70-3161R</b>	1.6mm Rigid Plate, Straight
2	<b>70-3162R</b>	1.6mm Rigid Plate, TL
1	<b>70-5025</b>	2.5mm Hex Driver
1	<b>70-7016</b>	1.6mm Implant Caddy

#### Required (not included)

Item # 70-4130 - 1.3mm / 1.5mm Shaft Drill Bit **or**  
 Item # 70-4130P - 1.3mm / 2.35mm Shaft  
 Item # 70-6002 - Finger Driver  
 Item # 70-6004 - Depth Gauge

## Intramedullary (Steinmann) Pins

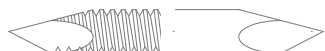
### Trocar/Trocar Smooth

Pins feature a trocar point on each end of a smooth pin. 316LVM stainless steel.



### Trocar/Trocar Partial Thread

Pins feature a trocar point on both ends with one end including approximately 25mm of threaded length. 316LVM stainless steel.



Smooth Item #	Partial Thread Item #	Diameter x Length	Inch Equivalent
<b>10116</b>	<b>11116</b>	1.6mm x 230mm	1/16" x 9"
<b>10564</b>	<b>11564</b>	2.0mm x 230mm	5/64" x 9"
<b>10332</b>	<b>11332</b>	2.4mm x 230mm	3/32" x 9"
<b>10764</b>	<b>11764</b>	2.8mm x 230mm	7/64" x 9"
<b>10180</b>	<b>11180</b>	3.2mm x 230mm	1/8" x 9"
<b>1018L*</b>	—	3.2mm x 305mm	1/8" x 12"
<b>10964</b>	<b>11964</b>	3.5mm x 230mm	9/64" x 9"
<b>10532</b>	<b>11532</b>	4.0mm x 230mm	5/32" x 9"
<b>1053L*</b>	—	4.0mm x 305mm	5/32" x 12"
<b>1031S</b>	—	4.8mm x 230mm	3/16" x 9"
<b>10316</b>	<b>11316</b>	4.8mm x 305mm	3/16" x 12"
<b>1014S</b>	—	6.3mm x 230mm	1/4" x 9"
<b>10140</b>	<b>11140</b>	6.3mm x 305mm	1/4" x 12"

\*1018L and 1053L "long" versions are commonly utilized as a tie-in with external skeletal fixators.

## Intramedullary (Steinmann) Pin Starter Kits

IM pin kits contain an assortment of standard size K-wires and IM pins in an autoclavable cloth bag with labeled pockets for the various sizes. Available in smooth and partial thread.

### Smooth IM Pin Starter Kit with IM Pin Bag

Item # 10SKT

Quantity	Item #	Description
6	<b>00035</b>	.035" x 6" K-wire
6	<b>00045</b>	.045" x 6" K-wire
6	<b>00062</b>	.062" x 6" K-wire
2	<b>10116</b>	1/16" x 9" IM Pin, Smooth
2	<b>10564</b>	5/64" x 9" IM Pin, Smooth
2	<b>10332</b>	3/32" x 9" IM Pin, Smooth
2	<b>10764</b>	7/64" x 9" IM Pin, Smooth
2	<b>10180</b>	1/8" x 9" IM Pin, Smooth
2	<b>10964</b>	9/64" x 9" IM Pin, Smooth
2	<b>10532</b>	5/32" x 9" IM Pin, Smooth
2	<b>10316</b>	3/16" x 12" IM Pin, Smooth
2	<b>10140</b>	1/4" x 12" IM Pin, Smooth
1	<b>30005</b>	Cloth IM Pin Bag, Autoclavable

### Partial Thread IM Pin Starter Kit with IM Pin Bag

Item # 11SKT

Quantity	Item #	Description
6	<b>00035</b>	.035" x 6" K-wire
6	<b>00045</b>	.045" x 6" K-wire
6	<b>00062</b>	.062" x 6" K-wire
2	<b>11116</b>	1/16" x 9" IM Pin, Partial Thread
2	<b>11564</b>	5/64" x 9" IM Pin, Partial Thread
2	<b>11332</b>	3/32" x 9" IM Pin, Partial Thread
2	<b>11764</b>	7/64" x 9" IM Pin, Partial Thread
2	<b>11180</b>	1/8" x 9" IM Pin, Partial Thread
2	<b>11964</b>	9/64" x 9" IM Pin, Partial Thread
2	<b>11532</b>	5/32" x 9" IM Pin, Partial Thread
2	<b>11316</b>	3/16" x 12" IM Pin, Partial Thread
2	<b>11140</b>	1/4" x 12" IM Pin, Partial Thread
1	<b>30005</b>	Cloth IM Pin Bag, Autoclavable



## K-Wire and Miniature Stick-Pins

### K-Wire



Trocar points on each end of a small diameter smooth pin. 6" or 9" lengths, except 0.028" x 5". Six wires per package. 316LVM stainless steel.

Item #	Diameter x Length	Inch Equivalent
<b>00028</b>	0.7mm x 125mm	0.028" x 5"
<b>00035</b>	0.9mm x 150mm	0.035" x 6"
<b>00045</b>	1.1mm x 150mm	0.045" x 6"
<b>00062</b>	1.6mm x 150mm	0.062" x 6"
<b>01035</b>	0.9mm x 230mm	0.035" x 9"
<b>01045</b>	1.1mm x 230mm	0.045" x 9"
<b>01054</b>	1.4mm x 230mm	0.054" x 9"
<b>01062</b>	1.6mm x 230mm	0.062" x 9"

### K-Wire Benders



Available in two sizes and manufactured from hardened stainless steel, the K-wire bender allows repeatable and accurate bending of common K-wire diameters from 0.7mm to 1.6mm (0.028" to 0.062"). Rounded ends assist in creating a smooth, uniform bend at the desired angle and location. Commonly used with tibial tuberosity transposition, fracture/osteotomy of the greater trochanter, and fracture/osteotomy of the olecranon.

Item #	Description	Accepted Diameters	Inch Equivalent
<b>30015</b>	Small K-wire Bender	0.7mm – 1.1mm	0.028" – 0.045"
<b>30016</b>	Large K-wire Bender	1.4mm – 1.6mm	0.054" – 0.062"

### Miniature Stick-Pins



Frequently utilized as short, partially threaded Kirschner wires. Common clinical applications include tibial crest translocations, capital physeal fractures, and avulsion fractures/osteotomy of the greater trochanter. These partially threaded pins feature a trocar point on each end and are regularly used in combination with cerclage and tension band applications. Originally based on miniature Interface® half-pins and positive-profile thread design. Implant Quality 316LVM Stainless Steel.

Item #	Recommended Drill Bit	Shaft / Thread Diameter	Inch Equivalent	Thread Length	Total Length	Pins per Pack
<b>06035</b>	0.8mm	0.9mm / 1.1mm	0.035" / 0.045"	12mm	75mm	6
<b>06045</b>	1.1mm	1.1mm / 1.4mm	0.045" / 0.056"	12mm	75mm	6
<b>06062</b>	1.5mm	1.6mm / 1.9mm	0.062" / 0.075"	12mm	75mm	6
<b>06078</b>	1.8mm	2.0mm / 2.3mm	5/64" / 0.091"	15mm	75mm	6



Trocar

## Orthopedic (Cerclage) Wire

### Orthopedic (Cerclage) Wire

Rolled orthopedic wire for cerclage application. Available on non-wicking, plastic, autoclavable spools or free-rolled without autoclavable spools. Free-rolls provide a better value and lay flat in surgery packs. Wire on autoclavable spools can be easier to identify and handle. 316LVM stainless steel.

Item #	Diameter	Style	Approx. Length
<b>04016</b>	1.2mm (16 gauge)	Spool	3 meters
<b>04018</b>	1.0mm (18 gauge)	Spool	4 1/4 meters
<b>04020</b>	0.8mm (20 gauge)	Spool	6 1/2 meters
<b>04022</b>	0.6mm (22 gauge)	Spool	10 meters
<b>05016</b>	1.2mm (16 gauge)	Free Roll	10 meters
<b>05018</b>	1.0mm (18 gauge)	Free Roll	10 meters
<b>05020</b>	0.8mm (20 gauge)	Free Roll	10 meters
<b>05022</b>	0.6mm (22 gauge)	Free Roll	10 meters



## Pin and Wire Accessories

ITEM #	DESCRIPTION
30001	3/8-24 Extended Chuck and Key
31001	1/2-20 Extended Chuck and Key Cannulated, stainless power drill adapter and key. Available in a 3/8" or 1/2" option with dimensions based on the diameter of the cordless drill's threaded shaft. Remove the factory chuck to determine the appropriate drill extension. Holds 0.5 to 7.0mm diameters.
30002	Hand Chuck with Key and Extension Tube Cannulated, stainless Jacobs chuck on anodized, knurled handle. Will hold from 0.5 to 7.0mm diameters. Extension provides hand protection when placing long pins. Stainless key included.
30003	Stainless Steel Replacement Key for 7.0mm Jacobs Chuck Fits 7.0mm Jacobs chuck on extended chucks used with power surgery drill (Item #s 30001 and 31001) and hand chuck (Item # 30002).
30008	Mini Hand Chuck This hand-held pin driver is very useful for K-wires and very small IM pins. Provides fingertip precision and control when placing K-wires from 0.7mm to 2.0mm (0.028" to 5/64"). Keyless.



## Pin and Wire Accessories

ITEM #

DESCRIPTION

30010

### Power Surgery Drill with Extended Chuck and Key

This variable speed Bosch drill includes an extended chuck (Item # 31001), stainless chuck key (Item # 30003), external charger and two lithium ion battery packs. The extra battery can safely remain on the charger. **Drill and batteries are not autoclavable.** Commonly used with an autoclavable drill shroud (Item # 30006).



30005

### IM Pin Organizer Bag

Autoclavable cloth bag with labeled pockets for the various sizes of IM pins and K-wires. Double reinforced bottom fold. Sold separately or included with purchase of IM pin starter kits.



30006

### Cloth Drill Shroud

Autoclavable cloth shroud utilized with power drill adapter to provide a sterile field when using a non-sterile drill. Fits IMEX® surgery drill and a variety of smaller hardware store drills. Not suitable for larger drills with expanded handles.



30009

### IM Pin Gauge / Scale

Accurately measure lengths and gauge diameters of K-wires, ESF pins, drill bits and IM pins in metric or inch. Gauge holes range from 0.9mm (0.035") to 6.3mm (1/4") for pins and wires with a dedicated section available for sizing common external fixation and plating drill bit diameters (1.1mm to 4.7mm). Stainless Steel



## Pin and Wire Accessories

### Pin Caps

Autoclavable pin caps for protecting IM pin and ESF pin points during sterilization and storage. Also covers cut ends of external fixation pins, protecting owners and patients during bandage changes. Approximately 50 per pack.

Item #	Accepted Pin Sizes
<b>Capblack</b>	2.0mm
<b>Capwhite</b>	2.4mm and 2.8mm
<b>Capblue</b>	3.2mm and 3.5mm
<b>Capgray</b>	4.0mm and 4.8mm



### K-Wire Benders

Available in two sizes and manufactured from hardened stainless steel, the K-wire bender allows repeatable and accurate bending of common K-wire diameters from 0.7mm to 1.6mm (0.028" to 0.062"). Rounded ends assist in creating a smooth, uniform bend at the desired angle and location. Commonly used with tibial tuberosity transposition, fracture/osteotomy of the greater trochanter, and fracture/osteotomy of the olecranon.

Item #	Description	Accepted Diameters	Inch Equivalent
<b>30015</b>	Small K-wire Bender	0.7mm – 1.1mm	0.028" – 0.045"
<b>30016</b>	Large K-wire Bender	1.4mm – 1.6mm	0.054" – 0.062"



# Suture Anchors

Often termed tissue anchors or bone anchors, these implants are practical alternatives to bone tunnels, screw-washer combinations, and other methods of attaching soft tissue to bone. Anchors are easy to use in locations where bone tunnels are not readily placed and represent a smaller profile than screw/washer combinations. Developed in conjunction with several referral surgical facilities, these anchors and related suture materials should be considered temporary fixation devices that allow tissue to heal to its original location, protect primary soft tissue repairs during the early phases of healing, or facilitate the formation of fibrous tissue to assist in maintaining joint stability. Suture anchors are threaded implants designed to maximize implant/bone interface by being screwed into bone. Pre-drilling is required; however, the anchors are self-tapping.

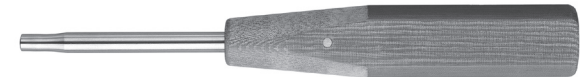
The 4.0mm and 4.7mm suture anchor's square drive-head with cross-hole is approximately 2.0mm in height. 2.7mm anchors have an elliptical head approximately 2.4mm in height. The driver for the 2.7mm anchor is slotted to allow preloaded suture prior to application.

## Suture Anchors

Suture anchors are screwed into bone to act as insertion points for sutures used in reconstruction of ligaments, joint capsules and tendons.

- 2.7mm anchors accept most brands of 60 lb. nylon leader and #2 suture
- 4.0mm anchors accept most brands of 60 lb. nylon leader and #2 suture
- 4.7mm anchors accept most brands of 80 lb. nylon leader and #5 suture

Many other suture types and sizes are frequently used depending on the surgeon's preference.



## Suture Anchor Drivers

A durable design to withstand many anchor applications.

Item #	Description	Head/Driver Style
<b>61-27-DR</b>	2.7mm Driver	Elliptical
<b>61-40-DR</b>	4.0mm Driver	Square
<b>61-47-DR</b>	4.0mm Driver	Square

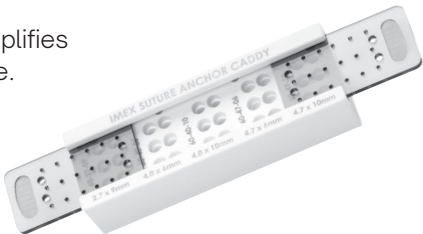
Item #	Diameter	Thread Length	Hole Dimension	Recommended Drill Bit	Head/Driver Style
<b>60-27-09</b>	2.7mm	9mm	1.3mm	1.5mm	Elliptical
<b>60-40-06</b>	4.0mm	6mm	1.1mm	2.7mm	Square
<b>60-40-10</b>	4.0mm	10mm	1.1mm	2.7mm	Square
<b>60-47-06</b>	4.7mm	6mm	1.3mm	3.5mm	Square
<b>60-47-10</b>	4.7mm	10mm	1.3mm	3.5mm	Square

# Suture Anchor Caddy and Starter Kit

## Suture Anchor Caddy

Item # 61-CA-DD

Anchor caddy is labeled with anchor dimensions and item numbers to simplify inventory management. Caddy design simplifies anchor retrieval directly into self-retaining anchor driver. For use with 2.7mm, 4.0mm and 4.7mm anchors. Autoclavable.



## Suture Anchor Starter Kit

Item # 60-00-00

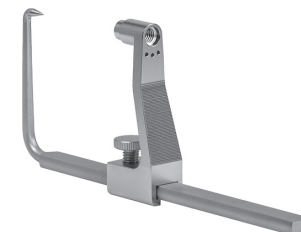
Qty	Item #	Description
3	60-27-09	2.7mm x 9mm Anchor
3	60-40-06	4.0mm x 6mm Anchor
3	60-40-10	4.0mm x 10mm Anchor
3	60-47-06	4.7mm x 6mm Anchor
3	60-47-10	4.7mm x 10mm Anchor
1	61-CA-DD	Anchor Caddy
1	61-27-DR	2.7mm Anchor Driver
1	61-40-DR	4.0mm Anchor Driver
1	61-47-DR	4.7mm Anchor Driver
1	33015	1.5mm ESF Drill Bit
1	32027	2.7mm StickTite™ Drill Bit
1	32035	3.5mm StickTite™ Drill Bit

# Universal Aiming Device, Drill Guides and Toggle Pins

## Universal Aiming Device

### Item # 50000

A high quality, adjustable aiming device for pre-drilling and pin placement. While commonly used for coxofemoral luxation repair with the toggle pin method, this instrument can also be used for many other applications including: lag screw repair of condylar fractures, placement of calcaneo-tibial screws for repair of Achilles tendons, and lag screw fixation of femoral neck fractures. A variety of screw-in-place drill guides are available to support many drill bit diameters.



## Drill Guides for Universal Aiming Device

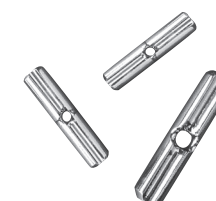
Screw-in-place drill guides are easily interchanged. Nine drill guide diameters are available and can be purchased independently as needed.

Item #	Drill Bit Diameter	Item #	Drill Bit Diameter
<b>50016</b>	1.6mm	<b>50031</b>	3.1mm
<b>50020</b>	2.0mm	<b>50035</b>	3.5mm
<b>50023</b>	2.3mm	<b>50039</b>	3.9mm
<b>50025</b>	2.5mm	<b>50045</b>	4.5mm
<b>50027</b>	2.7mm		



## Toggle Pins

Toggle pins are placed medial to the acetabular wall to anchor suture. The cross-hole sizes are compatible with most commonly used sizes of monofilament suture material. Depending on the size of suture used, the required acetabular wall drill bit may be approximately the same size as the toggle pin or up to 1-2 millimeters larger (to allow for large suture). The blunt end of a suture passer can be used to assist with final passage of the toggle pin through the acetabular wall. Femoral neck drill bit diameter should not risk mechanical or biologic damage to the femoral neck. Implant quality stainless steel.



Item #	Diameter	Length	Cross-hole	Accepted Suture
<b>55027</b>	2.7mm	10mm	1.1mm	40 lb and #2
<b>55032</b>	3.2mm	14mm	1.1mm	60 lb and #2
<b>55040</b>	4.0mm	18mm	1.9mm	80 lb and #5



# Suture Buttons, Suture Passer and Coxofemoral Luxation Starter Kit

## Polypropylene Suture Button

Item # 55100S

These two-hole suture buttons are used at the lateral femur to simplify suture tie-off when performing the toggle pin method of coxofemoral reduction. The 2.0mm hole diameter can accommodate virtually all large suture materials. Approximately 6.5mm x 14mm. Pre-packaged sterile.



## Titanium Suture Button

Item # 55200

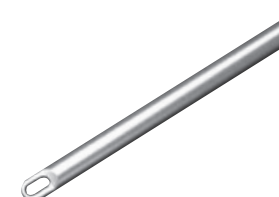
Two-hole titanium suture buttons, like polypropylene suture buttons, are used at the lateral femur to simplify suture tie-off with the toggle pin method of hip luxation repair and find additional uses in other surgical procedures. The paired 1.7mm holes will accommodate virtually all suture material choices. Approximately 3.2mm x 10mm.



## Suture Passer

Item # 55000

Similar to a large sewing needle with an eye, this suture passer is designed to be a very economical method of pulling suture down the femoral neck. The passer diameter is 3.2mm and with suture included, it is necessary to utilize a 3.5mm drill bit. This instrument is most useful when utilizing soft pliable suture material, while stiffer monofilament materials are usually pushed through the femoral hole by hand. The blunt end is also utilized to “pop” the toggle pin through the acetabular wall. With smaller patients and femoral neck tunnels less than 3.5mm, use cerclage wire to pull suture.



## Coxofemoral Luxation Starter Kit

Item # 55SKT

Qty	Item #	Description	Qty	Item #	Description
1	<b>50000</b>	Universal Aiming Device	3	<b>55200</b>	Titanium Suture Button
1	<b>50035</b>	3.5mm Universal Aiming Device Drill Guide	1	<b>32035</b>	3.5mm StickTite™ Drill Bit
1	<b>55000</b>	3.2mm Suture Passer	1	<b>32039</b>	3.9mm StickTite™ Drill Bit
3	<b>55100S</b>	Polypropylene Suture Button	6	<b>55032</b>	3.2mm Toggle Pin

# The Toggle Pin Method of Coxofemoral Luxation Repair

There are a number of popular surgical methods for maintaining reduction of coxofemoral luxations - use of the toggle pin method, ilio-femoral sutures to limit external rotation of the hip, and caudo-distal transposition of the greater trochanter. Each of these methods depends on the joint capsule and associated muscles for acute stability, and especially for long-term stability. If the joint capsule is severely traumatized and not conducive to primary repair, some surgeons elect to perform a capsulorrhaphy or dorsal suture augmentation of the joint capsule. With any surgical method for stabilization of hip luxations, it is important to remember that the use of sutures and anchors must be considered temporary solutions until the joint capsule and periarticular soft tissue can heal. As such, patients with poor hip conformation are not good candidates for these methods of repair and should be considered for Total Hip Replacement or salvage procedures, such as FHNE.

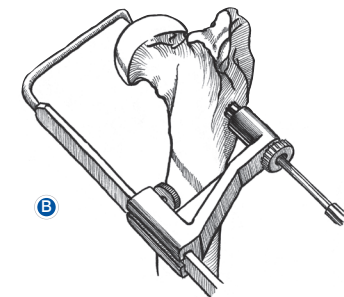
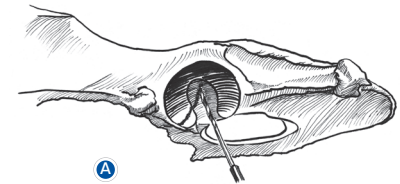
The toggle pin method of maintenance of coxofemoral luxations has been around many years. Commercially available toggle pins, suture buttons, and the IMEX® universal aiming device have simplified the method and increased its popularity. This method places a strand (or multiple strands) of suture material in a location that mimics the normal origin and insertion of the round ligament of the femoral head, which is torn when the hip is traumatically luxated. This anatomic positioning of suture material is relatively straightforward and visually demarcated in the hip, and is perhaps partially responsible for the logic and popularity of the method.

Different suture material and sizes are used based on the surgeon's preference. IMEX® customers use both monofilament and braided suture material. Braided material is popular with customers who desire strength and knot security and tends to bend acutely around anchors or toggles better than monofilament suture material. Typical sizes include #2 and #5. Monofilaments are popular with customers who desire a relatively inert material.

## Surgical Procedure

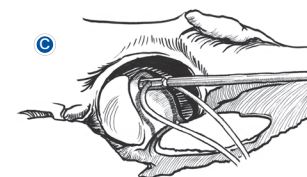
**A** This method of repair is best accomplished through a craniolateral approach to the hip with caudal retraction of the femur to allow for complete visualization, exploration, and appropriate debridement of the acetabulum. After debridement of impinging tissue, clot, and remaining round ligament, a hole is drilled completely through the medial wall of the acetabulum centered in the acetabular fossa. Use of a hand-held drill sleeve will simplify drilling while protecting the femoral head. The diameter of the hole must be large enough for the toggle pin and suture combination chosen. **A 3.2mm toggle pin will require at minimum a 3.5mm hole.** However, a 3.9mm hole or larger is often needed if using heavy monofilament line. For the 4.0mm toggle pin, a 4.5mm to 5.5mm drill bit is recommended. The toggle pin-suture combination should be easily inserted through the acetabular drill hole. If difficulty is encountered, the acetabular hole may be enlarged with a larger drill bit.

**B** The aiming device is used to drill a femoral neck tunnel for the suture. The aiming device is placed so the tunnel is drilled from the subtrochanteric area of the lateral femur to the fovea capitis of the femoral head. It is helpful to have a surgical assistant at this time. The 3.5mm drill bit is the most common drill bit utilized in medium to large dogs and also the minimum hole diameter used with the suture passer. When drilling of the femoral tunnel is nearly complete, it is advisable to remove the aiming device and complete the drill hole by hand. This eliminates potential damage to the drill bit. 2.0mm and 2.7mm tunnels should be used in smaller patients.

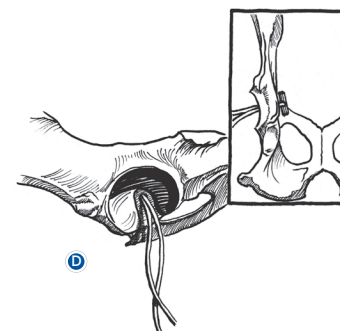


## The Toggle Pin Method of Coxofemoral Luxation Repair

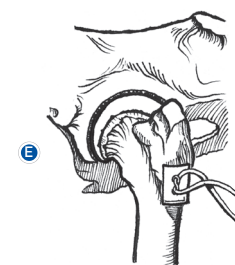
Ⓒ The suture used for repair is passed once through the hole in the toggle pin creating a simple loop. The toggle pin is held at one end using large needle holders, Kelly forceps, or a similar instrument. The suture is pulled tight along the sides of the toggle pin so each strand seats within the toggle pin grooves. The toggle pin is then visually started into the acetabular drill hole and inserted as far as the instrument will allow. The instrument is removed, and the blunt end of the suture passer or drill bit is used to push the toggle pin completely through the acetabular drill hole. If this step seems to require excess force, it is likely that the acetabular drill hole is not large enough to accommodate the diameter of the toggle pin and suture combination used.



Ⓓ The ends of the suture are spread and tensioned to pull the toggle pin tight against the medial wall of the acetabulum. The toggle pin is tested for secure seating within the pelvic canal. The suture is then pushed or pulled through the femoral canal to exit the lateral femur and tensioned while the femoral head is reduced into the acetabulum.



Ⓔ Appropriate reduction is verified and the ends of the suture are tied over another toggle pin or a suture button as shown in figure E. Alternatively, another small bone tunnel can be drilled in the lateral aspect of the femur to allow one of the suture strands to be passed through and then tied to the opposite strand. The hip should be appropriately reduced and firmly seated; however, do not over tighten the suture by placing excess tension on it. This will adversely effect hip joint range of motion and will cause the suture to fail prematurely.



## Spiked Bone Washers

### Spiked Bone Washers

Most commonly used for re-attaching avulsed soft tissue to bone. The 6.0mm spiked bone washer functions with 2.0mm and 2.7mm bone screws. The 11mm spiked bone washer functions best with 3.5mm, 4.0mm cancellous, or 4.5mm bone screws and will function with some brands of 2.7mm bone screws. Implant quality stainless steel.

Item #	Diameter	Recommended Bone Screws
<b>56006</b>	6.0mm	2.0mm, 2.7mm
<b>56011</b>	11.0mm	3.5mm, 4.0mm, 4.5mm



